A PERSPECTIVE ON PRIORITIZATION IN PROJECT PORTFOLIO ENVIRONMENT

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A PERSPECTIVE ON PRIORITIZATION IN PROJECT PORTFOLIO ENVIRONMENT

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Abstract

The overbridging aspect of this interpretative master thesis is the implementation of a project prioritizing strategy. The concept is subdivided into three processes and entities, which could be seen as tools; project management office (PMO), project evaluation and project selection, which in turn are discussed separately. The thesis investigates how the tools impact the prioritizing strategy and why a company must follow a certain prioritizing strategy.

The primary focus has been an IS/IT department at a large Swedish industrial company. Results from interviews at the industrial company have been compared to current theory. In order to map best practice methods a benchmarking study has been conducted at an auto manufacturer, medical company and a telecom company.

When implementing a prioritizing strategy it is vital to have a project methodology in order to streamline the project management itself. Also, a PMO with a controlling objective should focus on the task of verifying project information quality and thus minimizing the information overflow to the decision makers. To continuously improve the project mythology and minimize the secondary failures, project should be evaluated.

Prioritizing process should not only be made in the project selection phase but continuously during portfolio life cycle by comparing project relevance to risk. A prioritizing strategy would not only highlight the most important projects in the organization, but also make sure that they also receive highest support. A vision for a well defined prioritizing strategy is having project that consume more resources for a shortened time frame instead of having projects consuming less resources but for a longer time frame.
Preface

We would like to thank our supervisor Joakim Lilliesköld, assistant professor at the Royal Institute of Technology, for helping us discuss project portfolio management issues and for guidance with direction of the master thesis. We would also like to thank the people who participated in the interviews as well as a special thanks to our supervisor at the industrial company who made this master thesis possible.

Henrik Eberhardt and David Lindblom

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1. Introduction

This chapter describes the background for this master thesis as well as specified limitations, question at issue and problems related to the study.

1.1 Background

Projects have been evolving in the direction of becoming one of the most important organizational structures for successful companies\textsuperscript{1}. Projects are considered to be a great solution for managing the increased product complexity, fast changing markets, cross-functional business expertise, customer-focused innovation as well as market and technological uncertainty\textsuperscript{2}. Projects can also be seen as integrating mechanisms, enabling cross-functional integration within different organizational parts of a company\textsuperscript{3}, which in turn make them ideal for implementing complex solutions and realizing goals.

Companies use project portfolios to organize individual projects in way that makes it possible to compare active projects, see resource- and project dependencies, and to create a managerial oversight of the on-going project portfolio\textsuperscript{4,5}. Strategies for portfolio management is also seen in literature as a key competence for companies handling many projects simultaneously\textsuperscript{6}.

Projects are not isolated islands, as sometimes described in project literature\textsuperscript{7}, but have many interdependencies, which complicates the areas that are closely related to project prioritization. Issues regarding project prioritization involve e.g. a process for selecting projects and a process for evaluating projects in order for keeping project knowledge in the organization and thus ensuring that the most important projects are executed.

1.2 Purpose

The primary purpose of this thesis is to evaluate how project prioritization is conducted within an IS/IT department in a large Swedish industrial company and how the usages of project prioritization techniques can be beneficial. Furthermore, the ambition is also to illuminate theory on why prioritization is important and discuss about the needs of a prioritization strategy.

\textsuperscript{1} Canonico, P & Söderlund, J., *Getting control of multi-project organizations: Combining contingent control mechanisms*
\textsuperscript{2} Hobday, M., *The project-based organisation: an ideal form for managing complex products and systems*
\textsuperscript{3} Engwall, M., *No project is an island: linking projects to history and context*
\textsuperscript{4} Ghasemzadeh, F. & Archer, N.P., *Project portfolio selection through decision support*
\textsuperscript{5} Laslo, Z., *Project portfolio management: An integrated method for resource planning and scheduling to minimize planning/scheduling-dependent expenses*
\textsuperscript{6} Killen, C., *Project portfolio management for product innovation*
\textsuperscript{7} Ibid.
1.3 Limitations
For a more focused and well-defined discussion about the issues regarding project prioritizations in a project portfolio, limitations related to the common perception of project-based work has been stated. The first limitation is related to the project itself. A distinction between the process of performing project work and the actual product, which the project implements, has been made in order to get a specific focus as also discussed by Wateridge\textsuperscript{8}, see figure 1.

Figure 1: Illustration of the process vs. product distinction

Since project portfolio management is a huge subject, which includes a variety of minor categories the second limitation state that only project selection, project evaluation and project management office will be studied in relation to prioritization strategies.

The third limitation is the fact that this master thesis does not investigate concrete project management tools and methods at a large extent. The industrial company has recently started working according to Project Management Institute standards but implications of this have not been within the scope of the thesis. Another reason is that these models are usually very depletory, which means implementing and realizing these involves a big commitment and organizational changes that are outside the scope of this thesis. The used approach when it comes to project portfolio management is that models do not make decisions, managers, or people, do\textsuperscript{9}. This means that the frame of this thesis within project selection is foremost based on the managerial perspective and what factors that needs to be considered in order to make good strategic selections. Yet another problem with models for project portfolio management is the way a projects needs to be generalized in order to fit into the typical model, which would require a very deep understanding about the individual projects in the portfolio.

\textsuperscript{8} Wateridge J., How can IS/IT projects be measured for success?
\textsuperscript{9} Clark, C. Software packages don’t manage projects – people do!
1.4 Question at Issue
To not only fulfil the purpose with the stated limitations but also to develop a specified direction for the interviews a number of research questions have been formulated:

- What aspects contribute and can contribute to the prioritization strategy at the industrial company?
- How can good selection and evaluating strategies contribute to more efficient prioritization in an IS/IT project portfolio at the industrial company?
- How can the Project Management Office participate in making the prioritization work more effective?
2. Methodology

This chapter describes the perspectives that the researchers have had to explore project portfolio management issues and the methods used to understand their complexity.

2.1 Paradigm

Even tough project management studies traditionally have had a positivistic approach;\textsuperscript{10} this study tends to be almost the opposite. The paradigm of this research is interpretative, which has its origin in the criticism of the positivism. The reality according to the ontology assumption of interpretivism is subjectively created and socially constructed, which results in an affect of the researchers on the objects being researched\textsuperscript{11}.

The methodology for interpretivism is inductive, which means that theories generated by this study are created from observations of empirical data\textsuperscript{12}. To be able to generalize the specific results it is of great importance to understand the underlying activities. During the interviews the question ‘why’ has been co-occurrence to understand the purpose of a certain action\textsuperscript{13}.

An associated methodology to interpretivism is case study\textsuperscript{14}. The case study phenomena is about exploring a specific case and come to conclusions based on information retrieved from that case\textsuperscript{15}. The observations made are collected through interviews, which will be detailed described below.

2.2 Method Design

The master thesis emanates from an IS/IT department at a large Swedish industrial company. IS/IT means Information System/Information Technology, where the purpose is to implement and integrate IT applications. There is often a strategic dimension in choosing the right IT application for a specific issue, which makes running IS/IT projects challenging.

The IS/IT department of the industrial company pursues its activities through projects. To collect necessary information people with different working positions have been interviewed, which results in an overview of how the industrial company handles its project portfolio when it comes to prioritizing. A person higher in the company hierarchy can have other apprehensions than a person lower down. The interviews have been semi structured with a predefined list of subjects the interview will focus on, which prevents the interviewer form discussing irrelevance.

\textsuperscript{10} Blomquist, T through Jerbrandt Anna, Organisering av projektbaserade företag. p. 38
\textsuperscript{11} Collins, J. Business research
\textsuperscript{12} ibid.
\textsuperscript{13} ibid.
\textsuperscript{14} Ibid.
\textsuperscript{15} Denscombe, M., Forskningshandboken, p. 6.
2.2.1 Benchmarking companies

To make a better and more profound analysis, benchmarking interviews have also been conducted. The benchmarking interviews have not only focused on the IS/IT department and its way of solving problems but have tried to broaden the perspectives. Three companies, which operate in different industries, have been investigated. The first is a medium sized medical company, the second company is telecom developer and the third is large auto manufacturing company. In contrast to the industrial company, there was only one semi-structured interview at each benchmarking company.

2.2.2 Description of data

Since the interviews were semi structured the data is qualitative, which means that it is not possible to draw any statistical conclusions. However it is not the intention of this report as previously discussed in 1.2. The interviews were the basis for exploring the nature of the IS/IT problematic. For qualitative data to be useful it must be detailed and deep\(^{16}\). Usage of qualitative data needs specific way of analysing it, since the focus should not only be on describing it, but also trying to understand the underlying factors\(^{17}\).

For the analysis the information from both the emanated company and the benchmarking has been compared with theory.

2.2.3 Reliability and validity

When using qualitative data it is important to be able to verify it\(^{18}\). This study verifies the data by transcribing the interviews and later on, giving the interviewee the opportunity to read the transcript in order to confirm or disapprove the information.

For the industrial company it is easier to verify the qualitative than for the benchmarking companies. For the industrial company a triangulation method is used, since information can come from more than one source. For the benchmarking interviews it is somewhat more problematic, since only one interview at each company is made.

However, the researchers have not observed the on-going work, since it would not be an efficient way of collecting information, due to the fact that the research must be done within 20 weeks. This will however result in a biased view of the company. This would have been another possibility to verify the results from the emanated company. It is also important to stress that people might embellish and make their work look better. This is something, which the researchers had in mind. Since the research has an interpretivistic approach it is likely that the researchers have influenced the interviewees during the interviews. There is a social construction, which is affected by the questions from the researchers. This can also result in biased results from the questions.

\(^{16}\) Ibid, p. 63-64
\(^{17}\) Lantz, A., Intervjumetodik- Den professionellt genomförda intervjun, p. 73.
\(^{18}\) Denscombe, M., Forskningshandboken, p. 378
In a positivistic research reliability is fairly unproblematic in comparison to interpretivism. This is treated differently in under the interpretivism paradigm. It is hard to repeat the answers from the interviewees, since their own opinions.
3. Introduction to Project Portfolio Management

The goal of this chapter is to give a short introduction in general about structures and ways of organizing when working with portfolio management.

3.1 Introduction to project management

According to Project Management Institute, project management is defined as:

“The application of knowledge, skills, tools, and techniques to project activities to meet project requirements”\(^{19}\).

A project is seen as a unique task, which should have a clear beginning and end\(^ {20}\). The uniqueness is one of the most important factors that really separate the project structure from other forms of work within an organization. Projects are well suited in organizations for handling complex product development, the changing demands in the markets and thereto let the organization be more customer oriented\(^ {21}\).

It is commonly believed that the Manhattan Project was the birth of project management, but then later developed and structured by the American military\(^ {22}\) as a way of keeping large tasks organized. This way of working has later been passed over to the corporate world, which faces the same organizational problems as the military when it comes to tasks such as new product development and organizational renewal\(^ {23}\).

Today project management is becoming a core competence in many high profile companies in Sweden and throughout the world. Swedish companies like ABB, Skanska, Ericsson and NCC have reached their position thanks to strategically well executed projects\(^ {24}\).

In general there are three different types of projects; business projects, change projects and development projects\(^ {25}\). Söderlund describes the different project types from a management perspective based on the following categories\(^ {26}\):

- Business projects: Customer communication, customer integration and negotiating.
- Development projects: specifications, technical solutions, and integration of technical solutions.

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\(^{19}\) PMBOK 2000, Trough Lilliesköld, J., Global Project Management - Delivering System Solutions in a Multi Organizational Environment

\(^{20}\) Lilliesköld, Global Project Management - Delivering System Solutions in a Multi-Organizational Environment, p. 17

\(^{21}\) Hobday, M., The project-based organisation: an ideal form for managing complex products and systems

\(^{22}\) Schwalbe trough Lilliesköld, Global Project Management - Delivering System Solutions in a Multi-Organizational Environment, p. 37

\(^{23}\) Söderlund, J. Projektledning och Projektkompetens - Perspektiv på konkurrenskraft, p. 19-21

\(^{24}\) Ibid. p. 59

\(^{25}\) Ibid., p. 37

\(^{26}\) Ibid., p. 37-45
Introduction to Project Portfolio Management

- Change projects: change resistance, anchoring, internal marketing and management hierarchy.

Historically, IS/IT projects have had a proneness to fail\(^{27}\), perhaps, partly because they can be seen as a combination between all of the above categories. This is based on the fact that they have characteristics derived from all of the three different categories such as customer integration, having to define specifications and evaluating technical solutions as well as having to deal with the issues of change resistance. Because of this, IS/IT projects are in general hard to manage and to control.

3.2 From individual projects to multi project management

Running projects in parallel is called multi project management and has its origins in the Japanese car industry\(^{28}\). The focus within multi project management is allocating resources to the running projects\(^{29}\), since the multi project environment does not permit senior management attention to be focused on one individual project\(^{30}\). When putting it together, with a strategy focus it is called portfolio management\(^{31}\).

Project portfolio management is based on the need to create an oversight of a company’s projects in order to steer and manage the project portfolio. The main managerial objectives for projects in a portfolio is to be aligned with a firm’s strategy and goals, be consistent with the firm’s value and commitment, contribute to a positive cash flow, utilize effective use of the firm’s resources and contribute to the firm’s health both today and in the future\(^{32}\). That is why theories within project portfolio management strive to find methods for ensuring that the current portfolio is aligned with the main objectives. Almost all methods for aligning projects in the project portfolio are based on four pillars: scope, time, cost and quality\(^{33}\). Problems arise because not all of these pillars are equally prioritized and valued by all stakeholders\(^{34}\), which in turn leads to misunderstandings and wrongful expectations about the project execution and delivery.

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\(^{27}\) Al-Shehab, A et al. - *The modelling of Risks in IS/IT projects through causal and cognitive mapping*
\(^{29}\) Ibid.
\(^{30}\) Pennypacker, J. & Dye, L. *Project portfolio management and managing multiple projects: two sides of the same coin?*
\(^{31}\) Ibid.
\(^{32}\) Levine, H. *Project Portfolio Management- A Practical Guide to Selecting Projects, Managing Portfolios and Maximizing Benefits*
\(^{33}\) Ibid.
\(^{34}\) Ghasemzadeh, F. & Archer, N.P., *Project portfolio selection through decision support*
There are a number of different ways to organize a firm depending on its operations. Hobday presents a framework for how the organizational structure can differentiate in six ways, see figure 2.

Structure A is referred to a functional organization where all operations are done in the line organization with clearly defined work descriptions. In a functional organization the project manager has little authority. This organizational structure can have problems adapting to external conditions. The authority and the responsibility of the project managers increase with the different organizational structures (A-F). In the balanced matrix, structure C in figure 2, the project manager and the functional manager share the responsibilities and the authority, which result in a flexible organization. In structure F, which is referred to the project based organization is extreme, since all the work is operated through projects.

Figure 2: Ways for companies to organize related to project management in an organization. P stands for major projects, whilst F is for functional departments.

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35 Hobday, M., *The project based organisation: an ideal form for managing complex products and system?*  
36 Tonnquist, Projektledning, 7  
37 Ibid.
4. Organizational perspective

This chapter describes a few organizational units, which are important for project portfolio management. The organizational perspective is also a foundation for project learning through project evaluation.

4.1 Project portfolio and organization

To have a successful portfolio management there is a need for a variety of functions. First, ideas have to be initiated into a project, and then the projects have to be combined in relation to the company business strategy. Second, the scarce human resources have to be shared between the projects in the portfolio, which demands a function for administering it. Through discussion between project managers and the resource owners the resources can be allocated.

Figure 3 describes a generalized organizational structure of project portfolio management and the included organizational units in a simplified manner. The figure is independent of the organizational structures presented in figure 2, but might not be applicable in the project lead and the project based organization. It is important to realize that customers of the project portfolio management organization are primarily company-internal. The governance controls the strategic decisions, while portfolio manager can take care of both strategic and operational decisions. The organizational structure PMO can be implemented on different hierarchical levels [see 4.3 Project management office] but will assist managers in decision-making and by controlling parts of the project portfolio processes.

![Figure 3: Structure for organizing around project based work.](image)

38 Jones, D. Empowering project portfolio managers: How management involvement impacts project portfolio management performance.
39 Pennypacker, J. & Dye, L. Project portfolio management and managing multiple projects: two sides of the same coin?
40 Dawidson, O., Project portfolio management – an organizing perspective
4.2 IS/IT project- and portfolio managers guided by governance

There are some differences in how a project manager should act regarding the distribution of resources in comparison between an IS– project and projects in general. The purpose of multi-project management is to focus on resource utilization, since a project manager cannot just add resources to complete a certain task. In a regular project there is a tendency that project manager assign resources to task, while in IS projects tasks are in general assigned to resources\textsuperscript{41}.

Since IS/IT projects are complex and have a tendency of failures, project managers play an important role in running them\textsuperscript{42}. Project managers should be aware of risks and challenges, e.g. not clearly defined objectives. A way of solving this is to use project managers focused on IS/IT projects, since these project managers have the ability to apply their experience from previous projects. To further improve the IS/IT project management process, the project managers should attend project management training courses\textsuperscript{43}. This will help to build up more in depth knowledge and understanding of problems related to IS/IT project implementation.

As project portfolios have grown both in size and value, they are now considered a strategic tool for companies\textsuperscript{44}. The role as portfolio manager can vary with the responsibilities. A portfolio manager’s influence varies from an administrating nature, which consist in guiding the project managers to reach their goals\textsuperscript{45}, to a more managerial nature with involvement in the project selection and project prioritization phases. From an administrator’s perspective, the portfolio manager gathers and consolidates information to the decision makers\textsuperscript{46}.

The decision maker can be seen as the portfolio governance or governance council and should consist of senior management. The portfolio governance is responsible for the key strategic decisions with mainly a mid- or long-term perspective\textsuperscript{47,48}. The governance team and the portfolio manager can together be seen as portfolio management with the responsibility of selecting and prioritizing projects as well as managing the portfolio\textsuperscript{49}.

4.3 Project management office

There are two different kinds of offices for projects. The first entity is called project office and comprises just a specific project and is managed by a project

\textsuperscript{41} Yagar, S. Managing Multiple Projects in Large Information Systems Organization.
\textsuperscript{42} Wateridge, J. Training for IS/IT project managers: a way forward
\textsuperscript{43} Ibid.
\textsuperscript{44} Jones, D. Empowering project portfolio managers: How management involvement impacts project portfolio management performance.
\textsuperscript{45} Dobson, M. Juggling the Interdependent Project Portfolio
\textsuperscript{46} Ibid.
\textsuperscript{47} Light, M. Project Offices are Key Components of IT Governance
\textsuperscript{48} Pennypacker, J. & Dye, L. Project portfolio management and managing multiple projects: two sides of the same coin?
\textsuperscript{49} Ibid.
Organizational perspective

manager. The project office can be thought of as an office on a building site, where the documents are stored. The other entity is called project management office (PMO)\(^50\), which will be focused on in this thesis. This kind of management office has different shapes depending on the level, in which the organizational structure it is implemented. According to PMI the PMO is defined as:

“An organizational body or entity assigned various responsibilities related to the centralized and coordinated management of those projects under its domain. The responsibilities of the PMO can range from providing project management support functions to actually being responsible for the direct management for the direct management of a project\(^51\).”

As the definition states the responsibilities of the PMO can vary a lot. There have been a lot of studies how companies use its PMO and the findings can be summed up into three groups; reporting PMO, supporting PMO and multi-project-management oriented PMO, see table 1. The findings in the research correspond with the definition by PMI.

Table 1: Different ways of implementing the PMO organizational unit.

<table>
<thead>
<tr>
<th>Type</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controlling</td>
<td>Overlook and monitor the projects</td>
</tr>
<tr>
<td></td>
<td>Report project progress to management</td>
</tr>
<tr>
<td></td>
<td>Early warning system</td>
</tr>
<tr>
<td></td>
<td>Filter information</td>
</tr>
<tr>
<td>Supporting</td>
<td>Support project management</td>
</tr>
<tr>
<td></td>
<td>Implement project methodologies</td>
</tr>
<tr>
<td></td>
<td>Improving communication</td>
</tr>
<tr>
<td></td>
<td>Centre of excellence</td>
</tr>
<tr>
<td>Multi project management</td>
<td>Own project managers</td>
</tr>
<tr>
<td></td>
<td>Setting priorities</td>
</tr>
<tr>
<td></td>
<td>Allocating resources</td>
</tr>
</tbody>
</table>

The controlling PMO can be divided into two tasks or responsibilities. The first task is to overlook and monitor the projects. When overlooking, the PMO should follow the projects and see whether they are following the project plan. The PMO works closely with the governance council, where the PMO reports the status of the projects to the council. As soon as a project runs over budget or time the PMO communicates the information to the decision makers in the governance team\(^52\). The PMO can therefore be seen as an early warning system\(^53\).

\(^{50}\) Dai, C., *The role of project management office in achieving project success*

\(^{51}\) Pellegrini, S., Garagna, L, *Towards a conceptualisation of PMO as agents and subjects of change and renewal*

\(^{52}\) Levine, H. *Project Portfolio Management- A Practical Guide to Selecting Projects, Managing Portfolios and Maximizing Benefits*, 55

\(^{53}\) Light, M. *Project Offices are Key Components of IT Governance*
When a key project has a problem, the PMO will notice the issue and report back to the governance team. The PMO provides the governance team with information, on which the actual decisions are made. The PMO therefore can be viewed as the link or a filter between each project and the governance team. The filtering task of the PMO is important for preventing information overflow, since managers have trouble making good decisions when there is a large amount of information to consider, due to the fact that relevant information can be shadowed with bad information. The quality of information is also correlated to successful management, since it is a basis for the decision makers.

The second category of implementing PMO is supporting PMO, which is perhaps a more traditional way of using the PMO. The overall purpose of this implementation is to make the project management more efficient. One responsibility of the supporting PMO can be to implement project methodologies and help improve the project work proceedings. By developing methodologies the organization gets aligned and therefore work in a more efficient way.

“There is strong evidence that PM standards and methods are most highly correlated with project performance.”

Researches have found that absence of a unified project methodology is a major reason for projects to fail. A unified project methodology will result in improved communication possibility between people in the organization, since every project manager is in a consistent way.

A second responsibility is connected to the project history. The PMO can work as a centre of excellence by using it as a knowledge bank, where information about the previous projects is stored. This could be achieved since the PMO should do the post calculations and evaluate the project [see 4.5 Organization learning through evaluation]. The PMO can act as a database of project documents, which is helpful for project managers.

The third role and function for the PMO involves multi-project management. The PMO can be seen as a separate entity within the organization, which “owns” the project managers. In some organizations the PMO is responsible for setting

54 Dai, X., & Wells, W., An exploration of project management office features and their relationship to project performance.
55 Light, M. Project Offices are Key Components of IT Governance.
56 Elonen, S. & Artto, K., Problems in managing internal development projects in multi-project environments
57 Dietrich, P. & Lehtonen, P., Successful management of strategic intention through multiple projects – Reflections from empirical studies
58 Hobbs, B. et al., A multi-phase research program investigating project management office
59 Dai, X., & Wells, W., An exploration of project management office features and their relationship to project performance
60 Tonnquist, B., Projektledning, p. 327.
61 Dai, X., & Wells, W., An exploration of project management office features and their relationship to project performance.
62 ibid.
63 Whitten, N. Organizing for Multiple Projects
Priorities to new projects and to allocate resources to projects. This would result in a PMO that manages the whole project portfolio.

4.4 The role of human resources in the organization

One reason why projects fail to correspond to the stated expectations is because of the fact that people work in too many projects. The problem is that too many projects steal time and energy from other projects. Therefore it is important to keep record on how many projects a person is involved in. A result of running too many projects is uncompleted projects.

Handling project overload might be challenging, since some key competencies are shared and needed in a lot of projects. Another problem related to resource sharing is the fact that a lot of IS/IT projects claim a need for high competence staff. This factor is usually a big driver when it comes to limiting the number of projects in order to fully dimension the project portfolio. If the number of projects are too large, work will build up around special competences and get fragmented, which delays work and makes the project organization overloaded. Crucial resources that are shared among multiple projects set the pace for all projects.

Successful portfolios have a better way of planning and identify the critical resources as well as highlighting them in the organization. Resource planning in advance makes it easy to understand what parts of a project that is crucial for project success. What is important is not the quantity of planning but the quality. According to Platje & Seidel the planning phase should not only be done on a portfolio level, but also lower in the organizational hierarchy, otherwise an organization will end up replanning and rescheduling the resources and project plans. A too centralized organization can result in a bureaucratic planning structure, where people more rely on their informal contacts to bypass complicated ways of decisions.

4.5 Organization learning through evaluation

Davenport discusses how knowledge can diminish the probability of project mistakes:

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64 Hobbs, B. et al., *A multi-phase research program investigating project management office*
65 McDounough, E. & Spital, F., *Managing project portfolios*.
67 Žika-Viktorsson, A. et al., *Project overload: An exploratory study of work and management in multi-project settings*
68 Bonham, Stephen. *IT Project Portfolio Management*, p. 169
69 McDounough & Spital. *Managing project portfolios*.
70 Ibid.
71 Platje & Seidel. *Breakthrough in multi-project management: how to escape the vicious circle of planning and control*.
“Having made costly errors by disregarding the importance of knowledge, many firms are now struggling to gain a better understanding of what they know, what they need to know, and what to do about it.”

Within IT projects there are four kinds of knowledge that can be distinguished. Firstly there is, the *process* knowledge, which is the knowledge of running projects and secondly, the *domain* knowledge, which is the technical knowledge. The two remaining types are *institutional* and *cultural* knowledge, where the first is about the organization’s structure and the latter about bringing different organizations together in a project. The process knowledge is vital for having good project management where it is important to have planning and task delegating tools. The domain knowledge involves the technical knowledge, where specific product and business knowledge are important. Knowledge in different products and solutions are vital for selecting the right IT application and for implementing them in the best possible way. The intuitional knowledge can be seen as the history of the organization, which is transferred by stories from people within the organization. The institutional knowledge can be seen as “what is really going on” and is important if external project managers are used. The last kind of knowledge deals with the cultural aspects of IT projects. Since it is important for the project manager to understand how to manage people in IT project management, an organization must be aware of the cultural knowledge.

Researches have found that there are many companies, in which the knowledge from a certain project does not get fully absorbed and lifted to organizational knowledge. Organizations have problems developing a culture of project knowledge and transferring information, which can be due to the temporary nature of projects. Project learning would focus on letting people interpret their observations rather than getting the right information to the right people. A way of letting people interpret what they have experienced is through project evaluation. After the evaluating it is important to transfer the acquired results into common knowledge and it is therefore important to understand what an organization should learn from each project. Is it “know how”, “know why” or figures like cost and timelines? But it is also important to state who should be participating in the reviews.

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73 Reich, B. et al. *Modeling the Knowledge Perspective of IT Projects*
74 Chan, R. & Rosemann, M., *Managing knowledge in enterprise systems*
75 Reich, B., *Managing knowledge and learning IT projects: A conceptual framework and guidelines for practice*
76 Schindler, M & Eppler M. *Harvesting project knowledge: a review of project learning methods and success factors*
77 Anbari, F, et al. *Post-project reviews as a key management competence*
78 Schindler, M & Eppler M. *Harvesting project knowledge: a review of project learning methods and success factors*
79 Ibid.
4.5.1 Project evaluation

A way bringing knowledge into an organization from a single project is through project evaluation. It can be divided in three different parts; pre project, on going and post project evaluation\(^{80}\).

The pre project evaluation is important for the project selection, which must be connected with the strategy of the company. The on-going project evaluation should not only help the project managers to see the direction of the project but is also important for decision makers as a guidance when allocating resources\(^{81}\).

A post project evaluation is an opportunity for interpreting and articulating the knowledge. Post project reviews should be the information resource base for future projects, so that project managers will not repeat the same mistakes twice. This could prevent scope creep in projects if it has similarities with previous projects\(^{82}\). To make a valuable post project review, management needs to implement a structure where post project evaluation is encouraged. In many organizations the post project evaluation is neglected due to shortage of time and due to upcoming project\(^{83}\). Furthermore people do not see a personal gain of putting effort in documenting information in a post project review\(^{84}\). The management needs to emphasis the importance of also evaluating what went wrong in particularly failed projects\(^{85}\).

\(^{80}\) Anbari, F, et al. *Post-project reviews as a key management competence*

\(^{81}\) Ibid.

\(^{82}\) Ibid.

\(^{83}\) Ibid

\(^{84}\) Schindler, M & Eppler M. *Harvesting project knowledge: a review of project learning methods and success factors*

\(^{85}\) Anbari, F, et al. *Post-project reviews as a key management competence*
5. Prioritization in a project portfolio

This chapter will discuss important aspects related to prioritization in a project portfolio, such as making the right project selections and to handle prioritization strategies the right way.

5.1 Portfolio strategy

Portfolio management is about making strategic choices as well as a process for senior management to execute their business strategy. In large companies, senior management have no way of getting a broad overview over the daily work of the projects. For the portfolio management, one of the major tasks is to determine the strategy for what kind of projects to start and implement over the coming years, which highlights the strategic importance of the portfolio management. In order to do this successfully, tools and guidelines needs to be implemented, some of which will be presented later in this chapter.

The portfolio management is also responsible for distributing resources between the available projects. By doing the distribution process, the management team makes active priorities in both the mid-term as long as the long-term perspective, by giving the most resources to the most important projects. If this is not done properly it will mean longer cycle times, poor quality of execution and underperforming new products.

5.2 Project selection

Project selection is the base for achieving an affective project portfolio and is defined by F. Ghasemzadeh and N.P. Archer as:

"Project portfolio selection is the periodic activity involved in selecting a portfolio of projects, that meets an organization's stated objectives without exceeding available resources or violating other constraints."

By this explanation, project selection is not just the process involving starting up a new project but also the on-going work with balancing the project portfolio via a critical approach to the active projects. This critical approach is closely related to project prioritization as some projects, if resources are limited, will not be selected and never started, since they are not prioritized in the organization.

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87 Levine, H. *Project Portfolio Management- A Practical Guide to Selecting Projects, Managing Portfolios and Maximizing Benefits*, p. 44
88 Blichfeldt, B., & Eskerod, P., *Project portfolio management – There's more to it than management enacts*
89 Cooper R., et al., *New Product Portfolio Management: Practices and Performance*
90 ibid.
91 Pennypacker, J. & Dye, L. *Project portfolio management and managing multiple projects: two sides of the same coin?*
92 ibid.
93 Ghasemzadeh, F. & Archer, N.P., *Project portfolio selection through decision support*
One problem with IS projects is the so-called critical information technology management issue\textsuperscript{94}. This problem depends on the fact that it is difficult to make sure that the right project is chosen for the project portfolio, mainly because of the complicated nature of IS projects with a large number of interdependencies between projects. Factors that complicate the process are preferences of the decision makers, resource allocation, project inter-relationships and several other factors, which are hard to measure\textsuperscript{95}. Project selection should be adapted to company objectives\textsuperscript{96}, which is related to the fact that objectives might be multiple and often conflicting and that induces further problems with project selection\textsuperscript{97}. It is also very important that all projects are evaluated and selected based in consistent factors, as there is a proven correlation between consistent factors and successful organizations\textsuperscript{98}.

5.2.1 Stages in project selection

F. Ghasemazadeh and N.P Archer has developed a model with five major process stages for making a sufficient project selection\textsuperscript{99}:

- Pre-screening
- Individual project analysis
- Screening
- Optimal project selection
- Portfolio adjustment

The first three stages are referred to as offline activities and done before management committee meeting. The pre-screening process ensures that projects that are being considered for selection has undergone a preliminary analysis. In the individual project analysis stage, a common set of parameters is calculated for each project. It is important that the parameters are well adapted to suit company or department operations and examples on parameters can be net present value, internal rate of return or a weighted score. The final of the three pre-stages is the screening stage, which uses the parameters acquired from the previous stage to eliminate projects that do not add value to the project portfolio in the extent needed in order to run them.

The last two stages are described by Ghasemzadeh and Archer as tasks done by the portfolio management team. In the optimal portfolio selection stage it is important to consider factors as resource limitations, timing, project interdependencies, balancing criteria and to maximize total portfolio benefit. The purpose of the final stage, or the adjustment phase, is to apply the knowledge and experience of the management team in order to select the best possible

\textsuperscript{94} Rabbani, M. et al., A multi-objective particle swarm optimization for project selection problem
\textsuperscript{95} Ibid.
\textsuperscript{96} Ghasemzadeh, F. & Archer, N.P., Project portfolio selection through decision support
\textsuperscript{97} Ibid.
\textsuperscript{98} Dietrich, P. & Lehtonen, P., Successful management of strategic intention trough multiple projects – Reflections from empirical studies
\textsuperscript{99} Ibid.
portfolio. Their primary task at this stage is to balance the portfolio by adding or removing projects.

5.2.2 Difficulties with project selection

One difficulty is the amount of information, or more precisely, the lack of important information, which becomes an obstacle when selecting projects for the portfolio. In order to make effective project selection decisions, information about financial results, resource needs, timing, probability of completion and success for all projects needs to be available. Some of these factors are subjective and very dynamic, which makes the process even harder.

Another important difficulty related to project selection is the problem with decision-making based on power, discussed by S. Elonen and K.A Artto. This relates to the fact that politics should not be underestimated when it comes to project selection in a multi-project environment. Both managers and workers tend to see their own business as the most important, which in turn often means that they will lobby for work being done on their project. It can also mean that starting some projects, for example long-term strategically projects, is not a rational exercise of just informing others that the particular project is important, it is as much about generation support for the idea within the organization.

5.3 Prioritization

Making priorities is an issue for business today. A common view among researchers within project portfolio management is that making prioritization within the portfolio is vital in order to conduct successful business. That is why the most important task of portfolio management is to set priorities to individual projects and to make the best possible project selections. However, literature suggest that there is a tendency to assign all projects in the portfolio with the same priority, which means that all projects comes to be considered high priority, or at least equally important when in execution.

5.3.1 Prioritization and organization

The basis for making effective and adequate prioritizations is to use the available information as effectively as possible. Well-selected information combined with the experience of the management team is the ground on which projects are launched. In order to receive good quality information, a system for filtering

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101 ibid.
102 Elonen, S. & Artto, K., *Problems in managing internal development projects in multi-project environments*
103 Ibid.
104 De Maio, A. *A multi-project management framework for new product development*
105 Pennypacker, J. & Dye, L. *Project portfolio management and managing multiple projects: two sides of the same coin?*
106 Ibid.
107 Ghasemzadeh, F. & Archer, N.P., *Project portfolio selection through decision support*
needs to be applied so that the management team can concentrate on managing and launching the right projects. In many cases the PMO will fill this role and becomes vital in the work with filtering information delegated to the portfolio management\textsuperscript{108} [see 4.3 Project management office].

Well-based priorities help to guide employees as to which projects that are most important\textsuperscript{109} and this can counter problems related to project overload. Project overload is caused by the fact that people work in many projects at the same time, which in turn leads to a loss in productivity\textsuperscript{110}. By doing effective prioritizations this problem can be reduced and will also help the organization, and especially, the managing of scarce special human competences to assure that the organization is working with the right tasks\textsuperscript{111}. A lot of delays and bad quality projects comes as a result given by the fact that many project organizations are strained under lack of resources and would benefit from running less projects, but with higher quality and lower cycle times\textsuperscript{112}.

One of the major advantages of fitting all projects into a common project portfolio is the ability to more easily compare projects in order to make prioritizations between the projects\textsuperscript{113}. By using portfolio management, a project is ideally adapted to the same shape as the other projects in the portfolio thus making it possible to critically review and prioritize in an objective manner. Even though an organization has a great system for managing projects, the process of making priorities are aggravated by the following facts pointed out by McCauley et al.\textsuperscript{114}:

- Priorities set by one organization rarely match the priorities set by other organizations.
- The pace of business and market competition results in priorities that change often, sometimes even daily.
- Management is rarely disciplined enough to honour the priorities and decisions made.
- If the results of the prioritization are not honoured, morale of the organization can be adversely affected, causing additional resource-related delays.

All of these factors are important to take in consideration. All departments or organization within a corporation want to have their projects as highly prioritized as possible. This will create friction but some of this friction can be reduced by presenting a clear strategy for making priorities and by trying to apply this strategy and by honouring the priorities already made. There have to be room for making re-priorities but they should be done in an objective way

\textsuperscript{108} Hobbs, B. et al., A multi-phase research program investigating project management office
\textsuperscript{109} Pennypacker, J. & Dye, L., Project portfolio management and managing multiple projects: two sides of the same coin?
\textsuperscript{110} Zika-Viktorsson, A. et al., Project overload: An exploratory study of work and management in multi-project settings
\textsuperscript{111} Meredith, J. & Mantel, Jr. S., Multiproject scheduling and resource allocation
\textsuperscript{112} Cooper, R. et al., New Problems, new solutions: more effective portfolio management
\textsuperscript{113} Githens, G. Programs, portfolios and pipelines: How to anticipate executives” strategic questions
\textsuperscript{114} McCauley, M. et al., Effective resource management – Debunking the myths
Prioritizing in Project Portfolio

thus reducing the friction when applying them. Further, Pennypacker and Dye concludes that it is important to consider the following when selecting and prioritizing projects:\(^{115}\):

- Project should be of similar size and level of complexity
- Projects should be relatively of the same duration and require few unique resources
- Projects should be of similar priorities to permit balancing requirements without completely omitting some projects in resource assignment.
- Projects should be in similar disciplines and technologies.

By actively regarding these guidelines it will be easier for management to compare projects and also by comparing apples with apples\(^{116}\).

5.3.2 Prioritizations at project start-up

The first part about prioritization relates to the way projects are categorises based on their value, after the project selection process is finished. When setting the priority for at project, a number of factors need to considered such as; organizational benefits, financial benefits, intangible benefits, availability of resources and the risk level of the project portfolio\(^{117}\).

When it comes to developing systems for setting priorities a lot of work has been conducted by De Maio et al. who have created a model targeted at high tech industries\(^{118}\). The model aims to help managers in five steps of the multi-project process:

1. Individual product evaluation, classification and initial screening
2. Multi-project classification and selection
3. Actions for improvement and portfolio reclassification
4. Priority assignment
5. On-going control of project portfolio

In all these steps relevance, risk and critical resources need to be addressed in order to fulfil the best possible project portfolio\(^{119}\). By determine the risk and relevance as well as critical resources for each project the project becomes possible to prioritize correctly, see figure 4.

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\(^{115}\) Pennypacker, J. & Dye, L., Project portfolio management and managing multiple projects: two sides of the same coin?

\(^{116}\) Ibid.

\(^{117}\) Ghasemzadeh, F. & Archer, N.P., Project portfolio selection through decision support

\(^{118}\) De Maio, A., A multiproject management framework for new product development

\(^{119}\) Ibid.
Prioritizing in Project Portfolio

The individual projects are displayed as circles and their size are proportional to expected absorption of critical resources. Each project is mapped as to perceived relevance and risk, which makes it easier to compare all active projects. It also becomes clear that the projects with the lowest risk and the highest relevance should be prioritized. The prioritization line [presented by De Maio as the straight line] sets the bar for starting the individual projects. The available resources in the organization should set the prioritization line. The relevance and risk parameters would have to be adapted to the individual organization thus ensuring that the most vital factors are considered and weighted.

By having to set both relevance and risk parameters for individual projects means that all projects are evaluated, classified and screened at project start-up. When mapping them against other projects, which are also classified based on the same parameters, there priority is visualised in the portfolio. However, it is important to realize that the job does not end here, because the final stage presented by De Maio is on-going control of the project portfolio, which means that this process should be repeated at periodic intervals in order to assure that relevance, risk and critical resource usage is up to date. This can be formalized for example by implementing a stage gate model [see 5.3.3 Re-prioritization and stage gate model].

It is also important to realize that projects should be prioritized in relation to each other and not independently. This goes both for projects being screened and for project under way. This is partly a method for avoiding the situation of

120 De Maio, A., A multiproject management framework for new product development
121 Pennypacker, J. & Dye, L. Project portfolio management and managing multiple projects: two sides of the same coin?
having a portfolio filled with just high priority projects but also a way of performing critical reviews of the active project portfolio.

5.3.3 Re-prioritization and stage gate model

Another model for setting priorities and ensuring that the right projects are being executed in the organization has been developed by Cooper et al.\(^{122}\), see figure 5. This process has its origins in stage gate related models, which sets a number of stages in the project life cycle that end with a gate decision.

![Figure 5: Stage gate model presented by Cooper et al.](image)

At the gate, the initial decision is whether the project should be continued or killed. If continued, the project priority should be updated compared to other active projects. This is important because of the fact that priorities in the organization can change and thus forcing the priorities of individual projects to change. It is imperative to realize that gates are the decision points of the stage gate process. All projects have must meet criteria that have to be met. They should also be scored against should meet criteria which will be used in the pass kill gate as well as when prioritizing or reprioritizing the project\(^{123}\). The go/kill process ensures that the projects that are being run in the organization has the validity needed in order to be successful as well as receiving a periodic review on how it performs related to other projects. After the prioritization phase, the project is either continued, possibly with a new priority, or placed on hold if there are not enough resources for the priority level of the project, see figure 6.

\(^{122}\) Cooper G. R. et al., *New problems, new solutions: Making portfolio management more effective*

\(^{123}\) Ibid.
Figure 6: Stage gate decision point as presented by De Maio et al.

However, time consumption can be seen as a negative side with working with stage gate models as the require a descent bit of work in order to be fully utilized. Another negative aspect related to changing project priorities in an on-going project is that emotional reactions from project participants that can be destructive to the project team. It is important that project participants fully understand why the change has been made and how this project will be executed from now and on.

5.4 Prioritization and the tools
In order to build up an organization with a clear focus on running the right projects with the right priority, there is a need to create structures that can facilitate this work. The tools presented earlier in the theory part will be very important in order to achieve this goal. In Figure 7: How prioritization is connected to the tools presented in the theory an overview have been created, showing how the tools are inter-connected and how they affect the process of setting the best priorities for the business.

124 McCauley M. et al., Effective resource management - Debunking the myths
In the figure, prioritization is the overhead goal with using the tools is to make the best priorities. Project selection, PMO and the project evaluation process become the foundation on which the prioritization is based. The PMO is set in the middle because of the interaction with both the project evaluation process as well as the project selection process.
Project Portfolio Management at the industrial company

This chapter discusses portfolio management in general within the business area at the industrial company.

6.1 Organization and the project portfolio

A few years ago, the industrial company launched a new, more centralized way of working for implementing IS/IT projects. The previous strategy, where divisions had responsibility for their own IS/IT projects, had resulted in a huge diversity in the application flora and thus diminishing synergies between the different divisions. As a result, primarily due to the lack of synergies and governance, a new strategic IS/IT department was implemented just under business area level, in charge of the selection and implementation of IT projects within the different divisions. Other reasons for making this change were the need for oversight and a vision to use a more standard approach to implementing new applications and IT infrastructure. The organizational structure for the company can be seen in figure 8.

![Organization Scheme](image)

Figure 8: Organization scheme for the business area at the industrial company.

Since the centralization of the IS/IT department, a roadmap for future and existing IT applications and solution has been developed. The roadmap states what applications and solutions that should be used when identifying a need. This is in response to the historically very differentiated application and solution flora within the business unit in the industrial company and has been developed as a tool for making sure that different department uses systems that have the ability to interact. With this strategy, a common problem is that project managers and users within the divisions sometimes question why they should use a system that are less suited for a task, just because the system fits within the roadmap. This will also mean that far less specialized applications will be used and more standard applications will be implemented.

6.1.1 Project Life cycle

When a need for a new IS/IT project is discovered, a project proposal is added to a project tracker. The tracker is implemented as a way of formalizing the idea phase and to get a simple overview over the coming projects in the project pipeline. The portfolio manager is in charge of the project tracker, or also called
submit an idea, and reviews all the incoming projects ideas. If the project is approved it is moved by the portfolio manager to the core team tracker.

The IS/IT governance team, or also referred to as the inner core team, consists of six participants. They are responsible for selecting projects from the core team tracker to do an initial screening to see if the proposed project aligns with strategy of IS/IT department.

After projects are considered to be aligned with the overall strategy, a project manager is appointed to take the project through the rest of the pre-study phase. Before the project manager takes over the project an initial cost and time calculation has been made, but it is seen as impermanent and is expected to be changed once the project manager does his own, more precise calculations.

Biweekly the project manager has responsibility to report the progress of the project to a project database, which makes the information available to the project portfolio manager and to the PMO. The PMO processes all the information found in the project database and once a week discusses subjects that need attention with the project portfolio manager. At the writing of this paper, the IS/IT department has about 160 projects in the project database, both active and in the start-up phase.

6.1.2 Project methodology

Another vital part connected to the reorganization has been to implement a standardized work procedure for the project organization when realizing IS/IT projects. The framework for the methodology at the industrial company is largely based on PMI standards for conducting work. The primary reason for using PMI is the need for tools to ensure the quality of the ongoing project. The industrial company believes that a standardized way of working makes it easier for new project managers to begin and conduct work within the IS/IT organization. This approach is pointed out during the standard IS/IT work-method training for new and inexperienced project managers. It is pointed out during the interviews that it takes time to implement a project methodology.

6.1.3 Project steering

Each project has an assigned steering committee, which is in charge of the steering and evaluating the work the project manager delivers. The steering committee usually involves, or should at least involve a person from the core team, or someone closely related to the IS/IT core team. This is the primary way for the governance team at the IS/IT department to be able to steer on-going projects in the right direction and to make sure that projects stays on the predetermined path. Other members of the steering committee involve stakeholders in the projects and persons affected by the result once the projects is implemented and delivered.

The project manager mainly reports to his steering committee and all changes to the project scope or in the parameters: time, cost, benefit and quality have to be discussed and approved by the committee. The committee has the mandate to approve these changes without a discussion with the IS/IT governance team. In
one project the steering committee made some decisions with little feedback from governance team, which resulted in different expectations between them both. The governance team has, however, usually representation in the steering committees as a way of managing this issue.

6.1.4 Process councils

At the time of the interviews the industrial company is implementing a process council, which has not yet been fully implemented. The purpose of the process councils is to provide expert knowledge within different solution categories. It is said to be used primarily in the start up phase, when determining a need for a certain application or solution. The goal for the future is to involve the process councils in all project change related matters.

6.2 The role of the Project Management Office

To assist the portfolio manager a second person dedicates 20% of the operating time to serve as a PMO. The purpose of the PMO is to overlook the whole portfolio and report to the project portfolio manager. Project managers start the information flow by reporting per weekly basis to the database and the PMO then control the information and communicate it to the portfolio manager.

6.2.1 Updating status

The project managers for each project have to fill in information about the ongoing project in the project database when the project starts. The information contains for example data about project budget and time plan. Biweekly the project manager has to update the status of the project in the database concerning, scope, business benefit, time, cost and income, risk and resources. These items help the project manager then to decide the overall status of the project. The status of the items is based on three different flags; red, yellow and green. The red flag means that an issue has already happened that cause the project for example to be delayed. The yellow flag means that an issue has not yet occurred, but there is a potential risk that it will do. The green flag mean that the project is following the plan. The approach of flagging a project red, yellow or green can seem to be clear and straightforward, but in practically it is not. In one project there was a delay, but the project manager was flagging it yellow, even though, according to the project methodology, should have been flagged red.

“At the moment it is yellow, but otherwise it would be green on the different questions125.”

6.2.2 Controlling

The PMO has to trust the updated flags, since it does not exist any control unit to ensure that the status information is correct. However, the PMO is controlling that the information is correctly reported and that all the project managers have

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125 Interview with a project manager
updated the status. Basically, the PMO check and control the quality of the information.

"My role is purely, I hate the word policeman, but it is similar\textsuperscript{126}.”

If a project manager has forgotten to update the weekly report or if the information is wrongly reported in the project database the PMO sends an email to remind the project manager to fill in the missing information. These emails can look auto generated, which therefore can loose the personal touch and somewhat the feeling that someone is actually watching what the project managers’ report.

"I have never been contacted personally, but if I would have been contacted it would make a big difference\textsuperscript{127}.”

The PMO is not just controlling the status on the on going projects, but also controlling the change request by the project managers. A change request has to be written when project plan is changed. The PMO just checks if the change request is written correctly and does not review it critically.

When the project has to be changed in some way the project manager has to file a change request. There are three major reasons for a change request; timeline, budget and scope, but the timeline is the most usual reason. The ambition is that even small changes should be subjected to making a formal change request, but this way of working is relatively new and not yet fully implemented. During the interviews it was noticed that some of the project managers do not see the meaning of filing a change request if the change is just a small one.

"I am not aware if there exist a change request procedure. Perhaps there is one, but anyway you will bring it up. If it concerns changes in the direction then perhaps you will have to write one but usually there are only small changes where you just get an extra assignment to investigate\textsuperscript{128}.”

The apprehension is that it is most important that the steering committee has accepted the changes, which do not have to be formally written.

Once the information is in the database the PMO compile it and report to the project portfolio manager. Since there can be about 160 projects the PMO only discusses the projects that demand attention. It is important not to overflow the portfolio manager with information. If one of the items is flagged red, then a project needs attention and the PMO discusses it with the portfolio manager. The PMO and the project portfolio manager also discuss the projects if they are flagged yellow in the overall status.

\textsuperscript{126} interview with a PMO
\textsuperscript{127} Interview with a project manager
\textsuperscript{128} Interview with a project manager
6.3 Project selection

Projects are selected from a project tracker. The project tracker is based as an idea incubator, were employees who see a need for a certain application or solution has the opportunity to submit the proposal. The ideas have usually gained some kind of support, preferably from management, in the organization from where they have originated before being placed in the project tracker.

After the project has been submitted to the tracker it goes through the first screening. The portfolio manager conducts this screening process. The idea is that this initial process will remove the projects that are completely unrealistic or has a goal that conflict with the current roadmap of the IS/IT department. It is also a check to see that the project idea meets the formal standards. The projects that pass the first screening process are moved to the core team tracker.

The project tracker is relatively new for the industrial company and was started during the reorganization, which made the IS/IT department a more centralized part of the business area. The old method for selecting IS/IT projects would have been a project driven in a division within business area. The idea would have been pitched to division manager who would make the decision whether to run the project or not. The industrial company claims that the advantage with the new project tracker system is that all ideas have to be formalized and hopefully more firmly established before being sent in. This process in itself has led to a reduction in the amount of projects driven within business area and also increased the quality of the overall project portfolio.

6.3.1 Selecting projects at project start-up

The core team tracker holds all the projects that are considered for reviewing. The reviewing process is conducted within the IS/IT governance team, which consist of six people. The team's most senior member is the vice president over the IS/IT operations within the business area. Having the vice president in the core team helps with the project process, especially when implementing projects and asking for resources that otherwise would be difficult to spear.

The core team gathers the basic information needed to determine the initial project specifications and defines an initial project scope. In this phase the core team might involve other specialist from other units in order to get their opinion on the matter.

When the initial screening is done the project usually moves on to the next phase, which consists of finding a project manager for the project. Almost all projects are launched as long as they do not conflict with the roadmap and strategy elaborated by the IS/IT department. However, projects that are not executed within 70% of the planning time frame, specified by the core team, are cancelled, mainly due to lack of commitment.

The project portfolio is not limited to any set maximum number of projects. This is based on the fact that project, which does not fill any need, will not reach the planning phase and by this logic all projects that do, should be followed through. The fact that all project are pushed through means that after receiving managerial support, the selective process is primarily based on how well the
Project Portfolio Management at the industrial company

project matches with the IS/IT roadmap. On the other hand, there is also a selective process that is done once the project reaches the planning phase were it might get sorted out as a response to the lack of commitment.

6.3.2 On-going projects

Projects in execution are rarely closed. The only things that tend to close projects are severe scope drifts or if projects are headed way over budget. There are two possible reasons for this, which was discussed during the interviews. The first reason is that due to a solid pre-study conducted both by the core team and by the designated project leader the value and the benefit of the project is well based. The good planning also ensures that the project is well planned and fits well into IS/IT:s strategy. The other reason for the low number of closings in the implementation phase is perceived due to lack of critical judgment done on open projects. During the interviews both of these perceptions have been raised.

“We attempt to run them because there is nobody to take the decision to shut them down.”

The relatively low number of participants with any of these views is however too low to draw any qualitative conclusions as to which one of these reasons are the primary one.

6.4 Resource Selection

People within the divisional organization manage the IS/IT projects, since the IS/IT department does not have its own project managers. Usually, the scope is not fully defined at the start-up phase, which in turn means that the time plan predictions are very preliminary and not that accurate. When a project is advertised it is also stated how much time the project manager should dedicate to the project. In one observation a project timeframe was set to 20% of full-time, which should be done a side from the ordinary 100% working tasks. The scope later enlarged and the project manager dedicated 50% of his working time to that project.

During the interviews it was pointed out that the IS/IT department does not have its own project manager, due to two reasons. First, the IS/IT department should not be running projects, even though they are both experienced and experts in that discipline. Instead, the purpose of IS/IT department is to filter ideas and deciding which projects to launch. The second reason is meant to show the dedication of the customer organization. If a project is important, the customer organization dedicates a person for the project manager role. If the customer organization does not want to release a person, the project is not important and thus not prioritized. Before new project managers can run IS/IT projects, they must be qualified by attending a project management course, which is based on PMI standards. The course is basically about understanding what the importance in IS/IT projects are.

129 Interview with an application integration manager
6.4.2 Asking for the recourses

The project managers have to ask the resource owners for the resources. An oral agreement is easy to acquire but a written can be more difficult. There has been a tendency during the interviews that seem to show that it can be difficult to get a resources owner to sign anything on record, because the one who signs a contract is then responsible for delivering that resource. This behaviour results in a problematic way of planning the critical resources. Sometimes it can be necessary to forward the email to a vice president to get some authority.

At the moment the project database does not support a planning and scheduling of the critical resources. One way of ensuring the critical parts of a project is to have a personal contact with the critical resource. By knowing them on a better personal level makes it easier to get the task done on time.

6.5 Project evaluation

Project plan, resource plan, time plan and the budget is saved when a project is closed. The purpose of storing data is to support project managers. The evaluation of projects can be divided into three different parts; weekly status updates, post calculation with intangible values and post calculation with financial evaluation. The biweekly status reports are the different flags the project manager has to report to the PMO. The other evaluations have to be done when the project is finished.

However, other than the three different evaluations, the IS/IT team does not investigate the long-term effect the finished product has when running. This can result in that a project can be implemented and then not used to the extent it originally meant.

“… SAP project that I was involved in for Canada, USA and Australia. …there is no one here in the product company that even have login credentials to the system even though there probably is lot of usable information that would help us.”

However, the impression is that this is relatively unusual.

6.5.1 Financial Evaluation

To understand whether a project has been a success or not a post calculation is done. The financial part of the post project calculation consists of two excel sheets, containing pre-calculated and post-project costs and financial gains. As a foundation for the project calculation the investment proposal is used, since the purpose of the post calculations are to see whether investment proposal was correct.

The post calculation is calculated after around six months, since the solution must have been running a while to actually be able to calculate the costs. All

130 Interview with project manager
costs for the project implementation are calculated for example licences and implementation cost. Then savings from the solution is calculated, which is the hardest part. Sometimes it is not easy to measure the efficiencies, which means it has to be estimated. Then the payback time is calculated and compared with the estimated payback time from the initial investments.

6.5.2 Intangible values

During the last years post project calculations with intangible values has been implemented. The intangible values evaluation is a document, which is based on personal reflections about a project. All the project participants should describe what went well and what did not go well regarding the project in all the stages. The result of the personal reflections combined with actual project results will work like a track record for the project managers.

However, the evaluation of the intangible values has not yet been fully implemented as a standard method. At the moment, analysing the project with intangible values is secondary. If there is any extra time the project manager can fill in the evaluation, but when a project is delivered the project managers usually have other tasks related to do, since they are not full-time IS/IT project managers.

6.6 Prioritization

The industrial company’s IS/IT has of today no formal way of method for making priorities in individual projects in the project portfolio. All projects executed are officially considered equally important. There are, however, methods for setting priorities in the project database used by the portfolio manager but this feature is not utilized today. A project with a high value or a high complexity with big importance to the industrial company will receive a more experienced project manager and will also be closely monitored by the portfolio manager as well as the rest of the portfolio management team.

“So we try as much as possible to direct the senior project managers to the really difficult projects131.”

Another factor, which affects the informal priority of a project, is where in the organization a project is launched. If a project is launched higher up in the organization the project will receive a higher priority compared to lower started projects. The reason for this is not only because of higher position of the initiator of the project, but also the fact that projects launched higher up in the company tend to have a more strategic mission or is launched because of senior managements lack of in sight into a certain process or unit.

“Yes, the higher up in the hierarchy the bigger it [the project] usual is. If the CIO, chief information office, is involved then you know it is more important. You therefore put effort into it and stay more a jour132.”

131 Interview with a portfolio manager
6.6.1 Portfolio manager and the core team

The portfolio manager is in charge of the daily work with reviewing the project portfolio, with help from the PMO as discussed earlier. This also makes the portfolio manager the person who has the best overview of the complete portfolio. When the core team selects and initiate projects today, projects are not ranked in the database.

“Yes, that [hierarchy of projects] is prioritizing, and we do not have that.”

The motivation for this is that all projects launched are launched because they fill a need and thus is in theory is important.

As each project receives a steering committee with the actual power to both make decisions and critically review on-going projects. When doing changes in the projects, for example changing the scope of a project, the steering committee is the one in charge of this process.

The PMO are not aware of any projects being of higher priority than other. This means that all of the 160 projects are monitored in the same way, with the same time given to each project.

6.7 Overview of the results

The results from the main aspects of the interview series have been concluded in table 2.

Table 2: Presentation of the project related characteristics in the industrial company’s IS/IT department.

<table>
<thead>
<tr>
<th>Method / Tool</th>
<th>How often</th>
<th>Type of decision</th>
<th>Impact on individual project</th>
<th>Role</th>
<th>Basis for decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMO</td>
<td>On-going</td>
<td>No decisionmaking</td>
<td>Low</td>
<td>Controlling</td>
<td>Guidelines</td>
</tr>
<tr>
<td>Evaluation</td>
<td>After project</td>
<td>No decisionmaking</td>
<td>Low</td>
<td>Supportive</td>
<td>No decisionmaking</td>
</tr>
<tr>
<td>Project selection</td>
<td>Project launch</td>
<td>Should project be launched</td>
<td>High</td>
<td>Controlling</td>
<td>Gut feeling Experience of management</td>
</tr>
<tr>
<td>Prioritization</td>
<td>Irregular</td>
<td>Consensus within portfolio management</td>
<td>High / medium</td>
<td>Controlling</td>
<td>Hierarchical level of launching</td>
</tr>
</tbody>
</table>

132 Interview with a portfolio manager
133 Interview with a portfolio manager
7. Benchmarking

This chapter describes how portfolio management and prioritization of projects is done within three different companies that operates in different fields; one medical related company, one large auto-manufacturer and large telecom company. The descriptions about the different companies reflect the most interesting aspects identified during the interviews.

7.1 Medical Company

The company is a middle sized medical orientated company based in Sweden, with primary focus on products developed in-house. The company sells its products on a global market making it important to be able to compete with other international companies with the same category of products.

7.1.1 Starting projects

In order to match the customer needs and expectations, related to the product development division, there is a product management team. When the product management team discovers a need, it files a PID, product identification document, which has to be approved for starting a new project.

The company runs relatively long term development projects over a few years. Project teams vary in size, from five people to about 30 people at most. The ambition is that a person should only be involved in one project a time, but it is more difficult than it appears.

“*We try to run one project per individual. Maximum two. Above all, during the phasing-in and during the facing out it can be two. But the ambition is to have one per project individual*”\(^{134}\).

7.1.2 Steering committee

Once a project is started the project manager has to report once a month to the steering committee. The steering committee is in charge of critically reviewing the projects and to determine the project progress. During the meetings with the steering committee the primary focus is possible deviations from the original project plan. If deviations exist, the project manager should have a proposition prepared that will correct the problem. The meeting is a place for making decisions, not to discuss how to solve a problem. If there is a trouble the project managers should present a possible solution at the steering committee.

The steering committee meetings last a whole day and all active projects are reviewed. This visualizes all the active projects in the organization to both the steering committee and the other project managers.

\(^{134}\) Interview with project manager
7.1.3 Project Portfolio

The project portfolio can be viewed as it is divided into two parts; active and possible future projects in the next three years. The portfolio for active projects is mostly used as a way for higher management to get an overview over active projects and the results of the active projects. The portfolio is also a tool for resource allocation.

The planning process helps the management team to quickly establish the future resource utilization, by using generic resources while planning. This results in an early identification of the needed key competences and makes the resource delegation process more proactive.

The portfolio is updated on a regular monthly basis but also on a more thorough year-to-year basis. During the yearly review, before setting the project budgets, the management team critically reviews the portfolio in order to remove unwanted projects and to assign critical projects a higher priority. This also serves as a way for management to get a better oversight over active projects and thus a better understanding of individual projects.

Project budgets are assigned once a year. Money is allotted based on the future project portfolio. Projects that are expected to generate the most money to the company, receives a larger portion. For the company, these projects have higher priority, since they should get to the market as fast as possible. There are also projects related to government demands, which also receives a higher priority and thus a bigger budget because these changes must be implemented in order to comply with law.

7.1.4 Project office

The project office at the company is very involved in the multi-project management. In the initial phase of the project, the steering committee has the formal task of assigning project managers to projects. In reality, this task tends to end up at project management office that selects the project manager from a pool of available project managers. All project managers are tied to the project management office and their work schedules are based on needs specified by the office. Projects of higher priority will receive a certain project manager and thus ensuring the quality of the project process.

To make the oversight of the project the project office manager maintain a visualisation sheet. This visualization sheet helps to create an awareness of about the phases of the different projects and how the portfolio is performing.

7.1.5 Project evaluation

The project process involves five tollgates. When passing a gate a project review is done, both in terms of evaluating the intangible values aka lessons learned and also in financial terms. The reason is that the company has realized that they have a lot to gain from summing up information during the project process that are easily forgotten when the project is closed. The historical way of doing project evaluation was a final project rapport and a presentation for a few managers involved. This meant that project knowledge was primarily only
Benchmarking

shared within the project group and to some extent shared to the management group. Today all information received is documented, categorised and put in a database for easy access and thus helping project managers, primarily at early stages, to plan and execute project work with a better result.

7.1.6 Overview of the results

The results from the main aspects from the benchmarking at the medical company have been concluded in table 3.

7.2 R&D department at a telecom company

The telecom company work in a global environment and have do major investments in R&D. The competitions in the sector in fierce, which makes it vital for the company to be able to steer projects in the right direction and be able to make prioritizations that will help the company stay competitive.

7.2.1 Product management and product ideas

The product management team at the telecom company is in charge of setting the roadmap for new product development. They listen for customer needs and specify the type of features that they ask for. The product management are also in charge of the budget for product development, and more specific, the process of choosing which projects to start. This means that they control the way projects are prioritized by assigning money to the projects that, in their opinion, has the highest importance.

Ideas can also come directly from the R&D department or from the sales organization. These ideas are analysed and decided on by the product management team. This is the way to ensure that all ideas are measured by the same standard.

Problems with making priorities on product management level involve knowing what resources that are available. The product management team starts of the prioritization process based on their roadmap. After looking at what they want to do, they ask the teams involved in the project planning process in order to find out what they can deliver, see figure 9. The project planning team looks at the
available resources and then reports back which features on the roadmap that actually can be implemented with the current resources. After receiving the capacity information, product management can set the final priorities about the features to be implemented. It is also important to realize that all parts of the R&D department, that is product management, the individual project and the line, has its own budget. This means, projects have to be prioritized homogenous within all these departments in order for ensuring that the final products are successful and meet or exceed the initial goal for the product. It will also mean that the final priorities has to iterated in order to find the best possible solution with the resources available. This iteration process can be very time consuming but done the right way, it usually ensures that the R&D department develops the best possible product with the available resources.

**Figure 9: New product specification prioritization flow.**

7.2.2 Dependencies and quality

The biggest problem with implementing new features is that they often have implications for other projects within different product categories. This in turn means that a lot of work has to be put on coordinating work within the R&D organization. Implications from this are that the company not only has dependencies between projects in one portfolio but dependencies between different project portfolios.

Successful projects are executed with great quality, both in the project process and the final product. If a problem arises once a product has been delivered to a customer, the process of fixing that problem is very expensive for the maintenance department, which is in charge of active products. This is why it is of the highest importance that products meet the set demands for quality. That means that product quality monitoring has a high priority because of the fact that is better to have a bit higher costs related to more quality control during the
project then having to deal with the costly consequences of poor quality after the project is finished.

7.2.3 Handling specialist and bottlenecks

The telecom company has a clear strategy for working with project based R&D. Members should not be involved in too many projects at once, because just being involved in projects increases the time wasted by having to attend meetings and coordinating work.

“There is always a cost involved in participating in projects... There is even a cost for thinking.”

This is especially true for key specialists. These people tend to get involved in many other problems and questions outside their specific field, like for example, project managers who want to discuss questions about the project in general, which consumes a lot of their effective working time. And the more projects this specialist, the more of this time will be wasted on questions and issues outside this person's special field.

7.2.4 Overview of the results

The results from the main aspects from the benchmarking at the telecom company have been concluded in Table 4.

Table 4: Presentation of the project related characteristics in the telecom company.

<table>
<thead>
<tr>
<th>Method / Tool</th>
<th>How often</th>
<th>Type of decision</th>
<th>Impact on individual project</th>
<th>Role</th>
<th>Basis for decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMO</td>
<td>Not present</td>
<td>Not present</td>
<td>Not present</td>
<td>Not present</td>
<td>Not present</td>
</tr>
<tr>
<td>Evaluation</td>
<td>On-going</td>
<td>No decisionmaking</td>
<td>High</td>
<td>Supportive</td>
<td>No decisionmaking</td>
</tr>
<tr>
<td>Project selection</td>
<td>Project launch and during project life cycle</td>
<td>Should project initiated and should project be cancelled</td>
<td>High</td>
<td>Controlling</td>
<td>Based on the roadmap set by product management</td>
</tr>
<tr>
<td>Prioritization</td>
<td>At project</td>
<td>Consensus within</td>
<td>High / medium</td>
<td>Controlling</td>
<td>Based on roadmap decisions and organizational resources</td>
</tr>
</tbody>
</table>

7.3 IS/IT department at large auto-manufacturer

The IT-area of the company is divided into four different parts; R&D, production, marketing and finance. The IT-area for R&D is the base for this benchmarking. The R&D organization contains approx. 3000 employees and is divided into functional areas. There are around 10 process forums where, for example, embedded systems, is one. In each and every forum a business representative is the chairman and IT area representative is usually the secretary.

135 Interview with department manager
The chairmen of the process forums are also the members of the portfolio forum, which are both a decision forum and a preparing forum for the IT council R&D. The IT council R&D is higher up in the hierarchy than the process forums and discusses topics and needs with a more strategic view. There is a well-defined structure, stating which of the issues that can be decided in the process forum and which of them that must be decided in the IT council.

7.3.1 Start of a new project

All new ideas for an IT implementation must come through the IS/IT department, which in the beginning was a bit difficult, because of the fact that the programmers involved in the R&D process preferred doing the task on their own. The lack of control was one of the main reasons for making the project start-up process more formal. All the functional areas can now present their new ideas to their process forum. The process forum then decides whether the idea is appropriate or not by posting a post-IT on an IT roadmap. An example of this can be that a certain functional area needs a development system to be implemented by 2012. This request is posted and thus making the request official and possible to plan and discuss. All the process forums are represented by its own colour on the IT roadmap. The board is updated once a quarter.

To prevent the IT-area to run too many projects all the ideas are discussed in the portfolio forum. A representative from the order organization is invited to the forum to present the idea. The idea is presented by what is called project on a page, with a short description of the problem and how it can be solved.

The portfolio forum is then involved in discussing the proposed projects by following a questionnaire stating risk, strategy and business benefit. The questions are answered in numbers from 1 to 5, where 1 means low and 5 means high. What is important is that the forum should agree on the number, which means that all the questions are discussed until a specific grade is set. When all the questions are answered the project is then to be mapped in the risk/benefit chart, where all other on-going projects are placed. If the forum realizes that a project is misplaced in the chart, the members of the forum start over again to answer the questionnaire, unless the idea has developed to a project.

The purpose with discussion within the portfolio forum is to make a homogeneity view on which of the projects to prioritize. This is important, mainly because of the risk of a conflict if the participant from the same department/process forum as the order has believed that a project is more important than it actually is. When all the on-going projects are placed on the risk-benefit chart it becomes clear for the entire organization which of the projects that are prioritized.

This process could be perceived as bureaucratic and slow, but the manufacture company has created what is called fast lane. If the new idea is fulfilling the “fast lane criteria”, e.g. is simple, which means that if there are not any interdependencies between the new idea and other projects, it can go through the fast lane. This is a way of achieving faster implementations and less documentation and strain on project managers as well as making the organization more effective when implementing smaller projects.
7.3.2 Project management

Since the IT area has its own project managers to run the decided projects, they have become experts in running IT projects. In average one project manager has one or two parallel projects depending on the size of the projects. An effect of only having its own project managers is the possibility to develop the project management process in an easy way. When a bottleneck is identified the project managers can get together to solve it and improve the process of project management.

The prioritizing system determines the way the resource owners have to prioritize their resources. If there is a key competence, which is needed in two or more projects, the higher prioritized project gets it.

7.3.3 Visualization and project performance

A main feature for performing well-executed projects is to make the project portfolio visual and thus making oversight more efficient and easy. That is the reason why the company, which has the advantage of having almost all projects based in the same location, uses visualisation boards for all stages of project. This also helps when wanting to quickly create an understanding of the current project portfolio. When working with the visual process, the company representative describes the importance of having good quality and well-updated information. That is why the project managers have to present their project status biweekly in order to update the visualization system.

A clear strategy in the company is to try and keep projects short and thick instead of long and slim. This means that it is preferred that a project consumes a higher amount of resources for a shorter period of time rather than consuming a smaller amount of resources for a longer time. This ensures that project managers can focus on a smaller number of projects and in turn executing them more effectively. This is also a way of making sure that a relatively low number of projects are being run making it easier, both to visualise the process and making project specific decisions for the portfolio forum.

7.3.4. Project evaluation

The auto-manufacturer has developed a “lesson learned” system. There is a distinction between what is documented for the product and what is documented for the project process. The company saves models and used cases in order not to start at the beginning every time. The purpose of the lessons learned is to improve the project management process and it is preformed both in the project team but also among the other project managers in the portfolio forum. The project manager discusses what went wrong in the project management methodology and what should be brought to the next project. The actual delivery is not discussed.

7.3.5 Overview of the results

The results from the main aspects from the benchmarking at the auto manufacturer have been concluded in table 5.
Table 5: Presentation of the project related characteristics in the auto manufacturer.

<table>
<thead>
<tr>
<th>Method / Tool</th>
<th>How often</th>
<th>Type of decision</th>
<th>Impact on individual project</th>
<th>Role</th>
<th>Basis for decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMO</td>
<td>On-going</td>
<td>Operational / Strategic</td>
<td>High</td>
<td>Controlling</td>
<td>Not present</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Regular</td>
<td>Awareness</td>
<td>Medium</td>
<td>Monitoring</td>
<td>Managerial experience</td>
</tr>
<tr>
<td>Project selection</td>
<td>Project launch and during evaluations</td>
<td>Should project be launched</td>
<td>High</td>
<td>Controlling</td>
<td>Standard parameters and work methods</td>
</tr>
<tr>
<td>Prioritization</td>
<td>At project launch</td>
<td>Consensus within portfolio forum</td>
<td>High</td>
<td>Controlling</td>
<td>Based on organizational needs and strategic value</td>
</tr>
</tbody>
</table>

7.4 Similarities and dissimilarities

There are a number of factors that are both similar and dissimilar between the industrial company and the benchmarking companies. The factors are overviewed and mapped by the authors, see table 6.

Table 6: Summary of the characteristics of the benchmarking companies compared to the industrial company.

<table>
<thead>
<tr>
<th></th>
<th>The industrial company</th>
<th>Medical company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational</td>
<td>Management structure</td>
<td>Balanced matrix</td>
</tr>
<tr>
<td>Project / Portfolio</td>
<td>Type of projects</td>
<td>IS/IT projects</td>
</tr>
<tr>
<td></td>
<td>Prioritization forum</td>
<td>Not present</td>
</tr>
<tr>
<td></td>
<td>Interdependencies</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Number of projects</td>
<td>~ 160</td>
</tr>
<tr>
<td></td>
<td>Project complexity</td>
<td>High, cross functional</td>
</tr>
<tr>
<td></td>
<td>Product complexity</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Project selection</td>
<td>IS/IT governance team</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Telecom company</td>
</tr>
<tr>
<td>Organizational</td>
<td>Management structure</td>
<td>Project matrix</td>
</tr>
<tr>
<td>Project / Portfolio</td>
<td>Type of projects</td>
<td>Development projects</td>
</tr>
<tr>
<td></td>
<td>Prioritization forum</td>
<td>Product management</td>
</tr>
<tr>
<td></td>
<td>Interdependencies</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Number of projects</td>
<td>High number</td>
</tr>
<tr>
<td></td>
<td>Project complexity</td>
<td>High, cross functional</td>
</tr>
<tr>
<td></td>
<td>Product complexity</td>
<td>High, advanced products</td>
</tr>
<tr>
<td></td>
<td>Project selection</td>
<td>Product management</td>
</tr>
</tbody>
</table>

Management structure relates to how the company is organised when it comes to project related work [see 3.2 From individual projects to multi project management]. The balanced matrix means that responsibilities and authority for
each project are shared between functional managers and project managers\textsuperscript{136}. In the project matrix the project managers has authority over personnel, finance and other resources\textsuperscript{137}.

\textsuperscript{136} Hobday, M., The project based organisation: an ideal form for managing complex products and system?

\textsuperscript{137} Ibid.
8. Analysis

This chapter discusses the conclusions drawn based on the theory, information received at the IS/IT department at the industrial company as well as information gathered during the interviews at the benchmarking companies.

8.1 Organizing perspective

As mentioned earlier the industrial company has centralized the project portfolio regarding IS/IT projects within the business area. The change towards a centralized way of organizing has resulted in that applications and solutions are less differentiated and more standardized. This simplifies integration between solutions because of the fact that all systems come with the same certain set of connections. This has made it much more simple to share information between divisions and, to some extent, with the other business units.

Compared with the auto-manufacturer, the centralized IS/IT department at the industrial company has a lot more applications to manage and this increases the complexity, due to the fact that the auto manufacturer have four separate IT implementation departments. A lot of applications can be hard to manage and have focus on, which can result in a wide knowledge need for the participants of the governance team. A large amount of applications would therefore imply a fragmented application eco-system. However, one IS/IT department, compared to the four at the auto-manufacturer, gives the management an opportunity to implement applications cross-divisional.

When implementing high-level portfolio management it becomes clear that the company receives a greater control over strategic issues. The centralization has resulted in a more streamlined portfolio that is managed by the IT governance team, which results in a possibility to develop its own project methodology. As mentioned earlier by Dai and Wells, a project methodology is correlated with project performance and this can result in diminishing project failures, as described by Tonnquist. The project methodology should be seen as a possibility to increase project performance. A consistency in the methodology can also make it easier for comparing different projects, which then can result in a better prioritizing phase as discussed by Pennypacker and Dye, which will be further described later.

As Elonen and Arto discuss, one problem concerning project portfolio management is the commitment of reviewing project work. The centralizing has also created a better overview of all the existing needs. Since all project proposals go through the same tracker, two similar projects can be run as one and thus creating synergies. By organizing all projects in a portfolio and implementing standard ways of working with, selecting and evaluating projects these kind of problems has the chance of being eliminated. The centralized portfolio will therefore make it easier for the portfolio management to review the projects in the portfolio in a consistent way. This might increase the possibility to of becoming a successful organization, as described by Dietrich and Lehtonen.
8.1.1 Organizing perspective through project change request

The IS/IT department at the industrial company considers itself as a strategic resource and does not have its own project managers as described earlier. As mentioned before, the IS/IT steering will interact with both the process councils and the project specific steering committee. This model, see figure 10, is partly based on how the portfolio manager at the industrial company envisions the change request procedure to be realized.

![Diagram](image)

**Figure 10:** Proposed structure for handling changes in individual projects.

The process councils would be devoted to specific categories of IT applications and solutions and thus making them in charge of handling project change request. They would have proper knowledge to understand how a change in for example in project scope will effect the project implementation as a whole. They would be vital in the work of ensuring that projects stay closely tied to the roadmap derived by the IS/IT governance team. In a practical sense, this change will have the affect that project change requests will be judged in the steering committee regarded to their practical value while in the process councils more based on their organizational value compared to the roadmap.

Once the system is fully implemented and running, the portfolio will show a more accurate picture of the projects in the project portfolio. This is especially important when having an IS/IT governance team that is not directly tied to the department where the project is being implemented. This will also help the portfolio manager to work more proactively as the information becomes available at an earlier stage and combined with the approval from the experts, this should help ensure that projects as much as possible is adapted and implemented with regard to the IS/IT roadmap.
This way of organizing the project portfolio management can be compared with both the medical company and the auto-manufacturer. The medical company has a pool of project managers, which runs all the projects. At the medical company almost all work is executed through projects, which is different compared to the industrial company. By executing all work through projects, it is easier to plan the necessary resources in advance, which the medical company does by using generic resources, which follows the recommendations by McDounough and Seidel. Since the industrial company is much larger, this method cannot be implemented, which however might be an advantage. If the industrial would start planning the resources it would probably result in a circumstantial procedure, which in turn would be perceived as bureaucratic and then be bypassed as described by Platje and Seidel.

The project portfolio management at the auto-manufacturer, on the other hand, can be seen as something in between. The auto-manufacturer has its own project managers to run the proposed projects but, as the industrial company, the customer organization is an internal organization. This way of using the project managers corresponds to the analysis by Wateridge. The focus on project managers do not implies successful projects but could result in a higher probability of successfulness.

8.1.2 Usage of the PMO

The different organizational structure also results in different usage of the PMO. At the industrial company the PMO is of a controlling nature, where the purpose is to check the quality of the information and to make sure that the project database is updated. An advantage of using a controlling PMO is that the entity ensures that the information in the database if of great quality, when controlling mechanisms are possible. This facilitates for the decision makers, since they do not get information overload as described by Elonen and Arto. A disadvantage could be the unclear role of who should e.g. develop and implement project standards.

At the auto-manufacturer the PMO seems to be used as a supportive nature, where the purpose is to develop project standards and methodology together with the project managers. An advantage of using a supportive PMO can be that the portfolio management only has to make decisions and therefore does not have to focus on the project methodology.

The medical company seems to have a PMO, responsible for the whole project portfolio. The usage of this entity clarifies that it is the PMO that is responsible for allocating resources. The disadvantages is that it demands that almost all the work is done in projects, which can be compared to the project lead organization described by Hobday.

8.2 Project selection

As discussed earlier, project ideas are placed in a project tracker, to make all project ideas available to the core team. A first screening of the projects has been done, since projects placed in the tracker should have management approval,
and thus is seen as needed by the organization. The real screening is in two steps, when the portfolio manager moves the project to the core team tracker and when the core team evaluates the project.

The screening done by portfolio manager is mostly done as a way of ensuring that the projects reach the formal structure set for all projects. The actual selection process is done by the core team during a meeting were all coming projects are evaluated.

8.2.1 Selection at the Industrial company and the auto-manufacturer

During the benchmark it was noticed that the auto-manufacturing company uses a similar approach as the industrial company. But, there are some important differences, which both can be seen as positive and negative, that have crystalized during the interview. Instead of putting projects directly into a project tracker, the projects are filtered before being raised to higher-level portfolio management. The auto-manufacturer utilizes the same ideas as the industrial company does, but implements them a bit differently. The first filtering is done in the process forums (similar to the industrial company’s process councils). They judge if the solution has potential for their part of the R&D process. This is also the instance for collecting ideas and for lifting ideas higher in the organization. The main purpose for the process forum is however to see if the project has any cross-functional benefits and thus making it a more valuable projects. Projects that only benefit a small part of the organization with no clear advantages for other departments are usually cancelled unless the fill an important specific need. The next filtering is done at the portfolio forum, which consist of the chairmen from the process forums. The portfolio forum is at the same organizational level as the it-governance team at the industrial company, and thus has the mandate to start projects of roughly the same size.

The strategy of the auto-manufacturer corresponds very much with the method presented by Ghasemzadeh and Archer. As mentioned earlier, portfolio management should not be involved in the first three stages; pre-screening, individual project analysis and screening. Portfolio management should only, or at least mostly, be involved in the last two stages; optimal project selection and portfolio adjustment. At the industrial company, portfolio management is involved in all steps but the first. This means that the project selection process is not as effective as it could be and in some respects does not receive proper support in the organization.

Theories developed by Elonen and Artto also somewhat supports the ideas of Ghasemzadeh and Archer. Since building support for a project sometimes is as much of a political process as it is a process of answering needs from within the organization, building support for the project is vital for the success of the individual projects in the project portfolio. By making sure that the initial parts of the process is realized close to the ordering organization, proper support can be built for the project.

Low value projects can, however, be started at lower levels and very high value projects must be lifted to the IT-governance team, which is above the portfolio forum, in order to get funding.
One obvious positive side is that the manufacturing company has a tough filtering process before they reach the portfolio forum. By this, the company ensures that only projects with high value for the organization reach this level. The company also ensures that projects with cross-functional agendas have a solid backing from managers within all concerned functions. When the portfolio team discusses a project, less focus has to be placed on questions regarding project validity and more on project quality. This in turn means that a lot of work can be placed on assigning projects the right priority and making sure that projects driven by the portfolio forum have the resources that they need and thus ensuring that projects are effectively implemented.

8.2.2 Strengths and weaknesses with the strategy of the industrial company

There are advantages with using the industrial company’s way of working. The process councils consist of IT-application- and solution specialists and their task is to determine the real potential of an application or a solution within a certain area and thus work as a filtering mechanism. The advantage with having experts is the fact that they have been involved in these kinds of implementations before, making them qualified to determine the real need for a specific application or solution. The industrial company’s strategy is that all project ideas have to be handled by the IT-governance team to some extent. Some project ideas that reach the tracker might not have proper support, which explains the need for the 70% rule. As explained earlier, the 70% rule stipulates that projects that are not started within 70% of the planning phase time are cancelled.

8.4 Evaluation and organizational learning

Schindler and Eppler have found that companies often have problems with getting the acquired knowledge from a project to be fully absorbed in the whole organization, which also seems to be a problem at the industrial company. This was most distinguishable at project manager level. The industrial company has a good organizational culture, but it has some weaknesses, which can be improved.

One of the purposes of the IS/IT department is to guide the project managers by giving them information from previous projects. However, since the project database might be perceived as over-elaborated the purpose diminishes and therefore it is vital that the database only consists of important information not to overflow the project managers. Someone should be in charge of the database, which either could be the PMO or the portfolio manager, for ensuring that the information is always relevant.

8.4.1 On-going evaluation by the PMO

Project evaluation is, as discussed earlier, divided into three different parts; pre-, on-going and post. The on-going evaluation can be seen as the information from the project managers’ status updates. At the moment, the main responsibility for on-going evaluating projects is placed within the PMO. The PMO spends 20% of the working week involved in work related to this function and the rest to other jobs within another part of the organization. With this limited time, it becomes impossible for the PMO to have specific knowledge about all the projects in the
portfolio and thus having an evaluating role against the project product, so the focus must be mainly on the project process as it is at the moment.

Some of the project managers do not understand the purpose of updating the status for the PMO, which makes it even harder to evaluate the project progress. A way to make the project managers understand the purpose of the IS/IT standards can be though the start up course. The course can be used as a tool for emphasising the importance of the status updates.

The way the industrial company is doing the on-going evaluation can be compared with the medical company, which has an evaluation after every tollgate. This is done to guarantee the project quality at each point and ensuring that the project process and product reaches set established goals. This is, however, closely related to R&D work, in which the final product is not clearly specified at the beginning making it important to evaluate that the product fills the actual market needs. Even though, this way of working ensures that each stage of the project process receives a quality stamp and can be measured for success at the end of the project, which can be further developed as an integrated part of the stage gate thinking presented later on. It also increases the organizational learning; as both good methods and bad methods are regularly brought to attention.

8.4.2 The post-project evaluation

In the evaluation document with intangible values it seems as the industrial company focuses on the process knowledge and not as much on the other types. Since the process knowledge helps the project management, a project manager must articulate what has been learnt from a project in order to give the portfolio management the necessary information to guide other project managers, see figure 11. Anbari discusses this fact, which emphasise the importance of interpreting experience form a project. It has been realized that this is the intention of the intangible value evaluation. This method could be compared to the lessons learned done by the auto-manufacturer.

![Figure 11: Illustration on how project evaluation results should be used in the organization.](image)

It is important that the industrial company focuses on all the four aspects of knowledge in IS/IT project and not only the process knowledge, highlighted by
Reich. The domain knowledge is probably most interesting for the programmers and the integration managers, since it focuses only on the different technical solutions. The programmers can describe the different mythologies used, which can be a better base for the governance team for selection different applications. The cultural on the other hand is important for the project managers. Knowledge about how to manage people in an IT project could be helpful and diminish problems. The institutional knowledge is not as important as the rest of the four types, since project managers are a part of the customer organization and already know the informalities.

The intention of the post project evaluation of the industrial company is over all satisfying, but it could be a bit better for two reasons. Firstly, the document about intangible values could be more concrete. Instead of describing what went wrong it should focus on the reason why it went wrong. The organization should try to highlight the issues for better understanding the underlying reasons for it. This could result in a better time setting for the project. Secondly, the project managers sometimes do not fill in the evaluation questionnaire, due to shortage of time. Unfortunately, it appears as if is an organizational culture issue, which is mentioned by Anbari to can be a usual in organizations. Here the PMO could play an important role by pushing the project managers to fill in the evaluations and the PMO should make sure that the evaluations are of adequate quality. The post project evaluation is a key chain for organizational learning.

8.4 Prioritization within the industrial company today and in the future

Today, the industrial company does not prioritize individual projects in the portfolio in any formal way, even though many in the organization are aware of the importance of some of the projects. One thing that counter-acts the need for setting priorities is the fact that projects are not executed by resources owned by the IS/IT department and thus are, in a way, prioritized informally, based on the need by the resource owner and the ordering department.

8.4.1 Prioritizing of individual projects

As mentioned earlier the auto-manufacturer works with prioritizations in a very depletory way. First different groups within the portfolio forum create their own perception on how highly a project should be prioritized and after that they come together and form a strategy for the whole group. This way of working is closely related strategies presented by De Maio et al. and their risk, relevance and critical resource usage matrix and thus create a visualization of all active projects. The auto-manufacturer also uses the same prioritization line in-order to se if projects are ranked high enough to be included in the project portfolio and if the project environment would change, the line can easily be shifted and thus revealing the iterated set of accepted projects. The value of this process becomes even greater at the auto-manufacturer due to the fact that it includes other stakeholders than those of the project organization and thus helping the projects to build support with managers.
The problem for the industrial company would however be that their IS/IT department runs a larger amount of projects which are more diverse and global, making it unsustainable to work the exact same way.

A suggestion on how to work with this issue would be to implement that all projects in the database would have a priority set by both the IS/IT governance team and the corresponding process council. Getting a priority from the process council would ensure that the project validity related to the business and from the IS/IT governance team would mainly build validity related to overall strategy. In figure 12 it is demonstrated how this structure would be organized. Projects would be entered in the project tracker without a priority. After that they would go through the prioritization forum where the priority would be set. After this stage projects would be transferred to the project database and started, with a know priority. This would make it easier to create and understand the project value for resource owners as well as managers affected by the final implemented product.

Figure 12: Illustration over prioritization forum structure.

The method for making the priorities would be based on the method by De Maio et al., which has shown its usefulness at the auto-manufacturer. There would have to be a few different objective parameters each related to risk, relevance and critical resource utilization. These parameters could be discussed and during meetings, both in the corresponding process council as well as in the IS/IT core team, and this will be the ground for prioritization for the individual projects. The result from both the process council and the IS/IT governance team are weighted together and is the final priority of an individual project.

If the business unit within the industrial company would implement this way of prioritizing projects, it would be important to use the proper criteria. Some examples are return on investment, system synergies, meeting customer needs and payback period. It would be very important to get the right criteria’s and a close study of projects in the database would need to be undertaken in order to find the right ones.

138 Cooper R., et al., *Optimizing the stage gate-process: What best-practice companies do part II*
A big issue when prioritizing individual projects is however the wide array of applications and solutions being implemented by the IS/IT department. This makes it much harder to compare projects. In order to make good prioritizations, individual projects need to be of a similar style, which means that they have to be somewhat generalized. But still, because of the many types of projects, they would have to be categorized, in order to compare apples with apples as presented by Pennypacker and Dye, and then prioritized within their category. An idea on how to categorize could be to tie the categorizations to the process councils, and thus also making it clear to the experts involved in the councils on how the projects are prioritized.

8.4.2 Prioritization, evaluation and selection

Prioritization is closely related to project evaluation and project selection. When work with a centralized IS/IT department project selection becomes an important tool for ensuring that the right projects are executed in the project organization, thus verifying that only high priority projects are being executed.

The medical company uses a stage-gate like approach, as presented by Cooper et al. [see section 5.3.3 Re-prioritization and stage gate model], in order to incorporate project evaluations into the decision process. Each project stage is evaluated and every gate should be seen as a go/kill phase, with the goal to ensure that projects match expectations by management. This way of working is best suited for companies engaged in product development but the fact that projects are periodically evaluated as well as critically reviewed on predetermined factors is something that can be implemented by the industrial company. This method also creates a formal stage for making reprioritization. Needs identified months ago might have changed or other projects identified as more important might have been launched which will question the validity of the initial prioritization. By having standard gates, everyone in the project realizes that at this gate the priority of the project might be changed thus countering the phenomena described by McCauley that re-prioritizations can be destructive to the project team.

A stage gate model is however associated with a higher workload and more formal decision making than the many companies have been used to, which means that implementation should be done with care. It is important to find valid parameters to pass judgement on at the go/kill gates, so that the reviewing process becomes objective and efficient thus making the prioritization even better and in the end improving the quality of the project portfolio.

8.5 Issues and proposals

The overview of the portfolio management at industrial company is satisfying. However, there are some issues that can be improved, which previously have been stated in the analysis. These proposals are summed up in Table 7: '4P' Matrix. The matrix describes a process with corresponding problems and proposes a solution.
The first process is the status updating, which has a purpose for creating overview in the project database. Since some project managers do not follow the project methodology and do not update the database correctly, it is proposed to use the PMO as a quality assurance. The PMO should ensure that all project managers understand the importance of following the project methodology and report change requests.

Another issue is related to the project selection, where the industrial company has a subjective way of choosing the right projects compared to the auto-manufacturer, where the risk relevance matrix decides what projects to launch.

Project learning is also a process, which is constantly improving at the industrial company. To get even better the company could use the evaluation with intangible values as a method for articulate what a project manager has learnt and what could be better.

These processes will together build up the prioritizing phase, which should be present during the entire portfolio life cycle.

### Table 7: '4P' Matrix.

<table>
<thead>
<tr>
<th>Process</th>
<th>Purpose</th>
<th>Problems</th>
<th>Proposals</th>
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| Status updating| Create overview in the portfolio | •PMS do not understand the importance  
•Possibility that projects do not follow IS/IT roadmap | •Use PMO as quality assurance  
•Ascertain that change requests are done |
| Project Selection | Choose projects | •Almost all projects are run  
•Subjective way of choosing projects | •Use stage risk/relevance matrix combined with a stage gate approach  
•Use stage risk/relevance matrix combined with a stage gate approach |
| Project Evaluation | Project learning | •PM do not fill in the intangible post project evaluation  
•Difficult to know what a PM has learnt  
•The database can be perceived as over-elaborated | •Use PMO for ensuring that the evaluation is being done  
•Discuss why something went good/bad  
•Store only important descions |
| Prioritizing | Run most vital projects | •Unclear and informal priorities | •Priorities set by IS/IT governance and corresponding process council |
9. Conclusions and discussion

This chapter concludes the thesis as well as gives insights for further studies within the area of prioritization in a project portfolio.

9.1 Three conclusions

All actions should be aimed at ensuring that the organization runs the best possible and most important projects. One aspect of this is to implement methods and tools for prioritizing projects. However, project prioritization is not just about assigning a priority number to all projects and then allocating more resources to identified high priority projects. By implementing a good portfolio structure, both the project selection process and the evaluation process are made more efficient and with higher quality, which in the end results in better prioritizations. A higher quality selection process will mean that only projects with a good anchoring and with a high value contribution to the organization will be run. Further, a high quality evaluation process will ensure the organizational learning from finished projects while also critically evaluating the on-going projects and thus ensuring that the portfolio has the best possible project mix.

9.1.1 Implementing tools

There are a number of reasons for implementing tools when working with selection and prioritization of projects. The main reason is that all projects should be judged by the same criteria no matter their origin. This is also important for the industrial company. If projects are chosen in an objective way it becomes easier to motivate the project throughout the organization.

Models, e.g. the stage gate and the risk relevance matrix, are great for critically reviewing projects and setting priorities to projects. As mentioned earlier, models imply more work but better control and a uniform system for reviewing and setting the right priorities to projects. It is also important that the parameters in the model are chosen with care in order to ensure that projects are evaluated on right criteria. This could evolve and become integrated in the standard process during a project life-cycle in the industrial company.

Another vital tool to further develop is the formal project change request system. This will help the governance team to keep track of all changes in projects, thus verifying that projects deliver according to their business cases. This could prove vital when needing to quickly cut down on number of projects or when wanting to do a risk analysis of the project portfolio. The better quality of change requests will also help when implementing new projects, as project managers will have access to earlier used solutions with a greater accuracy regarding the final solution and the road to the final solution.

9.1.2 The PMO

At the moment the PMO should not directly be involved in the prioritizing stage at the industrial company, but rather indirectly. The PMO should continue to work as a controlling PMO with primarily two tasks; ensuring that the project database is updated with adequate quality and that the project methodology is
followed. A controlling PMO would function as a filter with quality control. The PMO would ensure that all project managers update the database in a formalized way it would be possible for the portfolio manager and the governance team to make better and more profound decisions. This would result in an easier way of prioritizing between projects.

9.1.3 Prioritization

The tools, combined with the work of the PMO, should be used in order to implement an effective system for making priorities. Models for formalizing the process can be of big help, both for prioritizing projects in an objective manner as well as creating an understanding of why projects are prioritized the way they are in the organization. The models, and especially the risk-relevance matrix, will help to visualize the individual projects, making it easier to understand their importance and contribution to the organization. Why this helps is best specified by Pennypecker and Dye as:

“...managers should recognize that a well-defined project selection and prioritization process can give guidance to project and resource managers for planning and allocating assignments.”

Setting priorities has meaning to the organization when it comes to resource allocation, making sure that projects align with strategy, planning individual projects, ensuring project quality and individual project success. That is why it is so important. By weighting prioritizations made by the process councils, the IS/IT governance team as well as resource owners, a better understanding is created in the organization about the importance and value of a specific project. The process councils will contribute with their expertise knowledge in different IT solutions. It will be highly beneficial that projects are prioritized by the IS/IT management team, which probably has the best understanding of the project process as well as economical gains and values with the end product, implemented by the project. It is also of relevance that projects are rated based on more parameters than just economical, e.g. relevance, risk and critical resource utilization.

9.2 Successful portfolio management

The project prioritization process is a vital part of ensuring the quality and success of the company’s project portfolio. The complete process a best summarized by David Cleland with:

“In a healthy firm, a variety of different preliminary ideas are fermenting. As theses ideas are evaluated, some will fall by the wayside for many reason; lack of suitable organizational resources, unacceptable development costs, a position too far behind the competition, lack of “strategic fit” with the enterprise direction, and so on. There is a high

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mortality rate in these preliminary ideas. Only a small percentage will survive and will be given additional resources for study and evaluation in later stages of their cycle."

Even though it is not explicatively said, the essence is, that in order to be successful, the best possible projects should be selected, prioritized and finally executed based on high quality decisions. That is a large part in what portfolio management is all about.

9.3 Further studies
There are some questions, which have to be investigated and further analyzed. Since the thesis has not analyzed models to any deeper extent it is advices to further discuss how models and project methodology affects IS/IT project management. Furthermore, the areas of responsibilities between portfolio manager and PMO should be further analyzed in order to streamline the portfolio management.

\footnote{Cleland, D., Project management: strategic decision and implementation, 95}
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