Elevating project portfolio management in Global Operations

A case study at Axis Communication

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MASTER THESIS

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Abstract

A central part for organizations in achieving intended strategies and successfully executing projects is project portfolio management (PPM). However, many companies fail to effectively manage projects related to strategy, and a little research has focused on the realization of PPM regarding organizational development.

To gain further understanding of how PPM can contribute to a higher efficiency and building sustainable portfolio processes, this thesis studied the PPM activities and related challenges and opportunities at Axis Operations. Within this area, three main research goals were formulated to investigate the phenomenon of PPM in organizational development; Firstly, to identify and describe the key success factors to project portfolio management performance in operations. Secondly, challenges in the current structure around Axis Operations PPM, with each management level involved, are identified, and examined. Thirdly, a set of main improvement areas and a recommendation are outlined for how Axis Operations PPM can improve, based on best practices.

A qualitative case study was performed, with an abductive research approach, where a literature study and interview data were analyzed and cross-referenced to identify five key success factors for PPM. Five key success factors were identified: *organizational structure, resource management, strategic alignment, governance, and project management*. Based on these five areas, five main improvements were recommended, being *implementation of PPM office, visualization and communication of PPM, Stage-Gate process, documentation of key resources,* and *measurement and evaluation*.

In conclusion, the thesis contributes to academic research by identifying significant factors for prioritization of projects, optimizing resources, and structuring PPM, particularly focusing on operations and organizational development.

Keywords: Project Portfolio Management, Resource Management, Project Management, Governance, Organizational structure, Strategic Alignment, Case Study.

Sammanfattning

En central del för organisationer för att uppnå avsedda strategier och framgångsrikt genomföra projekt är projektportföljstyrning (PPM). Trots dess betydelse misslyckas många företag med att effektivt hantera projekt relaterade till strategi, och begränsad forskning har fokuserat på realiseringen av PPM när det gäller organisationsutveckling.

För att få ytterligare förståelse för hur PPM kan bidra till en högre effektivitet och bygga hållbara portföljprocesser, undersöker detta examensarbete PPM-aktiviteter och relaterade utmaningar och möjligheter inom Axis Operations. Kopplat till detta formulerades tre huvudsakliga forskningsmål för att undersöka fenomenet PPM inom organisationsutveckling; att identifiera och beskriva de viktigaste framgångsfaktorerna för PPM i verksamheten. Därefter, identifiera och utvärdera utmaningar i den nuvarande strukturen kring Axis Operations PPM, med varje inblandad ledningsnivå. Sist även beskriva en uppsättning huvudsakliga förbättringsområden och en rekommendation för hur Axis Operations PPM kan förbättras, baserat på bästa praxis.

En kvalitativ fallstudie genomfördes, med en abduktiv forskningsansats, där en litteraturstudie och intervjudata analyserades och korsrefererades för att identifiera fem huvudsakliga framgångsfaktorer för PPM. De fem viktiga framgångsfaktorer identifierade var; *organisationsstruktur, resurshantering, strategisk inriktning, styrning,* och *projektledning*. Baserat på dessa fem områden rekommenderades fem huvudsakliga förbättringar, vilka var *implementering av projektportföljskontor, visualisering och kommunikation av PPM, Stage-Gate processen, dokumentering av nyckelresurser,* samt *mätning och utvärdering.*

Sammanfattningsvis bidrar examensarbetet till den akademiska forskningen genom att identifiera viktiga faktorer för projektprioritering, optimering av resurser och PPM-struktur, med ett särskilt fokus på verksamhetsutveckling.

Nyckelord: Projektportföljstyrning, Resurshantering, Projektledning, Styrning, Organisationsstruktur, Strategisk inriktning, Fallstudie

Acknowledgments

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Finally, we would like to thank each other for a great teamwork and a successful thesis.

Lund, May 2024

Elma Causevic & John Moberg

Table of contents

List of Figures and Tables

List of Abbreviations

AO	Axis Operations
BSC	Balanced Score Card
KPI	Key Performance Indicator
MM	Middle Managers
OP	Operational Priority
PPM	Project Portfolio Management
PPMO	Project Portfolio Management Office
PM	Project Managers
PMI	Project Management Institute
R&D	Research and Development
SG	Stage-gate
SM	Senior Managers
SP	Strategic Priorities

1 Introduction

This chapter aims to provide some background to the thesis subject while providing information on Axis Communications AB and specifically the Operations department. The chapter also provides a presentation to the problem description, the thesis purpose, research goals and delimitations, as well as presenting a thesis outline.

1.1 Background

Portfolio theory was initially a financial framework, aiming to maximize expected return while minimizing risk by carefully selecting a mix of assets for investment. It was first introduced by Harry Markowitz (1952) with his paper on "Portfolio Selection". By the mid to late 1960s, project management incorporated elements such as cost control, resource scheduling, and the systematic identification of challenges. The non-financial perspective of portfolio management came when Boston Consulting Group (BCG) introduced the product portfolio term in a paper titled "The Product Portfolio" (Henderson, 1970), where the authors state that "to be successful, a company should have a portfolio of products with different growth rates and different market shares". To an extent, this became the starting point of including research and development (R&D) and product development in the portfolio management and selection area. The interest in project management surged in the mid-1970s (Snyder, 1987). The research area became so popular and widely recognized, Markowitz, along with Merton Miller and William Sharpe, shared a Nobel Prize in 1990 for their work on the theory of portfolio selection (The Nobel Prize, 2024). Portfolio management also became popular for information technology projects in the 1990s and several vendors released software that allowed managers to categorize projects in their portfolios and share collective data (Rad & Levin, 2006, p. 27). Portfolio management emerged as a dynamic process designed to align with the evolving demands of the market. Senior managers, especially those with a technical focus, deemed it a critical tool for maintaining competitiveness and survival in the increasingly globalized market. In 2006, the Project Management Institute (PMI, 2006a) issued a Portfolio Management Standard, whose purpose is to clarify and standardize the definition and understanding of portfolio management, mainly regarding product development. It has since come to include an even wider

definition of the term, also including operational improvement projects as potential content in the portfolio.

Today project portfolio management (PPM) has become a vital part of most major companies' strategy to succeed in an ever-increasingly challenging and competitive world. Most major companies today have some sort of structure around their project portfolio in different areas. Still, they do experience problems in the form of delayed projects, resource struggles, stress, and a lack of overview (Blichfeldt & Eskerod, 2008).

1.2 The Company

Axis Communications AB, hereafter only Axis, is a renowned global leader in the field of network video and surveillance solutions, focusing on high-quality, scalable, and intelligent solutions for a diverse range of industries. Established in 1984 in Lund, Sweden, Axis has grown from a local company to a global organization, with more than 4,700 employees in over 50 countries and a turnover of more than 17.4 billion SEK in 2022 (Axis Communication, 2023). The company signed the UN Global Compact in 2007, a voluntary initiative launched by the United Nations in 2000, encouraging businesses and organizations worldwide to adopt sustainable and socially responsible policies. This initiated a journey of prioritizing sustainability and incorporating it in its strategy. Axis has, since 2015, been a part of the Canon Group, a Japanese multinational conglomerate headquartered in Tokyo, specializing in cameras, printers, copiers, and medical equipment (Axis Communication, 2023).

As a company, Axis has always been an innovative company at its core. This has been a guiding star throughout the company since its start, meaning a flat hierarchy with most ideas and responsibilities coming from “the bottom”, not as orders and regulations from “the top”. This has, in turn, led to an organizational culture where continuous growth has been the main priority, not efficiency and effectiveness. There has also been a clear focus on the product portfolio, especially in R&D, where the portfolio structure is well-managed. The way of working within PPM is well established throughout the R&D organization today. However, in Axis Operations (AO) PPM has been a subject of interest only the last two years and is still a major organizational challenge. This is due to the complexity of the projects, the ever-changing external circumstances, and the different needs of the departments within AO. The four departments within AO are global supply chain, sourcing, manufacturing, and industrialization. Recently, with the goal of doubling in revenue in five years and quadrupling in revenue in ten years, Axis has switched the focus from growth in Operations to a more cost-efficient structure.

Axis has a unique supply chain setup, both upstream and downstream, where Axis itself does not have any production or sales department directly related to customers. Instead, there is a vast network of suppliers, manufacturers, collaborations,

distributors, system integrators, resellers. This requires an extensive and well-structured approach to how Axis relates to each provider and distributor and an area where AO works with continuous collaboration in all improvement projects throughout the supply chain (SC). It also includes several internal business development projects to increase efficiency and effectiveness, for example by improving project methodology. Additional responsibilities of AO include people management, maintaining high productivity and quality, ensure cost efficiency, and fulfill a responsible SC in regard to the suppliers and the greenhouse gas footprint. All improvement projects aim to maintain or improve these goals.

AO is driven by the vision to “Make a smarter, safer world a reality”. This objective is achievable through the implementation of industrialization, a sustainable supplier base, excellent manufacturing practices, and a reliable supply chain ecosystem that facilitates seamless installation and ensures a smooth end-customer experience. To align with this vision, AO has defined three key elements encapsulated in the "We R" framework, see table 1.1. These elements serve as constant reminders and guidelines for employees to steer their efforts in the right direction.

Table 1.1 Axis Operations framework

	Description
Resilient	Strategies and capabilities that proactively resist disruptions and enable them to absorb, adapt and recover from disruptions.
Robust	Robust way of working built on, clear ownership and responsibilities, effective and reliable production capabilities, strong partnerships and clear expectations and communication towards stakeholders.
Responsible	Taking responsibility for the impact on the environment and people and committing to the UN Global Compact and Science Based Targets Initiative.

1.3 Problem Description

AO engages in many improvement initiatives, and as the scope, complexity, and number of these initiatives expand, it becomes crucial to ensure that these efforts are directed efficiently, given the limitations of time and resources. It is within this area the crucial role of PPM comes in. AO has experienced a lack of structure and an overall overview in its PPM and needs to improve how it manages it to align the organization with its values and strategy and to achieve its growth targets. Additionally, as the company is expected to grow significantly and rapidly, new challenges and solutions will arise. Greiner (1998, p. 56) states “problems related to coordination and communication will magnify, levels in the management hierarchy multiply and jobs become more interrelated as the number of employees and the

sales volume increases". AO must therefore improve the structure, which could be achieved through a well-established PPM.

1.4 Purpose and Research Goals

The purpose of this master thesis is two-fold. Firstly, it is to investigate what factors impacts PPM success and what those factors entail, through the lens of an operations organization. Secondly, it is to identify the main improvement areas within AO PPM and provide a recommendation on how to enhance the PPM, by identifying challenges and possibilities in the current PPM structure at AO. To fulfill the objective, the following research goals will be investigated:

> RG1. Identify and describe the key success factors to project portfolio management performance in operations.
>
> RG2. Investigate the current structure around AO PPM, with each management level involved.
>
> RG3. Identify the main improvement areas and provide recommendations to AO PPM.

Through this analysis, it will be possible to create a useful PPM framework for AO. This will be a supportive steppingstone for Axis to reach its development initiative in sustainability relating to the UN Global Impact goals.

1.5 Delimitations and Focus

This master thesis project is limited to AO and no other parts of the organization. The focus of the report is on certain aspects of AO PPM, namely key success factors and main improvement areas. The report will therefore not focus specifically on change management, even though this can be a major part of the phenomenon. This is since a department of several hundreds of people and the challenges that arise with coordinating them in improvement projects are often too complex to holistically handle in the time frame this report had to refer to. Finally, the report will not provide recommendations on how to implement the given framework, as it would require a greater timeline.

1.6 Distribution of work

For this master thesis, the authors ensured that all tasks were equally divided between them. Both authors participated in the research and data collection, sharing the responsibility for, for example, conducting interviews and reviewing literature. Each section of the thesis was co-written and reviewed by both authors, in that each section written by one author was reviewed by the other and then discussed. This collaborative approach ensured a balanced workload and a high-quality thesis.

1.7 Thesis Outline

Table 1.2 presents the outline of the master thesis and summarizes each chapter.

Table 1.2 Overview of the content

Chapter	*Page numbers*	*Explanation*
Introduction	13-17	A background to PPM and an introduction to the case company. Additionally, the problem description with its purpose and research goals are presented, as well as a presentation of the contribution to existing knowledge.
Methodology	18-28	The method used for conducting research based on Yin's (2018) methodology including a strategy for planning, designing, and preparing for the study, collecting, and analyzing data and sharing the results is presented.
Literature Review	29-53	A systematic literature review presenting what is known about PPM and key success factors for PPM success.
Case Analysis – Axis Operations	54-58	Case analysis of current state and structure of PPM at AO.
Results	59-69	Qualitative results are presented with relevant background data, based on key success factors from the literature review.
Gap Analysis	70-83	A gap analysis and a comparison between the identified themes from the literature review with the key insights from the interviews.
Final Recommendation	84-90	Recommendations on the main improvement areas related to PPM performance within AO.
Conclusion	91-94	A conclusion of the study relating to the research goals and suggestions for future research and improvements in area.

2 Methodology

This chapter provides a description of the research methodology used, which includes a literature review, a case study on Axis, and a qualitative analysis. In the case study design, Yin's (2018) six-step methodology was used, namely plan, design, prepare, collect, analyze, and share. Finally, the issue of ethical consideration and the quality of the research design is presented and discussed.

2.1 Overview

The main purpose of this thesis is to investigate the three research goals presented in subsection 1.4, through Yin's (2018) systematic framework for case studies. The framework consists of six steps and relies on a linear, but interactive approach, facilitating a flexible and adaptive workflow and seamless flow between various steps. The research approach is grounded in an abductive logic, where theoretical framework, empirical fieldwork and case analysis evolve simultaneously (Dubois & Gadde, 2002). The literature review and the qualitative analysis were conducted in order to answer research goal (RG) 1 and 2. Finally, RG3 is answered with a recommendation including guidelines based on collected data and the findings from RG1 and RG2. An overview of the used methodology is presented in figure 2.1.

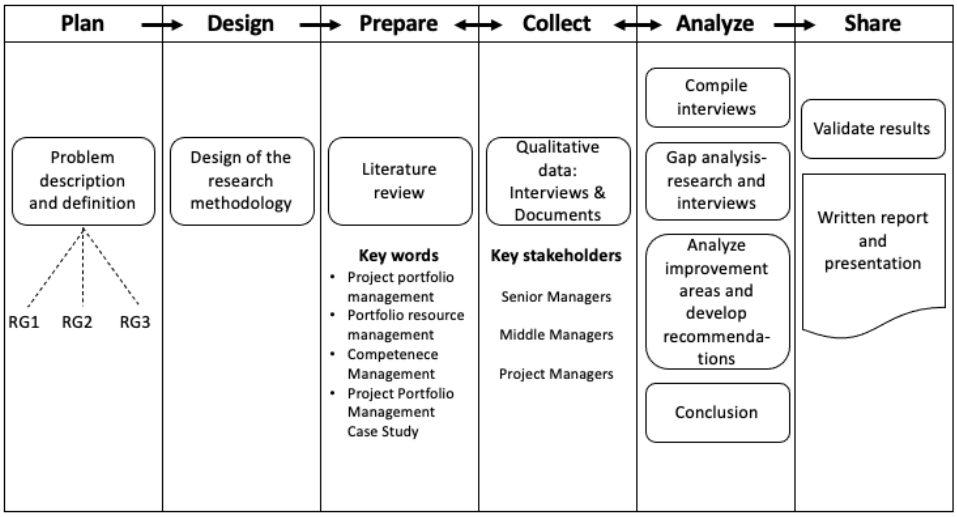

Figure 2.1 Process map of the methodology based on Yin (2018).

2.2 Plan

Yin (2018) stresses the importance of having a well-structured plan for data collection to incorporate diverse sources of evidence and to fairly analyze data. As mentioned, the main purpose of this master thesis is to identify the main improvement areas within project portfolio management (PPM) and provide Axis Operations (AO) with a recommendation on how to enhance PPM. Since the research purposes results in a *how* statement and the analysis includes several units of analysis at more than one level at Axis, it was decided to perform a case study according to Yin (2018). Additionally, the study was completed with guidelines and suggested actions, according to the normative structure provided by Björklund and Paulsson (2012).

2.3 Design

With the master thesis' purpose in mind, Yin (2018) recommends a normative embedded single-case study design. A normative embedded single-case study is useful when knowledge and understanding about the topic exists and the goal of the study is to give guidance and propose measures to take (Björklund & Paulsson, 2012).

A case study is an empirical research method that involves an in-depth investigation of a specific contemporary phenomenon, typically in a real-world context (Yin, 2018; Voss, Tsikriktsis & Frohlich, 2002). This research method is often used in various fields to gain a holistic understanding of a particular subject and potential factors influencing the subject. The design of a case study is quite flexible since it is possible to gather data from various sources, including interviews, observations, documents, and other relevant materials. Both qualitative and quantitative data collection and analysis methods can be used in case studies, however, qualitative data is the most common (Höst, Regnell & Runesson, 2006; Schwarz & Stensaker, 2016).

There are three main ways of going between theories and empirics: inductive, deductive, and abductive (Björklund & Paulsson, 2012). Inductive methodology involves deriving general principles from specific observations or cases. Deductive methodology begins with general principles and applies them to specific instances. Abductive methodology aims to infer the most likely explanation or hypothesis based on available evidence (Dubois & Gadde, 2002). Unlike inductive and deductive reasoning, abductive research offers the flexibility to explain, develop, or alter the theoretical framework at various stages whether before, during, or after the research process (Dubois & Gadde, 2002). The selection of an abductive research approach was deemed most appropriate given the inherent nature of the research objective.

The embedded design, which involves multiple units of analysis, is suitable when capturing various aspects of an organization is desired. For instance, if the study involves employees as sub-units within an organization, focusing on the target organization in the research is crucial, rather than individual employees (Yin, 2018).

2.4 Prepare

2.4.1 Literature Review

A literature review was used as a research method to address the research questions. The purpose of a literature review is to get a sense of what is already known and potential gaps in existing knowledge. Without an understanding of the subject and what has been done before, there is a risk of something being repeated and not contributing to existing knowledge (Höst, Regnell & Runesson., 2006; Jesson, Matheson & Lacey, 2011). Höst, Regnell and Runesson (2006) present an initial phase of the literature review, namely sourcing materials, as three steps. The initial step suggests a broad, exploratory search of material, where keywords have been used at selected databases. The databases include SCOPUS, LUBSearch and Google Scholar, all accepted outlets of academic material. The sources used from Google

Scholar were cross-referenced with SCOPUS check for their reliability and trustworthiness since Google Scholar is accessible to anyone and covers a wide range of different sources. Since PPM is not a new concept (Rowley & Slack, 2004), the year of publications has not been considered when choosing literature. These keywords included “project portfolio management”, “portfolio resource management”, “competence management”, “project portfolio management case study” and were used in different combinations in order to maximize the output of relevant articles. Selection includes an introductory reading of each relevant article, in this case study being the abstract, to assess the applicability to this case study. If the article is found to be of relevance, it moves on to a selected pool of articles that provide the broad literature base used in this case study. The other step of sourcing material is a deep search, which includes searching for specific subjects within the relevant area (Höst, Regnell & Runesson, 2006). This also includes building a further literature search in the reference list of the most relevant academic material, also referred to as backward snowballing (Badampudi, Wholin & Petersen, 2015).

Following the acquisition of literature, the complete literature review was conducted, inspired by the systematic literature review methodology outlined by Xiao and Watson (2019) and Höst, Regnell, and Runesson (2006), presented in figure 2.2. Initially, titles and abstracts were scrutinized to filter sources based on their relevance to the research goals, yielding a list of 68 potential sources. Subsequently, in the first reading cycle, the identified sources were examined to evaluate their quality, credibility, and relevance, each assigned a score ranging from 1 to 5. The criteria for quality, credibility, and relevance included considerations such as alignment with the research goals, comprehensiveness, and the published journal. Sources that received a score of 3 to 5 were deemed suitable for further analysis, while those with lower scores were excluded. The full list can be found in appendix A.

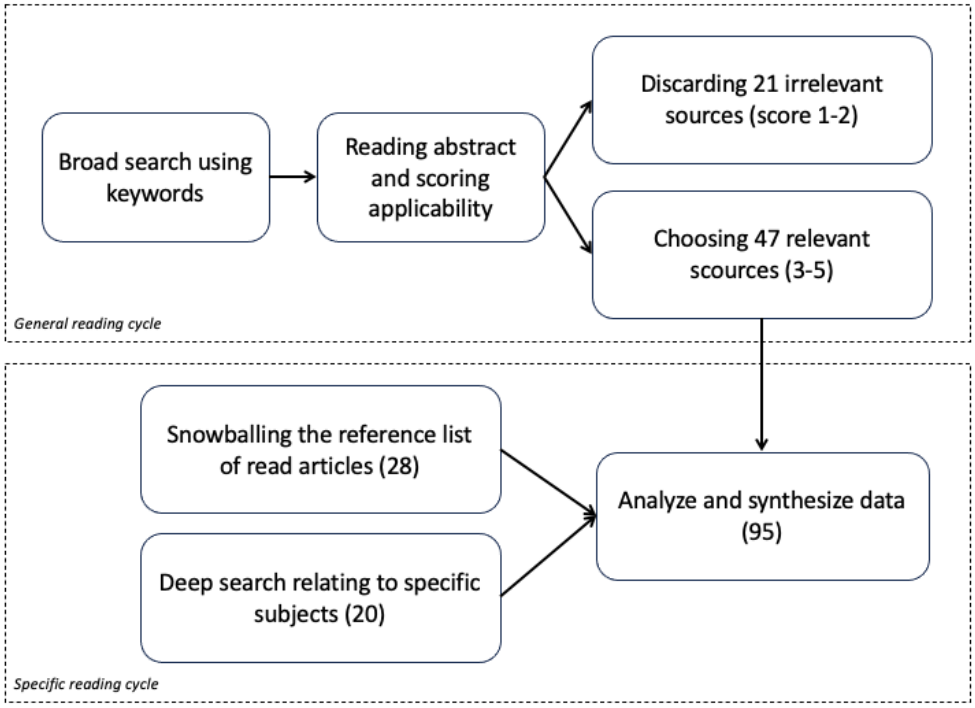

Figure 2.2 Literature review methodology inspired by Höst, Regnell and Runesson (2006) and Xiao and Watson (2019).

2.4.2 Preparations for Interviews

Yin (2018) highlights key factors in case study preparation, including understanding the issue, creating a protocol, and contacting candidates. A case study protocol was prepared for the interviews, as seen in Appendix B. The case study protocol outlines the research design, methodology and procedures that researchers followed throughout the project (Yin, 2018). With a clear and detailed protocol, the reliability, validity, and quality of the study was enhanced due to standardization, transparency, and consistency in the data collection. The protocol also reduced the risk of potential biases outlining strategies for minimizing bias in both data collection and analysis. It also addressed potential biases and ethical considerations, ensuring participant well-being.

Furthermore, Yin (2018) stresses the weight of desired skills and the value of the authors. As the data collection routines in case studies are flexible, it sets requirements on the author's intellect, ego, and emotions. Some of the mentioned desired skills are the ability to ask good questions, be a good listener, and stay adaptive in order to see encountered situations as opportunities and not threats. These skills were consciously employed during the interviews to enhance both the reliability and validity of the process and its outcomes. The interview questions were

formulated based on the literature review and discussions with the Axis supervisor, who also aided with the identifying and providing a list of interview participants. Before the interviews started, a pilot interview was conducted.

2.4.3 Pilot Interview

The final step in preparing for data collection involved conducting a pilot interview. The primary aim of this pilot interview was to refine the data collection plan. It served as a partially formative process, aiding in the development of pertinent lines of questioning. It is crucial to note that the pilot test is not a pretest focused on rehearsing the interview goal, as emphasized by Yin (2018). The insights gleaned from the pilot interview was summarized in a pilot interview report, highlighting crucial information for both research design and field procedures. This report suggested modifications for subsequent interviews. In the context of this project, a pilot interview was conducted, and the respective reports can be found in the pilot case report in Appendix C.

2.4.4 Selection Process

Höst, Regnell, and Runesson (2006) explain that the selection process of interview objects varies depending on what the research focus is and what people and resources are available. In this qualitative study, representativeness is not a focus, which means the selection of random interview objects is less critical. Instead, the focus is mainly on covering the variation within the available population. In this case, the supervisor at Axis chose interview subjects from the three managerial levels, defined by said supervisor, through a stratification process (Höst, Regnell & Runesson, 2006).

2.4.5 Interview Structure

To maintain a standardized interview guide with allowance for flexibility to clarify interviewee's answers, a semi-structured interview was deemed the most suitable method of data collection. Semi-structured interviews are most often used in social sciences for qualitative research and typically follows a predefined guide or protocol, centered around a core topic to offer a basic framework (Höst, Regnell & Runesson, 2006). As mentioned, they also allow for flexibility, which enables to pursue different topics as the discussion progresses.

2.5 Collect

The fourth step in the iterative process, presented by Yin (2018), is *collect* and the purpose is to clarify how the data is gathered from each source. The data collected in this study focuses on identifying key stakeholders throughout the AO organization and choosing the right people to interview. Appendix D outlines key stakeholders identified by the Axis supervisor, including their job titles, roles in the PPM structure, interview dates, and interview durations. Most of the interviews were conducted at the AOs office and in person. If not, they were conducted online on Teams. Each interview was recorded, and notes were taken to ensure reliability related to what each interview person said.

Additionally, background and informative walkthroughs of project methodology, Operations organizational structure, and research and development's (R&D) portfolio management structure were conducted. These activities aimed to ensure a correct and informed picture of current structure and methodologies, but also improving the final recommendation after the literature study and interview processes.

Furthermore, alongside the interviews, documents related to PPM and project management were collected and reviewed. The authors were assigned with encrypted computers, providing access to relevant information through Axis's intranet. The data was therefore also considered highly trustworthy. The considered data consisted of organizational charts, instructions, processes, methods, and routines. Relevant details and key information aligning with the research goals were highlighted. In conclusion, interviews, walkthroughs and reviewing internal documents were iterated in order to ensure relevant and reliable data was collected, as seen in figure 2.3. For example, checking what the internal documents say about the stage-gate process compared to the walkthroughs and interviews.

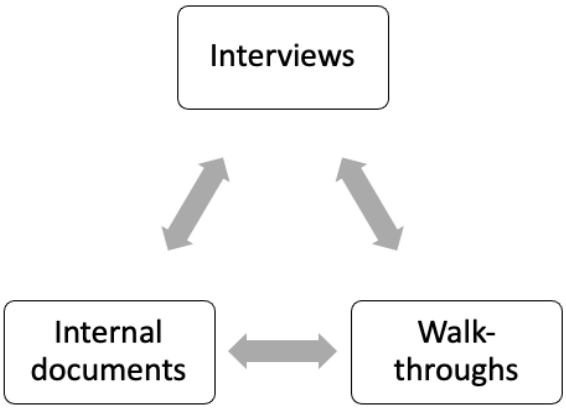

Figure 2.3. Iterative process of data collection.

2.6 Analyze

After the interviews, the recordings and notes were reviewed, categorized, and analyzed between the three different managerial levels. Since the identification of themes is driven by both literature review and interview data, Brown and Clarke (2008) suggest an abductive thematic analysis. This method results in a more detailed analysis of the chosen aspects of the data; however, it also tends to provide a less rich description of the complete data. This method is incorporated with the theme identification methodology presented by Ryan and Bernard (2003), meaning the identification method used was *repetition, similarities,* and *differences,* and *cutting and sorting*. After discovering and comparing themes in both the interview data and the literature, the most salient themes were identified and chosen.

The data collected from the documents was systematically analyzed and selected based on the literature review and interviews. The results were later complemented with the data collected from the interviews and the literature review in order to be able to triangulate the data (Natow, 2020).

Finally, a gap analysis was conducted to identify areas between the existing literature on PPM and the current AO practices where improvements can be made, and further research is needed. By comparing prior research with interviews and documents, this thesis aims to address unresolved questions, fill knowledge gaps, and contribute to the advancement of PPM theory and practice. These gaps and improvement areas set the foundation for the subsequent recommendations. The analytical process is summarized in figure 2.4.

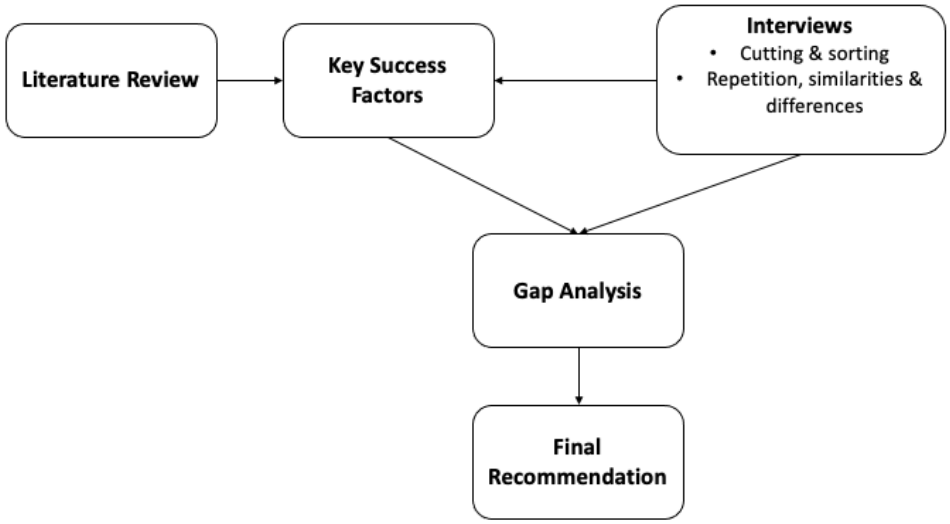

Figure 2.4. The analytical process resulting in the final recommendation.

2.7 Share

There were three feedback sessions with selected interview participants, two with senior and middle managers and one with a project manager, regarding the recommendations after the analysis and before the final recommendations were decided. This was in order to tailor and validate the recommendations to ensure relevance and impact at AO. The discussion from the gap analysis results in and is presented as recommendations. The result from this study is presented in this written report and in a final oral presentation for AO and at the LTH Innovation Department. This structure was chosen as it allows for a clear overview and presentation of the identified key success factors in PPM, AO's current challenges and opportunities, and finally the conclusive recommendation. This way of presenting also maintains a chain of evidence (Yin, 2018).

2.8 The use of generative AI technology

During the process of writing the master thesis, generative AI technology has been used, more specifically ChatGPT OpenAI. Since the chatbot has versatile capabilities to enhance the efficiency and quality of the report, it has been used and applied in various aspects. Initially, the chatbot was used to generate basic knowledge about the phenomenon of PPM, suggesting introductory ideas for the background to build upon. Furthermore, ChatGPT has been employed to generate ideas and offer alternative perspectives on the selected topic and report structure, while also providing valuable insights that enhanced both the discussion and final recommendations. Additionally, ChatGPT have played an assisting role in proofreading, identifying grammatical errors and offering suggestions for improving the clarity and consistency of some sections of the report.

2.9 Ethical Considerations

Since the project involves human affairs, protecting human subjects is a fundamental ethical consideration in the report. To gain consent and protect privacy and confidentiality, all the participants were informed from the beginning of the study through email about the purpose of the study and the procedure. This information was also repeated at the beginning of every interview. In the report, the participants will be referred to by their simplified title or associated group. Furthermore, all written and recorded documentation is obtained with the explicit consent of the participants and is treated with confidentiality and integrity (Yin, 2018). Only the authors of this report will be able to access the data.

2.10 Quality of Research Design

Yin (2018) emphasizes the importance of evaluating the quality of a research design as a fundamental step in ensuring the credibility and impact of a study. A well-constructed research design enhances the four relevant aspects: construct validity, internal validity, external validity, and reliability. An example of improving the overall quality of the research design is the semi-structured interview methodology, together with the thematic analysis of the results and a literature study, which ensures the possibility of triangulating the data. The purpose of triangulation is to increase the quality of the validity, reliability, and research data (Natow, 2020). For each criterion, the definition and the measures taken, to ensure the project's research credibility, will be explained based on Yin's (2018) definitions.

2.10.1 Construct Validity

Construct validity is a key concept in research that assesses the extent to which a measurement or test truly captures the theoretical construct or trait it is intended to measure. It evaluates whether the instrument accurately reflects the underlying concept it is designed to assess. Construct validity was built by establishing a thorough case study protocol to state the collected data and why it was collected. Additionally, in order to reflect different perspectives on the PPM phenomenon, multiple individuals at several different managerial positions and functions at Axis were interviewed. The semi-structured interview methodology ensured the same main set of questions were asked to each participant to strengthen construct validity.

2.10.2 Internal Validity

Internal validity assesses the degree to which the observed effects within an experiment can be confidently attributed to the manipulated independent variable, rather than being distorted by other factors. In this context, the concern revolves around whether the researcher presents a convincing causal argument, a form of logical reasoning that possesses sufficient strength and persuasiveness to support the research conclusions. To make the interview results trustworthy, the chosen methodology demands methodological awareness. Being conscious of potential risks in the interpretation of the material and ensuring that what is intended to be measured is indeed what is being measured (Höst, Regnell & Runesson, 2006). Nowell, Norris, White & Moule (2017) argue for two criteria to achieve credibility in the interpretation of material during thematic analysis. The first, audit trails, involves being transparent in the decisions and interpretations made (Nowell et al., 2017). Additionally, Nowell et al. (2017) emphasize the importance of reflexivity, meaning that as researchers, one should be self-critical in the choices and interpretations made. The establishment of internal validity involves aligning

qualitative data with the theoretical framework. This framework relies in this study on triangulation, incorporating multiple sources to validate the research findings.

2.10.3 External Validity

External validity, referred to as generalizability, is a critical aspect that assesses whether findings should be generalized beyond the study and to as well as across different measures and settings. Since the empirical data gathered in this report is exclusively from Axis, the generalizability is considered low. The theoretical framework is, however primarily embedded in the well-recognized academic literature about project management, PPM, and change management. The framework is therefore considered generalizable.

2.10.4 Reliability

Reliability refers to the consistency, stability and repeatability of measurements or findings and the goal is to reduce the errors and biases in a study. This implies that a reliable research methodology should provide the same findings and conclusion when the same procedure is conducted. In this report, reliability was created by defining and describing a clear case study protocol and a detailed interview procedure explanation. This allows the reader to assess the reliability of the case findings.

3 Literature Review

The literature review consists of two parts. The first part of the literature presents several definitions of what PPM includes and the different managerial levels it includes. The second part names the five different key success factors to PPM success and what they include, based on academic literature and several case studies.

3.1 Definition of Project Portfolio Management

There are several existing definitions of project portfolio management (PPM). A common denominator when describing PPM is the emphasis on centralized management of one or more project portfolios, harmonizing the collaboration between strategy, resources, and executive oversight (Levine, 2005; Cooper, Edgett & Kleinschmidt 1997). Table 3.1 presents five definitions of PPM and its purpose. The fifth definition is made by the large language model Chat GPT and was included partly due to the supervisors' encouragement, but also related to its availability, increasing usability, and efficiency today (Mulia, Piri & Tho 2023; Shaikh, Glavee-Geo, Karjaluoto & Hinson 2023).

Table 3.1 Five definitions of Project Portfolio Management

Article	*PPM Definition*
Archer and Ghasemzadeh (1996, p. 4)	"A group of projects that are carried out under the sponsorship and/or management of a particular organization."
Blichfeldt and Eskerod (2008, p. 358)	"The managerial activities that relate to the initial screening, selection and prioritization of project proposals, the concurrent reprioritization of projects in the portfolio, and the allocation and reallocation of resources to projects according to priority."
Meskendahl (2010, p. 1)	"The simultaneous management of the whole collection of projects as one entity."
Cooper, Edgett and Kleinschmit. (1997, p. 16)	"A dynamic decision process, whereby a business's list of active new product projects is constantly updated and revised. In this process, new projects are evaluated, selected, and prioritized; existing projects may be accelerated, killed or de-prioritized; and resources are allocated and reallocated to the active projects."
Asking Chat GPT (OpenAI ChatGPT, 2024)	"A strategic approach to centrally manage and optimize a collection of projects and programs within an organization. It aims to align these initiatives with the overall business strategy, prioritize resources efficiently, and ensure that projects collectively contribute to organizational objectives."

As the phenomenon of PPM can be adjusted and applied in several different settings, the area of the literature is extensive, and its definition also varies and can relate to its specific context. The most common definition relates to product development, which is why several different ones have been presented above. However, as there is an overlap in the definitions above, meaning each definition is relatively similar to the next one. The authors present a combination of these definitions to apply in this report. This definition, which will be the basis for this study, describes PPM as: "The strategic approach and dynamic decision process to centrally manage and optimize a collection of projects and programs within a particular organization. In its process, projects are evaluated, selected, and prioritized to align with overall business strategy with concurrent reprioritization of projects, and resources are allocated and reallocated according to priority".

3.2 Components of Project Portfolio Management

The PPM framework often encompasses different managerial levels to provide an end-to-end understanding, namely portfolio, programs, and projects (Bible & Bivins, 2011; Parviz & Levin, 2006). To get a more comprehensive understanding of the three levels of PPM, each level is defined and described relating to its definition and the main objective in Table 3.2 (CapGemini, 2010).

Table 3.2 Definitions of the three levels of PPM and its relation to the main objectives and each level of decision-making.

Area	*Definition*	*Main Objective*	*Decision-making level*
Portfolio	A group of programs and/or projects managed in a coordinated way to support business strategy and to deliver benefits in line with strategic objectives	Portfolio management focuses on doing the right things	Senior management level, often cross-functional
Programs	A set of interrelated projects managed in a coordinated way to attain the business objectives and benefits	Program management focuses on realizing the benefits	Middle-senior management level, often cross-functional
Projects	A project is a temporary endeavor to create a unique improvement related to a specific mission and goal	Project management focus on doing the things right	Project management or operational level

To further understand the constituent parts of the PPM structure, figure 3.1 visualizes the relation between the mission, vision, values, goals, objective, and operations and projects (Bible & Bivins, 2011, p. 22). It indicates the importance of a mission and the organizational values, and in that, culture, which encompasses all activities in a PPM framework. Mission and vision are critical elements of the strategy of an organization. A clear understanding of the mission and vision facilitates strategic planning, leading to relevant and achievable goals and objectives (Bible & Bivins, 2011; Taiwo & Lawal, 2016). The objectives should be specific, achievable, measurable, and directly supporting the goals, to reduce ambiguities within the organization.

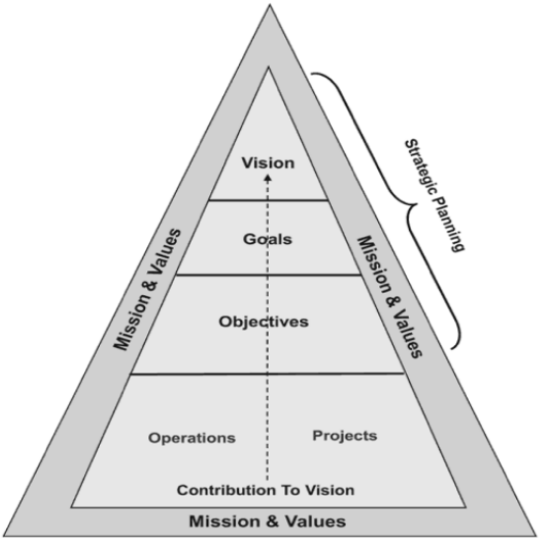

Figure 3.1 Visualization of relations between the components in strategic planning (Bible & Bivins, 2011, p. 22).

The different managerial levels also correlate with the different sections of the strategic planning structure, according to Bible and Bivins (2011), as certain strategic decisions must be made from the right seniority level of management. The mission, values and vision of the organization are set by senior management and are translated to portfolio management, where a clear vision and mission guide the way of the organization, surrounded by cultural values. The vision and mission are then translated into goals and objectives by middle-senior management, where a stratification process divides the portfolio into programs that focus on more specific goals. Finally, the goals and objectives in the programs are made operationalized by projects and in the day-to-day operations within the organization by either project or operational management. All the while, the entire structure and all activities are imbued by the organizational mission and values, embedded in the culture, as seen in figure 3.1.

3.3 Key Success Factors

The collected literature names many different success factors concerning the PPM structure and there are several perspectives on the subject. Terminology is often different even though authors are naming similar specific parts of the overall factors. In addition, literature often names product development as the main focus, meaning some factors are not as relevant in this study as others. The five identified areas are the result of gathering the most prevalent and relevant success factors throughout

the literature, all the while keeping in mind the PPM in this study relates specifically to operations activities.

3.3.1 Organizational structure

Organizational growth has a great impact on both the organization and culture and often results in a need for more structure. The expansion of both employees and the increase in sales volume introduces new dynamics and complexities since managing growth may involve a different set of considerations and new strategies (Greiner, 1998). This highlights the need for organizational adaptability and targeted approaches to address the evolving issues that come with growth. For instance, the decision-making speed will put strains on managers and the organizational structure under stress since the traditional structure is not designed to handle these requirements (Kotter & Sathe, 1978). In addition, Greiner (1998) also suggests that an organization's future is often shaped more by its internal history than external forces. Many companies fail to recognize the valuable insights within their own developmental stages.

That companies pass through a series of recognizable stages as they grow and evolve, have consistently been argued about in the academic literature. This phenomenon is referred to as the organizational life cycle and through these stages, they encounter distinct challenges and necessitate different management approaches, priorities, and structural configurations. While various theories and models have been developed to explain the life cycle process over the years, such as the Greiner (1998), Churchill and Lewis (1983), and Dufour, Steane, Corriveau (2018), they differ in terms of the number of stages identified, the characteristics examined, and the name given to each stage. Despite their variations, there is consensus regarding the existence of common patterns in organizational evolution. Greiner (1998) specifically stresses evolution, but also revolution in his model. Evolution refers to prolonged growth periods without major upheaval in organizational practices and revolution describes periods of substantial turmoil in organizational life. The different theories agree on how organizations progress through distinct stages and highlight the idea that management approach for one stage may become ineffective in subsequent stages. In table 3.3, findings and main characteristics of each individual life cycle and its stages are summarized and characterized.

Table 3.3 Summary of the three life cycles of organizations with each stage and its characteristics

Authors	*Stages of Life Cycle*				
Greiner (1998)	**Phase 1** The main goals is to create a product and market	**Phase 2** Characterized by efficiency, centralized U-form structure implementation of IT systems	**Phase 3** Delegation, decentralized units and acquisition	**Phase 4** Coordination, consolidation	**Phase 5** Collaboration, problem-solving, matrix structure, information system for daily decision-making
Churchill and Lewis (1983)	**Existence** Focus on survival, simple structure, the owner is the one leader	**Survival** Simple, minimal formalization, minimal system development, focus	**Success** Separation of ownership and management, grow and stabilize	**Take off** Decentralization, operational and strategic planning	**Resource Maturity** Consolidate and control the financial gains, risk of stagnation and low innovativeness
Dufour, Steane and Corriveau (2018)	**Acting the Future** Where and how do we want to go? Where are we now?	**Reflecting the Past** Are we satisfied with our performance/what we are doing in this industry?	**Acting the Past** How can we do even better what we are already doing?	**Thinking about the future** Where are we now? Where do we want to go and how do we get there?	

3.3.1.1 Project Portfolio Management Office

Single projects can no longer be treated as isolated entities, stated by Müller, Martinsuo and Blomquist (2008), but as the number of projects increases, the complexity of managing multiple projects simultaneously increases as well. This is a challenge organizations have to master in order to achieve their mission and vision, and it is addressed through PPM (Unger, Gemünden & Aubry, 2012; Mosavi, 2014). However, together with the increasing importance of PPM, comes a new unit and a new managerial role; the project portfolio management office (PPMO) and its associated manager (Jonas, 2010; Unger, Gemünden & Aubry, 2012). The best practices from several case studies indicates having clear ownership of the portfolio is one the main improvement areas (Appelberg & Stenbeck, 2018; Delibasic, 2011; CapGemini, 2010; Shaltry, Drew and Horgan, 2002; Ajjan, Kumar and Subramaniam, 2016, Miguel, 2008). Implementing a PPMO or a centralized office serves the purpose of ensuring strategic alignment of multiple projects and efficient resource allocation to facilitate a comprehensive overview. Ajjan, Kumar and Subramaniam (2016) adapted PPMO by establishing five processes within IT portfolio management, namely, program office and team, implementation methodology, communication plan, portfolio creation, and assessment of processes.

The responsibilities and amount of support may vary depending on the significance of the project office, but the main purpose of this new role is to improve effectiveness and efficiency by being a key person in planning and controlling complex projects (CapGemini, 2010; Unger, Gemünden & Aubry, 2012; Patanakul, 2022). The function must, however, be aligned with the overall organizational management framework and strategic goals to effectively contribute. Studies have shown that the stronger the relationship is between a function that is responsible for managing the project portfolio and the project managers, the higher the degree of PPM effectiveness (Patanakul, 2022; Unger, Gemünden & Aubry, 2012).

Unger, Gemünden and Aubry (2012) argue that the PPMO includes three roles: *coordinating role, supporting role,* and *controlling role*, where each affects the quality of PPM differently, as seen in figure 3.2. The *coordinating role* is responsible for allocating resources to projects across the portfolio in order to mitigate the risk of failure in the allocation process. When PPMOs assume the coordinating role, there is a more reliable enforcement of resource commitments, which in turn will positively contribute to the quality of both resource allocation and cooperation. The *controlling* role is supposed to create a transparent foundation of information since maintaining this can enhance the quality of information. The *supporting role* strives to develop standards, methodologies, and tools in order to improve the communication and transfer knowledge between projects. However, the result of Unger, Gemünden & Aubry (2012) shows that the supporting role supports single project success but has no significant impact on either cooperation or information quality.

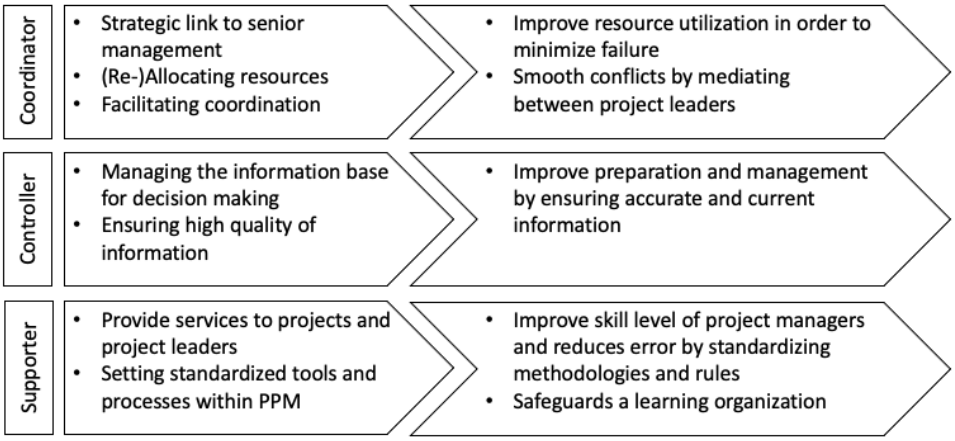

Figure 3.2. A simplified framework for PPMO configuration (Unger, Gemünden & Aubry, 2012).

However, the implementation of a PPMO faces several potential challenges and is often likely to fail (Kendall & Rollins, 2003; Hobbs & Aubry, 2007; Singh, Keil & Kasi, 2009). PPMO is often seen as too costly and as contributing too little to the project and program performance (Hobbs & Aubry, 2007). The primary purpose of a PPMO is to help the organization to achieve its goals but if the value propositions are not defined, it is most likely to be considered as wasteful (Kendall & Rollins, 2003). PPMO initiatives can be perceived by teams as unnecessary overhead. Without demonstrating clear benefits to the work community, PPMOs are at risk of failing to sustain themselves, especially in challenging economic conditions. This is also closely related to organizational resistance, which is another common challenge organizations face when implementing PPMO (Singh, Keil & Kasi, 2009; Kendall & Rollins, 2003). Kendall and Rollins (2003) argue that when the resistance from functional units surpasses the perceived value of the PPMO, it is at risk of suffering diminishing importance and potential dissolution. Singh, Keil & Kasi (2009) claim that in order to successfully implement a PPMO, it is often required to change the mindset and the way of working of the organization, which is difficult. Moreover, it has been found that most PPMOs have unstable structures, and they are frequently reconfigured by organizations (Hobbs, Aubry & Thuillier, 2008; Singh, Keil, Kasi, 2009). Many organizations may not always staff the PPMO with project managers (PM) who are experienced or who have led large PPMO projects. With inadequately experienced PPMO leadership, the PPMO implementation fails due to a lack of understanding of the scope, incorrect estimation of the number of resources required, and the impact of internal and external changes, for example, changes in budget or sudden compliance requirements. PPMO as an unstable structure may also lead to it being positioned too low in the management reporting structure. Kendall and Rollins (2003) claim that PPMOs operating under the radar may face blame for project failures without the authority or visibility to address issues effectively.

In order to succeed with PPMO, it is essential to have the “right” people, tools and data (Singh, Keil and Kasi, 2009; Kendall & Rollins, 2003). Singh, Keil & Kasi (2009) suggest having a “PPMO champion”, who actively advocates for the value of PPMO. This goes in line with Kendall and Rollins (2003), who claim the “right” people must have the skills to market and communicate the message in order to ensure collaborations and build trust. Through the right people, it is also possible to overcome the lack of experienced PPMO leadership. “Right" data, which is accurate, relevant, and timely, is essential for effective decision-making and project management. With access to this data, the PPMO can improve project delivery (Kendall & Rollins, 2003). CapGemini (2010) emphasizes that relying solely on implementing a PPMO to address challenges is not sufficient. Instead, they argue for adapting project models and methodologies to align with the specific needs of the company and to ensure the effective execution of the projects.

3.3.2 Resource Management

A crucial factor in optimizing PPM is resource management and implementing a dynamic capability of prioritizing the available resources, stated by Blichfeldt & Eskerod (2008) as one of the main problems in PPM. Resource management and related activities, e.g., resource allocation and reallocation, is also identified as one of the critical success factors related to PPM success by several case studies (Appelberg & Stenbeck, 2018; Lundell & Roxlin, 2021; Delilbasic, 2011; Shaltry, Drew & Horgan, 2002). Lengnick-Hall and Wolff (1999) explained the resource management issue with the “dynamic capabilities” framework, which enables organizations to effectively respond to changes in the dynamic environments in which they compete (Teece, Pisano & Shuen, 1997). This framework focuses on the processes used in organizations to integrate, build, and reconfigure their resources to compete in dynamic environments. Killen and Hunt (2010) found that the dynamic capabilities framework is useful perspectives that can help to explain the mechanisms through which PPM contributes to competitive advantage. Typical and iterative managerial activities are recognized as dynamic decision processes, which ultimately translate into a constant management challenge to senior management (Unger et al., 2012).

There are several different identifications of what is meant by resources and which of these resources are included in a PPM framework. Hyväri (2014) presents a case study where resources were defined as four factors: finance, human, material and equipment. These resources also defined the limit for the portfolio, related to how many projects could be managed simultaneously. Killen and Hunt (2010) exemplified resources in PPM as people, knowledge, assets, and product development capabilities. No matter how one defines the resources needed within the PPM structure, a common theme is that the resources are scarce and that managing them correctly is crucial for PPM success (Elonnen & Artto, 2003; Blichfeldth & Eskerod, 2008; Patanakul, 2022).

3.3.2.1 Resource allocation and reallocation

In order to strengthen the position of PPM as a dynamic capability, able to handle changes and disruptions in the organizational climate, it is clearly relevant to have a resource allocation and reallocation process to directly deal with changes in the resource pool (Helfat et al., 2009; Hendriks, Voeten & Kroep, 1999). In a multi-project environment, there are always a number of projects drawing critical resources from a common resource pool (Engwall & Jerbrant, 2003). According to Kendall and Rollins (2003), resource capacity is limited by two factors; the company's strategic resources and the amount of money a company is ready and able to invest in the portfolio regarding resources. The strategic resources can be defined as the resources with the highest workload in most projects or the resources most sought after. It is a continuous challenge to allocate resources and balance all projects in such an environment. Additionally, the importance of having a project termination process, further expanded in subsection 3.2.4, in order to decide where resources are best used, will rapidly impact the flow of resources and it is therefore crucial to always have resource allocation as an essential task at each crosspoint (Hagman, Månsson & Nordström, 2002).

Furthermore, resource bottlenecks need to be identified in order to better allocate resources in regard to the portfolio capacity (Kendall & Rollins, 2003). A company must invest in its strategic resources in order to maintain effectiveness in the capacity of the portfolio. Most companies, however, structure the planning around resource allocation from a short-term perspective (Hendriks, Voeten & Kroep, 1999). This factor, together with the fact that scheduled resources often tend to change, as seen in the case study by Lundell and Roxlin (2021), makes the allocation process a major challenge. A lack of sufficient communication between PMs and resource owners results in changes rarely being notified before they occur, as noted by Kendall and Rollins (2003). Here, Hendriks, Voeten and Kroep (1999) presents five elements vital for resource allocation to ensure multi-project success, with the three allocation processes summarized in table 3.4.

- Long-term-resource-allocation: Staffing appropriately typically takes several months. This plan, based on the business plan specifying needs for each discipline, translates into yearly budgets for departments and groups, with resource allocations reflecting anticipated changes in efforts over the coming years.
- Medium-term-resource-allocation: A periodical review is needed in order to stabilize and balance the long-and short-term planning, as changes in the portfolio within a year is inevitable. The main input is the long-term-plan and the output needs to be in line with the short-term plan. The medium-term also needs to give decision rules, in order to make clear which task to be executed first in case of resource conflicts. The planning must be in agreement with PMs and resource owners as the total resource claim exceeds the number of available resources.

- Short-term-resource-allocation: Using the long-term-resource plan and the decision rules from the medium-term plan, the short-term plan is the main input for the day-to-day planning of individual resources for the coming week. Almost all deviations can now be handled by function leaders in close harmony with PMs.
- Links: There needs to be a connection between the long-, medium- and short-term planning, giving each other continuous information in order to make the right decisions.
- Feedback: The links and communication between the three levels can be made better by a feedback and evaluation loop, where the input is compared to the real effort. This results in a better allocation process.

Table 3.4 The three resource allocation processes with each specific purpose, output, frequency, and planning horizon.

Resource allocation process	***Purpose***	***Output***	***Frequency***	***Planning Horizon***
Long term	Capabilities needed to achieve business plan	Department plan Yearly budget	yearly	5 years
Medium-term	A rough-cut capacity plan for the project portfolio	Projects to be executed Decision rules for PMs Analyses of the effects on the milestones of the projects Agreed rough allocation as input for short-term plan	quarterly	±1 year
Short-term	Operational day-to-day assignment of people	Assignment of tasks to people, within the medium-term resource allocation assignment	bi-weekly	±6 weeks

A case study by Miguel (2008) implemented resource matrices in order to balance personnel and resources in short- and medium-term planning. The matrix included project leaders, the count of individuals in each project, their functional area, responsibility and authority levels in each project, and the current project status. Similarly, Appelberg and Stenbeck (2018) recommend Alfa Laval to implement a "Dependency matrix" in order to visualize interdependencies between projects in order to enhance resource allocation. Resource allocation is often also supported by IT systems. In 2018, Medex implemented the PPM software tool Planisware. The software tool provides automated project reporting, comprehensive project and investment overviews, cost management tools, and a platform for resource management (Lundell & Roxlin, 2021). Planisware allows Medex to structurally and holistically allocate and plan resources. The project portfolio manager is responsible for maintaining updated information within the system. By 2020, the company also introduced "internal debiting" in order to provide a more accurate

representation of resource costs within projects, fostering awareness of actual resource expenses and enabling more precise project planning. However, despite efforts to plan and allocate resources, all three case companies experience changes in scheduled resources. This situation highlights a common challenge in resource management and communication within the organization.

3.3.2.2 Reliable resource information

Abrantes and Figueiredo (2015) identified the absence of dependable resource data as a primary obstacle, emphasizing its significance for achieving PPM efficiency. Similarly, Shaltry, Drew, and Horgan (2002) confirm this limitation in their case study, underscoring the crucial role of robust resource management information in establishing PPM capability. All resource management decisions should be based on collected information, generated at both project and program level, independent from each other in order to achieve corporate objectives related to the portfolio (Thiry & Deguire, 2007). Often, these decisions require a great level of detail and a high level of information and situational awareness, which makes them difficult to model and predict in advance (Abrantes & Figueiredo, 2015). It is often assumed that this information simply exists or is estimable at the beginning of a project, whereas the real case often indicates limited information availability, resulting later on in a resource conflict situation on a portfolio level (Abrantes & Figueiredo, 2015). Therefore, resource management procedures need to ensure that resource information is quickly gathered and consolidated to enable effective and correct decisions to be made in relation to resource allocation and reallocation (Petit, 2011).

3.3.2.3 Competence Management

The concept of competence management involves the organization and control of competencies within a corporation, its groups, or the individuals within those groups (Harzallah, Berio & Vernadat, 2006; Medina & Medina, 2015). Laakso-Manninen and Viitala (2007, p. 27) define competence management as *"the activity that aims to safeguard and strengthen a company's operating capability and competitiveness by means of its knowledge base"*. However, the authors state that in order to be able to effectively address a company's future operations, it is crucial to begin with a clear understanding of the direction it is heading.

Competence management has become increasingly important, as it complements core business processes, customer relationships, financial issues, and other aspects of achieving company goals (Medina & Medina, 2015; Laakso-Manninen & Viitala, 2007. Further, companies today must continually adapt to compete in today's dynamic environment due to the increased competition in the market and the need to shorten lead times or increase innovation, where it is critical to manage both competencies and human resources well (Harzallah, Berio & Vernadat, 2006; Laakso-Manninen & Viitala, 2007).

However, ensuring the acquisition of the right competencies through competence management necessitates direction, definition, evaluation, planning, and

development, in other words, a process. Laakso-Manninen and Viitala (2007) present a 2x2 matrix to identify core competencies both today but also in the future, regarding projects. The relationship between the projects and the core competencies are used as a tool to aid senior management in finding and mapping what competencies the organization has but also what is needed to invest in to secure current and future project needs. This matrix has been adapted from the one presented by Laakso-Manninen and Viitala (2007), where "markets" has been replaced by "projects". This factor is added into the matrix, as shown in figure 3.3.

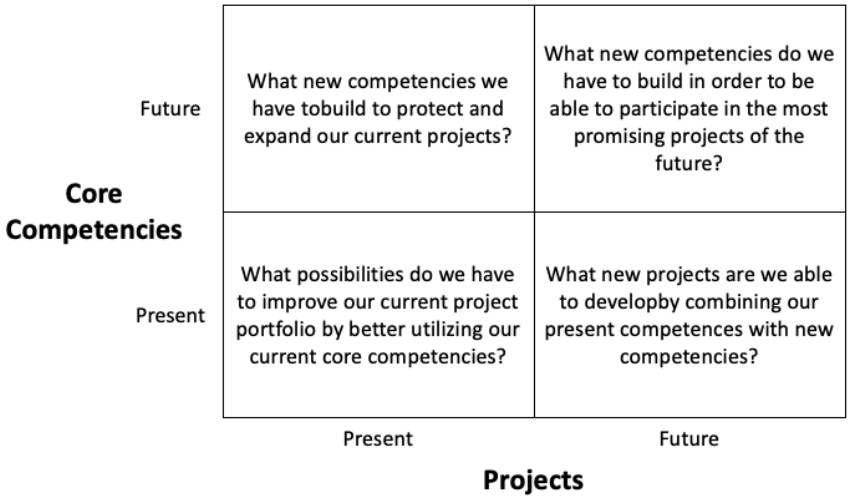

Figure 3.3. Relationships between core competencies and projects. Figure adapted from Laakso-Manninen and Viitala (2007).

3.3.3 Strategic Alignment

Another key success factor for successful PPM performance, in both literature and best practices, is to have clear strategic goals, including project management, selection and portfolio being linked to the strategy (Dietrich & Lehtonen, 2005; Appelberg & Stenbeck, 2018). The strategic fit of the project portfolio describes the degree to which the collection of projects and activities related reflect the business strategy (Lundell & Roxlin, 2021: Miguel, 2008). If projects within the portfolio are not well-aligned with the organization's strategy there is a risk of investing resources in initiatives that do not contribute effectively to the overall objectives (Filippov, Mooi, Weg & Westen, 2012; Parvin & Levin, 2006; Elonen & Artto, 2003). Internal politics and power struggles, due to misalignment and miscommunication, could also have an impact on the prioritization process negatively (CapGemini, 2010). Filippo et al. (2012) and Lundell and Roxlin (2018) argue that the inability to align

the projects with the strategy is influenced by the initial portfolio establishment and continuous portfolio steering. These two studies stresses that achieving greater strategic alignment is possible when the processes are tailored for the organization.

3.3.3.1 Communication

Strategic alignment is strongly influenced by communication. Communication is a vital part of successful projects to be able to build relationships with people and groups across the whole organization (Ramsing, 2013), which is further emphasized by several case studies (Delilbasic, 2013; Lundell & Roxlin, 2021; Shaltry, Drew & Horgan, 2002). With these relationships, it is possible to foster collaboration, share knowledge, and promote the effective use of portfolio management practices across organizations (PMI, 2015). However, the quality of information is largely responsible for the quality of decisions (Dietrich & Lehtonen, 2005; Elonen & Artto, 2003). However, despite communication plans, several channels for spreading information, organizations struggle to find the balance. Elonen and Artto (2003) argue that even with advanced portfolio selection and continuous portfolio steering, managers tend to struggle in the overflow of information, which affects the effectiveness of decision-making. Conversely, Hyväri (2014) notes that while portfolio management teams and project portfolio managers express the communication as effective and sufficient, individuals within the business functions highlighted a need for increased ongoing dialogue and communication. Lundell and Roxlin (2021) found that a poor connection between different managerial levels is often experienced as lack of communication. Furthermore, Delilbasic (2011) found increased communication both within and outside projects is an important strength.

Mosavi (2014) describes a common case, exemplifying the lack of established communication channels. The discussion on how to "puzzle the pieces" when incorporating new projects, how to adjust the portfolio plan, and re-prioritize current projects, often starts at any time before the official PPM meeting. Information on the new project, resources, and the market is discussed informally over lunch, phone calls, or drop-bys, not in the proper channel. Consequently, certain stakeholders had an idea on what to do, and a consensus, hence a decision, was in practice reached outside the official PPM meeting.

Macheridis (2010) names three types of communication tools and how they are used both formally and informally, presented in table 3.5. Formal communication means that the exchange of information always follows various formal rules within formal frameworks in a formal manner. Oppositely, informal communication is more spontaneous and often understandable but sometimes not entirely logically coherent (Macheridis, 2010). Well-functioning informal communication channels strengthen the organizational culture and alignment (Macheridis, 2010). This is also pointed out as an important part of strengthening PPM by Shaltry, Drew and Horgan (2002) in their case study.

Table 3.5 The formal and informal versions of different communication forms (Macheridis, 2010, p. 168).

Communication	*Formal*	*Informal*
Oral	Meeting	"Hallway talk"
Written	Protocol Report	E-mail
Visual	Organizational chart	Video conference

The main responsibility of establishing a proper communication structure lies with the portfolio manager, according to Rad and Levin (2006), who should design, develop, implement, and maintain a portfolio management information system documenting both tactical and strategic data. The tactical data address the ongoing projects, while the strategic data relates to the selection of new projects and termination of existing projects considering organizational objectives (Kendall & Rollins, 2003). Data contained in the system needs to be accurate and reliable, meaning data should be submitted when due, updated as required, used in consistent templates, and aggregated to meet the requirements of the different stakeholders in the PPM process (Rad & Levin, 2006).

Berkun (2008) relates communication directly with the importance of building relationships, defining roles, and having or encouraging a positive and constructive organizational culture. Proper communication is vital to the success of projects, and strong communication and personal relation skills are key for all stakeholders to possess in order to succeed with the projects an organization takes on (Ramsing, 2013).

3.3.4 Governance

Corporate portfolio governance is defined as: *"the ongoing activity of maintaining a sound system of internal control by which the directors of an organization ensure that effective management systems have been put in place to protect the assets, earning capacity and reputation of the organization"* (Jenner & Kilford, 2011, p. 24). Jenner and Kilford (2011) claim that both practical experience and research support that a key factor behind successful PPM implementation is effective governance. Portfolio management and governance support PPM success by linking projects to the organization's strategic objectives, providing a framework of rules and practices of the portfolio to ensure best practice, providing clarity and assurance on the progress of projects, and clarifying responsibility and accountability in the portfolio decision-making process (Jenner & Kilford, 2011). Clarity means what decisions are made, where and by whom, and the criteria used when reaching those decisions. Additionally, it is noted that the governance structure needs to be well

documented, effectively communicated and understood throughout the organization in the portfolio management (Jonas, 2010).

3.3.4.1 Project and portfolio measurement

Jenner and Kilford (2011) state that there needs to be a distinction between change initiatives included in the organizational portfolio and the ones that are not, based on three measurement thresholds. These are if the project; makes a clear contribution to the organization's strategic objectives, is above a cost threshold and is above a risk threshold. Effective governance to check and evaluate the projects according to the three measurements mentioned is crucial in order to plan resource requirements and provide a base for capacity planning. In order to be able to monitor and control the project portfolio effectively, Bivins and Bible (2012) and several case studies argue that performance metrics must be identified, unacceptable variances determined, performance reporting processes specified, and performance baseline established (Hyväri, 2014, Lundell & Roxlin, 2021; Shaltry, Drew & Horgan, 2002; Miguel, 2008). Bivins & Bible (2012) suggest each objective must have a mathematically sound relative importance to other objectives in achieving the strategic goal. Similarly, each project must be comparable in relative benefit to other projects and the strategic goals. The most common KPIs, found in the case studies, to evaluate projects both individually and collectively were the project's strategic significance or impact, a financial aspect such as budget or return on investment (ROI), risk, schedule, and resources needed (Hyväri, 2014, Lundell & Roxlin, 2021; Shaltry, Drew & Horgan, 2002; Miguel, 2008). Appelberg and Stenbeck (2018) suggest further increasing the focus on benefits by establishing a clear benefit management strategy and implementing "benefit KPI" to reduce the focus on the project execution key performance indicators (KPI). However, any specific KPI is not mentioned. Miguel (2008) further develops the KPI utilization with a scoring system consisting of six relevant criteria; strategic impact (high, medium, and low), origin (internal or external), level of innovation, forecast sale data, technological difficulty (high, medium, and low), and general importance (a "commodity", using a rate from 1 to 3 and a "specialty" by a rate of 3 or 4). After evaluating the scores, priorities are set using a 1 to 5 Likert scale, and resources are allocated accordingly. Furthermore, decisions regarding project status, whether to mark them as "active" or place them "on hold" are made, leading to the creation of two additional charts: one for potential ideas awaiting development and another for projects placed on a "waiting list" until resources become available.

There are several KPIs presented to be used when measuring project performance. The most relevant findings of KPI suggestions are summarized in table 3.6.

Table 3.6 A list of different project KPIs related to PPM.

Article	*KPIs of PPM*
Rad and Levin (2006)	Cost, duration and scope and quality
Levine (2005)	ROI, strategic alignment, balance of maintenance and investment projects, allocation of expenditure and resources, effective use of resources, probability of delivering project on time, within budget and designed work scope, and ancillary benefits
Baradari and Doloi (2013)	Meet time and budget, achieve project goals and objectives, customer satisfaction, user satisfaction, increase market share & profit, explore new opportunities or innovations, and prepare for the future
PMI (2008)	Budget at completion, planned value, earned value, and actual cost

There are also several methods of comparing the KPIs in projects and the portfolio, with the methods found presented in table 3.7.

Table 3.7 A list of evaluation methods based on the project KPIs related to PPM.

Article	*Method*
Forman & Peniwati (1998) and Bivins & Bible (2012)	Analytic Hierarchy Process (AHP)
Kaplan & Norton (1992), Levine (2005) and Persson (2012)	Balanced Scorecard (BSC)
Shaltry, Drew & Horgan (2002)	Forced Scoring
PMI (2008)	Earned value management

3.3.4.2 Project termination

It is vital to only pursue the appropriate projects in the portfolio in order to sustain PPM success, and if a project is characterized by low congruence to corporate strategy, senior management withdraw resources and terminate the project (Unger et al., 2012). This is of interest to organizations to secure collective resources are not worn down in vain and ensure strategy is implemented consciously, as only the projects in line with the overall strategy remain. There are several reasons that hinder project termination, including reluctance from the side of the managers or sponsors (Schmidt & Calantone, 1998), missing prerequisites for termination (Kumar, Persaud & Kumar, 1996), and the difficulty of timing the termination (Tadisina, 1986). The consequence is that too many incorrectly prioritized projects linger on (Appelberg & Stenbeck 2018; Delilbasic, 2012), using the already strained collective resources, decreasing overall portfolio effectiveness and ultimately continuing too many projects, which will be further discussed under subsection 3.2.5. Cooper (2008) presents thorough evidence that senior managers foster their

"pet projects", miss out on resource coordination, take single-person decisions and apply personal instead of transparent prioritization criteria. Additionally, senior managers often find themselves in a situation where their governance role traps them in reluctance to terminate projects since there is a "too-much-invested-to-quit syndrome", sunk cost effect or escalation of commitment (Schmidt & Calantone, 2002). Unger et al. (2012) introduces the concept of project termination quality (PTQ), meaning how well the decision-making and termination process is executed, characterizing the effectiveness of the abortion process of single projects. PTQ is stressed as a key factor for senior management in their governance role, overlooking the overall effectiveness and efficiency of the project portfolio.

3.3.4.3 Stakeholder management

Beringer, Jonas and Kock (2013) name stakeholder management as one of the key success factors within PPM, which is supported by both research and practice. Stakeholders who have the ability to influence projects are crucial contributors to the successful management of those projects. Without this, the company will not be able to effectively coordinate its workforce and handle the challenges a growing firm face. If one manages stakeholders well, it enables the organization to successfully handle resource management, strategic alignment, governance and risk management.

Beringer, Jonas, and Kock (2013) identify key stakeholders in PPM as senior managers (SM), middle-level line managers (MM), PPMO managers, and project managers (PM). SMs, as decisive decision-makers, play a critical role in PPM, while MMs contribute significantly during the resource management phase, utilizing their access to top management and operational insights for successful project execution. SM are also named as "gatekeepers" by Cooper (1990), relating to the stage-gate process, further explained in subsection 3.3.5.3, meaning they are engaged, review and decide on a project's approval throughout the process (Patanakul, 2022; Unger, Gemünden & Aubry 2012). This is done by getting them involved in the planning and execution of stakeholder engagement activities and it also means keeping them informed of progress and any issues that arise along the way. Thus, their involvement is most critical during the resource management phase (Beringer, Jonas & Kock, 2013). PPMO managers are tasked with planning and controlling complex project landscapes, providing support, and advising senior management with specialized knowledge in project portfolio practices. Lastly, PMs are pivotal in realizing project objectives, ensuring compliance with resource commitments through effective planning, and fostering cross-project optimization through the continuous delivery of timely project status information. The right level of senior management involvement can also facilitate strategic alignment, as long as it does not come at the cost of crippling the project termination process, explained further under subsection 3.3.4.2 (Unger, Kock, Gemünden & Jonas, 2012).

This is also in line with Jenner and Kilford (2011), who states the importance of engaging stakeholders, ensuring their voices are heard and valued throughout the

process. Jenner and Kilford (2011) also recommend a feedback loop, meaning a process must exist that ensures stakeholders can see how their comments and feedback have been dealt with. This will help to build trust and credibility, and it will also show stakeholders that their input is valued.

3.3.4.4 Risk Management

Any project will come with some kind of risk. If not, it is most likely not a project worth pursuing. Literature in the project management and the PPM area identifies several different risks, each characterized by unique circumstances and consequences. Risk is in this report defined as an uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives (PMI, 2008). This definition encompasses both positive and negative risks, which are often referred to as opportunities and threats, respectively.

Cooper, Grey, Raymond and Walker (2005) state that risk management enhances business and project outcomes by offering valuable insight, knowledge, and confidence for improved decision-making. Additionally, risk management aids in better planning and design processes to mitigate risks and seize opportunities, as well as enabling more effective contingency planning to address risks and their impacts, optimal resource allocation, and alignment of project budgets. Furthermore, risk management facilitates informed decisions regarding risk allocation among project stakeholders (Cooper et al., 2005). In spite of this, Hobb and Aubry (2006) show that only 29 percent of the project offices studied consider managing the risk database to be an important function. To further strengthen that claim, Kwak and Stoddard (2004) state risk management is the least practiced discipline among the areas of knowledge in project management.

There are different factors to consider when evaluating and managing risk in the different strategic levels of PPM, see table 3.8. Firstly, Sanchez, Robert, Bourgault and Pellerin (2009) name several different risk management categories related to projects, some examples being cost, resources, complexity, ambiguity of priorities and objectives of the project, changing environments and uncertainty. Therefore, the process of risk management in projects must be capable of quickly re-evaluating the options facing the changing circumstances of the environment (Jaafari, 2001). Secondly, considering risk management in programs, Sanchez et al. (2009) suggest three primary concerns to be addressed: enhancing the program's effectiveness in bolstering the organization's competitive standing, ensuring the realization of the program's anticipated benefits and monitoring changes in the assumptions outlined in the program's business case (Lycett, Rassau & Danson, 2004; Pellegrinelli, 1997). Finally, in project portfolio management the risk management processes focus on analyzing the probability of the success or failure of projects and the risk generated by the selection of projects (Archer & Ghasemzadeh, 1999; PMI, 2006a). Different perspectives can be used when managing risk on a portfolio level, such as strategic, financial, corporate management, compliance, or government agenda perspectives (Sanchez et al., 2009). Sanchez et al. (2009) conclude that projects, programs, and

project portfolios are interconnected, and the impacts of events affect them collectively rather than individually. However, employing a generic approach to risk management is inadequate. Each domain possesses unique characteristics and requirements, necessitating the development of specific risk management guidelines to maximize benefits. The three portfolio levels risk management characteristics are presented in table 3.8 (Robert & Bourgault, 2005, see Sanchez et al., 2009; PMI, 2006b; Sanchez et al., 2009).

Table 3.8 Each portfolio level with main risk management characteristics (Robert & Bourgault, 2005, see Sanchez et al., 2009; PMI, 2006b; Sanchez et al., 2009).

Portfolio Level	***Characteristics***				
Project	Collaborative environment	Resource monitoring	Analysis of interdependencies	Risk analysis and evaluation	
Program	Inter-project risks	Project risk response plan	Root cause analysis	Risk solution suggestions	Mitigation plan
Portfolio	Context Establishment	Risk analysis	Risk Evaluation	Risk control and monitoring	Communication

The project interdependencies relating to complexity are a final area of concern in risk management and are summarized in four major sources, namely the resources, the technology or knowledge used or generated, the functionality of the product or service developed, and the market which represents the strategic relation between the organization and its environment. The area of project interdependencies is further explored in subsection 3.3.5.1.

3.3.5 Project Management

As many as 43 percent of projects end up being either over-budget, late or have fewer functions or features than required, often resulting in there being too many projects active at any given time (PMI, 2015). Cooper, Edgett and Kleinschmidt (2001) states four main consequences of not choosing the right projects in the PPM:

- Strategic - The strategic criteria are missing in project selection and results in too many projects not being strategically aligned, which was described in subsection 3.3.3.

- Low value projects - An insufficient project selection process also results in there being too many extensions, modifications, enhancements, and short-term projects.
- Poor focus - The reluctance to terminate projects ultimately leads to projects just getting added to the active list and resources being spread thin, which was explained in subsection 3.3.4.2.
- The wrong projects - Without a formal selection method, decisions are too often not based on facts and objective criteria, but rather politics, opinion, and emotion.

Blichfeldt and Eskerod (2008) names too many projects as the most commonly found issue at companies related to their PPM, resulting in a lack of resources. It is therefore a key success factor to manage the number of projects in the project portfolio in order to maintain a sustainable effectiveness.

3.3.5.1 Project Interdependencies

Appelberg and Stenbeck (2018) points out understanding and managing interdependencies as one critical success factor for PPM success. However, even though complex project portfolios with multiple project interdependencies is common (Ghasemzadeh & Archer, 2000), several methods fall short in providing the necessary clear understanding that is required (Killen & Kjaer, 2012). And although many PPM tools and methods offer a "portfolio-level perspective" to balance project decisions, projects are still being treated as isolated entities. Interdependencies are in order to understand the interdependencies and to achieve PPM success, it is required to consider multiple factors to be able to support and improve the decision-making.

Killen and Kjaer (2012) claim that the understanding and management of the interdependencies is related to the organizational culture and project environment, but also the processes and methods. Regarding the organizational culture and project environment, studies show there is a consistent and strong correlation between PPM success and high-level support from management and a culture that encourages information sharing and transparency (Cooper, Edgett & Kleinschmidt, 2001; Jonas, 2010). Through support and transparency, it is possible to build a high level of trust, which is a requirement for project managers to be adaptable to the dynamic environment in a complex portfolio (Aritua, Smith & Bower, 2009). To ensure full transparency and information sharing, project teams, project managers, and portfolio managers must build a culture of trust and openness (Kim & David, 2007). Davies and Brady (2000) suggest this could be achieved through implementing learning cycles. The purpose of learning cycles is to learn how to manage and avoid repeated mistakes related to interdependencies. The authors claim the learning cycle enables the capture and transfer of lessons learned from current projects to others and to future projects.

Regarding managing interdependencies between projects through methods and processes, it is suggested to implement strategies to enhance communication between projects. Although conducting post-project reviews in order to capture knowledge, and adopting customized knowledge capture methods based on the project's environment often are suggested, research indicates that these are recognized as an ongoing challenge (Killen & Hunt, 2010). Moreover, this indicates a potential gap between recommended practice and actual implementation, emphasizing the need for better strategies to ensure successful knowledge capture and transfer (Williams, 2007; Killen & Hunt, 2010). However, in order to manage resource dependencies, resource optimization systems are often implemented to address the problem. In many PPM scenarios, these systems can be less useful because they often require significant numerical input (Runghi, 2009). Therefore, visual representations are being actively explored by researchers as a potentially more advantageous approach to overcoming these challenges.

3.3.5.2 Prioritization of projects

Governing principles and guidelines for how prioritization should be carried out are often missing in organizations (CapGemini, 2010). Ghasemzadeh and Archer (2000) highlight six difficulties associated with project portfolio selection:

- Multiple and often-conflicting objectives
- Some objectives being qualitative
- Uncertainty and risk affecting projects
- Need for portfolio balance in terms of important factors
- Interdependency among projects
- The number of feasible portfolios is enormous

Project prioritization and selection relates to all key success factors in this study, in that the process of prioritizing the right projects enables one to align projects with strategy, identify and align resource prioritization challenges, ensure support from senior stakeholders, sponsors and delivery teams, and govern and eliminate waste related to projects (Appelberg & Stenbeck, 2018). Cooper, Edgett and Kleinschmidt (2001) highlight the problem of too many project scoring methods failing to discriminate well enough, leading to the number of projects being too many. Another reason for selecting too many projects is that project scoring models also tend to rate projects against absolute criteria, rather than relative to each other (Cooper, Edgett & Kleinschmidt, 2000). Even though several methods are available, discussed in subsection 3.3.4.1, companies often have poor prioritization methods, with consequences being that resources are spent on unsuitable projects and that the organization loses the benefits it may have gained if these resources had been spent on more suitable projects (Appelberg & Stenbeck, 2018). Furthermore, the organization’s strategic goals are rarely ranked internally against each other, which complicates project prioritization further if there are conflicting interests requiring the same resources (Appelberg & Stenbeck, 2018). Martinsuo summarizes the point of these findings in a literature review and points out that the decision-making

process is often less planned and rational and, instead, more political and path-dependent (Martinsuo, 2013).

Appelberg and Stenbeck (2018) and Delilbasic (2011) claim a more process-based-thinking and straightforward procedures for prioritization, e.g., project ranking model, weighted values and scoring models, should be implemented in order to increase the visibility and transparency between strategy and project prioritization. Rajegopal, McGuin and Waller (2007, pp. 156-157) recommend five steps when engaging in a prioritization process:

- Identifying the business strategies: Understanding business strategy fundamentals is crucial for effective portfolio management, as it provides the context for assessing project contributions and determining their relative value based on the documented strategy.
- Defining strategy-related criteria: The prioritization criteria, based on business strategies, serve as standards guiding resource allocation decisions, ensuring equity and facilitating differentiation between projects as the portfolio management process evolves.
- Defining proposal content requirements: To assess projects according to defined prioritization criteria, the project portfolio management team (PPMT) must identify and gather project-specific information tailored to each portfolio's unique requirements to meet relevant criteria effectively.
- Establishing weighted values of the criteria: The PPMT evaluates each criterion relative to others, assigning weighted values (e.g., 0.5, 1.0, 1.5, or a 1-to-10 scale) to indicate their relative significance in quantifying the relationship between criteria, focusing on strategic and business emphasis rather than absolute importance.
- Defining the project scoring model: A scoring model applies prioritization criteria to projects, while a scoring anchor describes the measurement linked to numeric values within the model. Different scoring models and KPIs are discussed in subsection 3.3.4.2.

To conclude, as Cooper, Edgett, and Kleinschmidt (1999) show, formal and explicit methods of project prioritization work better than informal, ad hoc approaches. Ensuring a structured and clear way of continually prioritizing projects will secure a better way of building PPM success.

3.3.5.3 Stage-gate

In 1988, Robert G. Cooper presented his stage-gate (SG) model in order to form one solution to what hinders efficiency and effectiveness in many firms' new product programs (Cooper, 1988). The SG system is a conceptual and operational model for moving a new product from idea to launch, acting as a blueprint of the product development process in order to improve effectiveness and efficiency (Cooper, 1990). In certain cases, the SG model is known under other names, such as the

tollgate process (Muiño & Akselrad, 2009), or predevelopment activities (Cooper, 1988). The SG process is subdivided into several stages or workstations and between each workstation or stage, there is a quality control checkpoint. The SG process usually includes four to seven stages or gates, depending on the organization, and a typical system is shown in figure 3.4 (Cooper, 1990). This process is also used to visualize a roadmap for the project team and its PM, ensuring any involved party has a clear idea of where the project stands, where it is going, and what needs to be done next.

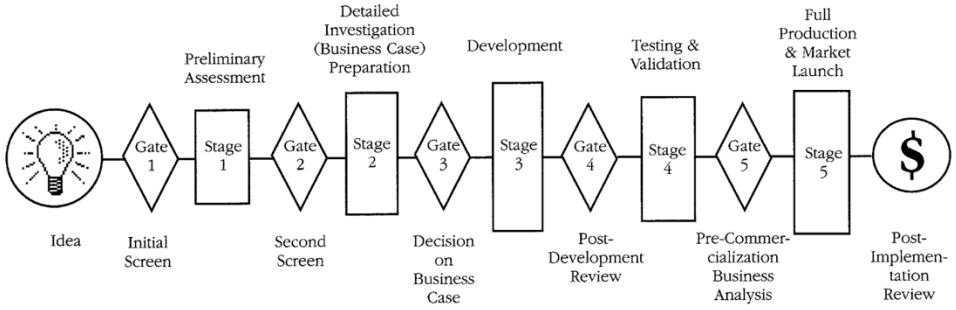

Figure 3.4 A typical SG system with five stages and gates (Cooper, 1990).

At each stage the gate is the entry pass where the project leader is required to provide the specified deliverables and meet the stated criteria in order to be allowed to continue, resulting in a set of inputs, exit criteria, and an output (Cooper, 2008). Criteria for passing through gates could be based on scoring or financial models (Miguel, 2008). The inputs are the specified deliverables the PM must bring to the gate, while the outputs are the decisions at the gate, usually being a kill/hold/approval decision for the next stage. Miguel (2008) also found that the case company introduced more detailed gate control along with documentation for closing gates, in order to strengthen gate control. Additionally, the close-out process included the acceptance of essential deliverables such as data sheets, prototypes and quality matrices. The "gatekeeper", presented in subsection 3.3.4.3, is a senior management group, often multidisciplinary and multifunctional, that has the authority to make the kill/hold/approval decision and approve resources (Cooper, 2008). The SG model requires a team and a project leader to "carry" the project throughout the process, in all stages. It also requires senior management commitment to the process and involvement at each gate concerning respective decisions (Miguel, 2008).

This process was presented in order to, among other things, minimize the unnecessary spending of resources on the wrong projects and enable cancellation as early as possible, since any project becomes more and more expensive with each gate passed. According to Cooper and Kleinschmidt (1986), the initial screening was one of the most poorly handled activities of the entire process of product development, meaning project evaluation was too weak and insufficient.

Using the analogy of an express train, the authors further explain that once the project, now an express train, is initiated based on little information and no formal criteria, there is very little that can stop it. Subsequently, evaluations become obstacles to be overcome, not an honest evaluation if the project should be killed, meaning that even though the train slows down at stations, it almost always makes it to its ultimate destination.

As Killen, Hunt and Kleinschmidt (2008) emphasizes that, in practice, organizations do not use the exact methods proposed in theory, but rather more "management friendly" methods. These include defined project management processes with documented decision point or "gate" criteria, formal project proposal and business case development processes, and standardized portfolio map and roadmap displays to facilitate group decision making. Lastly, the iterative nature of the SG model allows for continuous refinement and improvement of processes over time, ensuring adaptability to evolving organizational needs and market dynamics. By embracing these adaptable practices, organizations can navigate complexities with greater confidence and achieve sustained innovation and growth.

3.3.5.4 Project termination

As expanded on in section 3.3.4, project termination is a key factor of PPM success. This becomes even more evident when considering project re-prioritization, which should provide guidelines as to what project to include and exclude when new projects are presented. PTQ, explained in subsection 3.3.4.2, results in the number of projects in the portfolio not exceeding the available capacity of both resources and time (Unger et al., 2012). This allows for a context that does not allow for distracting activities, deviating investments or the wrong non-strategic projects, enhancing a favorable environment for strategic alignment (Chao, Kavadias & Gaimon, 2009). This highlights the requirement that project selection is in accordance with available resource capacity and the need for a structured way of evaluating PPM processes to improve and address associated challenges (Lundelll & Roxlin, 2021).

An additional result of failing to recognize the importance of a project termination structure is the changes in project scope or pressure to deliver more than what was agreed upon, also named scope creep (Amoatey & Anson, 2017). Scope creep is listed as one of the most prevalent factors in project failure, with the number of projects experiencing scope creep increasing to more than 50 percent (Komal et al., 2020, see PMI, 2019). The phenomenon of scope creep and the fear of terminating projects can be recognized in several real-life case studies. In the Delilbasic (2011) case, one of her respondents explained that projects were killed, just wounded in terms of resources being removed little at a time and "end up being spread so thinly that all projects are set up for failure". Despite scope creep being a major factor in project portfolios, only six percent of project managers list scope creep prevention as a method for risk prevention (Schoonwinkel, 2016). Establishing a project

termination methodology is an antidote to scope creep and aids the organization in managing the number of projects.

4 Case analysis – Axis Operations

This chapter aims to provide in depth understanding of the current PPM structure and practices at AO. The information was provided by AO employees through background and informative walkthroughs, and a review of the internal information and documents from the Axis intranet.

4.1 Current Project Portfolio at Axis Operations

The concept of project portfolio management has been placed high on the agenda for Axis Operations the last 2 years. Today, the PPM structure in Operations consists of strategic priority (SP) projects, major projects, including projects in the operational priority (OP) list, cross-functional collaboration projects, and projects within the functions and activities. The strategic priority projects and the major projects are decided by the operations senior management team and are projects that most often are IT-reliant and include several functions. IT-reliant projects are often related to Axis' enterprise resource planning system, named IFS. These projects are often the ones with the broadest scope, longest timeline and require the most resources. Cross-functional collaboration projects are decided by cross-functional management teams where the projects are often not IT-reliant but involve several functions. These projects are prioritized by the people involved in the projects and the projects are always a lower priority than the strategic ones. Projects and activities within functions can be suggested by anyone in Operations, or they can come as an external requirement, such as a compliance demand, and are most often led by a project manager. However, if a project manager is not available the initiator can lead the project as well. Activities have a smaller scope, have a short timeline, do not require as much structure or documentation, which the other levels have. There is no implemented structure around how an activity is performed, initiated, or evaluated and therefore resources are not officially allocated to these activities.

The senior management team has implemented a strategy process that follows a yearly cycle, seen in figure 4.1. It includes three all-employee meetings, where an update on the major strategic projects is presented, as well as updates or reminders of the overall strategy status. Any employee in operations is invited to join and present during this meeting. Twice per year, there is a manager day, where all managers in operations are invited to give their input on strategy and their

perspectives on current events. The operations senior management team engages in scenario planning to enhance resilience and robustness. This process involves making strategic assumptions, conducting global and competitor analysis, with the aim of identifying both risks and opportunities for effective strategy formulation.

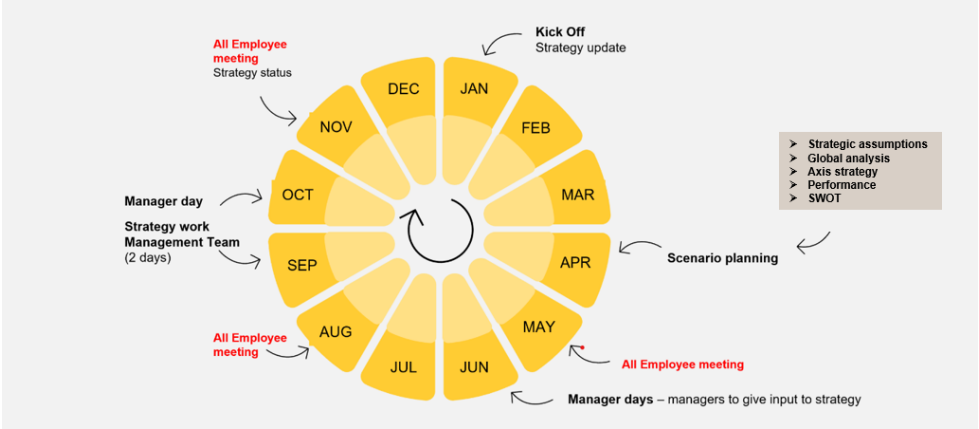

Figure 4.1 The strategy process running throughout the year (Taken from Axis Intranet, 2024).

4.2 Internal Documentation

The Axis intranet serves as the cornerstone of internal communication within the organization, providing employees with a comprehensive platform to access essential resources, stay updated on company news, and connect with other functions. From accessing important documents to participating in discussions and staying informed about company announcements, the Axis intranet is the central hub for fostering a connected and productive workplace environment. Below, the relevant documentation of PPM has been collected and summarized.

4.2.1 Current stage-gate methodology

There is a thorough project model presented with a project idea and the subsequent four phases and four tollgates (TG) defined, following the timeline shown in figure 4.2. The four phases are start or pre-study, planning, execution, and hand over and closure. In the start or pre-study phase, the project goals, deliverables, and time and resources needed are described and prepared for the TG start meeting. The planning phase is where a project and time plan are created. The execution phase is where the project plan is realized to fulfill the project goals and prepare and perform implementation. The final hand over and closure phase is where the project is prepared for hand over to the line organization in order to close the project.

Figure 4.2 The initial idea, the four phases and the four TGs (Taken from Axis Intranet, 2024).

4.2.2 Current stakeholders in projects

There are several stakeholders with a detailed description of each role presented on intranet. These include the orderer, sponsor, resource owner, project manager (PM), and project members, but also the steering group as a whole. The project members represent the relevant function in question of expertise and know-how and are responsible for actively participating, sharing information with respective functions and cooperating with other project stakeholders. The steering group is the project's highest decision-making forum and should include as few individuals as possible, but at least two, while maintaining representation of all relevant stakeholders. The group consists of three roles; orderer, sponsor and resource owner, and makes decisions on budget, resources, priority within the project, risk management, and whether to open or close the project. The orderer is the one initiating the project process by creating a draft of the project overview document (POD), and later also approving the POD, project plan and final documentation. The orderer is responsible to ensure there is a sponsor in the project when needed and keeping the sponsor updated during the project. Finally, the orderer is also responsible for final delivery being implemented with a continuous ownership in the organization after the project is closed. The sponsor is always someone from the senior management team and represents the business in the project. The sponsor ensures the project; is aligned with the corporate goals and strategy, has funding in regard to both resources and costs, and is promoted in the organization and that functions are committed to the project. The resource owner secures availability for project members, reallocates resources when needed, ensures project members have the necessary competence, and communicates regularly with other stakeholders regarding the need for competences and resources. The resource owner is most often a function manager. Finally, the PM is responsible for; creating the POD, building on the draft by the orderer, creating the project plan, keeping the steering group updated of the project's process, potential risks, and trade-offs, and continuously providing project documentation and follow-ups on performance. The project plan includes a time plan, well-defined goals, and what functions to be included in the project. The PM is also responsible for escalating issues in the project that cannot be resolved in the project team, and for saving and uploading the final documentation of both outcome and lessons learned.

4.2.3 Priority process

Operations senior management is responsible for the overall prioritization of projects expected to use common resources, in particular central IT, and information system (IS) resources. In order to only initiate and run improvement projects that have named and dedicated resources, a list, named operational priority (OP), that is only allowed to consist of around 12 to 15 prioritized projects has been chosen. The projects included in this list are the SPs and major projects. The list exists to provide an overview of the improvement projects that are expected to use common resources. The projects on the project list are chosen during a monthly priority/start meeting held by senior management and other key stakeholders, such as IT and IS management. The PM and the orderer then presents and pitches the project, with the required documentation according to a template, and the priority/start-group discusses and decides if the project is to be given the go-ahead and what priority level it should have. The list then serves as the basis for discussions on a monthly IS/OP Synch meeting, where operations senior management and IS/IT reviews all the projects on the list that are highlighted as having issues or challenges. The PM is then responsible to briefly describe a written status update of these projects and ensure follow-up on the decisions made from the synch meeting.

4.2.4 Wishlist

All employees at AO are encouraged to contribute with their own project ideas or activities on improvement areas. These ideas are today only structured and collected within the AO subdepartment Global Supply Chain, in the Supply Chain Wishlist. In this list it is possible to find information about the definition of project or activity, who the initiator is, the priority or importance, if it is active or on hold, which IT system is involved, date and time and cross-functional area. Finally, these project ideas are discussed and prioritized within the Global Supply Chain Management team.

4.2.5 Existing PPM application in R&D

The background and informative walkthrough regarding R&Ds portfolio management structure revealed that the need for a PPM overview had been discussed in the R&D organization about ten years ago. In response to that discussion, an internal application on the intranet was developed by external consultants, based on instructions and prerequisites set by the portfolio manager. This application is now widely used in all portfolios in the R&D organization and provides an interactive interface with all relevant information related to specific projects, but also how projects are interdependent in the timeline.

5 Results

In this chapter, the findings from the interview with the key stakeholders in Axis Operations is summarized.

To implement appropriate solutions, one needs to understand what drives people, in this case the stakeholders in Axis' project portfolio management (PPM) structure. A number of interviews have been conducted to evaluate today's challenges for Axis Operations (AO) regarding PPM, and how to overcome these. The goal was to map not only challenges and improvements areas, but also holistic solutions from all stakeholders' point of view, with input from interviews and inspiration from theory. The full list of interviewees can be found in appendix D and the interview questions, in Swedish, can be found in appendix B. While most answers have been accounted for, certain outliers will not be presented due to irrelevance or misinterpretation of the question. These are, however, only a few individual instances, where the answer does not affect the overall result of this study. Finally, when the different "groups" or "levels" are mentioned in each of the following subsections, it refers to the three managerial levels of senior, middle and project management, explained in subsection 3.2. All quotes have been translated from Swedish to English and are therefore not verbatim but as correctly translated as possible.

5.1 Organizational Structure

There is a common conviction among the interviewees that AO will have to change its way of working to manage the growth journey, specifically naming efficiency in projects as a key aspect.

> *"We need to increase the efficiency, improve processes and ensure better adherence" – Middle Manager*

Several middle managers (MM) and project managers (PM) believe this can be done by implementing more processes and roles. Although some senior managers (SM) agree to some extent, they emphasize the importance of maintaining the individual creativity and innovation and not let the organization become too administrative and theoretical. One SM, however, stresses the point that you easily become blind to your own flaws and that at some point there needs to be a revolution, in order to implement major changes and improvements.

> *"Yes, some [current]processes need to revolutionize and some need to evolve. Revolution is always difficult, but some things would probably need it."- Senior Manager*

Several interviewees mention the research and development (R&D) structure as a role model for portfolio management, but only a few of these interviewees has actual experience of working within the R&D organization. The interviewees with experience from R&D mention the issues that part of the company struggled with previously and that many of the challenges AO face today are similar. Therefore, they believe a lot of knowledge and structure could be transferred between the two departments, with one example given by an interviewee being internal project management training courses.

> *"There is a lot of existing knowledge and structure in the organization that we can benefit from and use, instead of inventing something new again" – Senior Manager*

The perception of the organizational structure related to PPM is fragmented. While some interviewees from both the SM and PM believe the management of the project portfolio is inadequate, others think there exists a supportive project organization within Operations. However, some MMs state strategic management of projects as a wish for a future organizational structure. Adding to this, one SM and several MMs and PMs mention the need for a more explicit portfolio ownership and several of these mention the specific role of portfolio owner. Several interviewees also mention the implementation of more transparent and well-defined processes within the PPM framework. This is seen as crucial for enhancing overall efficiency and effectiveness in future projects and for achieving their organizational goals. At the same time, one SM expresses resistance regarding the implementation of an organization/group solely dedicated to business development or PPM.

5.2 Resource Management

There is an overall understanding that there are insufficient resources in projects and the project portfolio today and that it is a continuous bottleneck for the progression of projects, especially key resources that often are a part of many projects.

> *"It is hard to assign project members with the right competence. Often, the same project members are a part of many different projects" – Middle Manager*

The main key resource identified by several managers at all three levels are the "heroes" that are a part of a function but have a more holistic perspective and can understand the process end-to-end. After that, several interviewees also mention IT-resources and IFS, the ERP system, experts as limited resources and competences. The least homogenous group in their understanding of resources sufficiency was the senior management group, where it was an even split on three perspectives; there

are insufficient resources, it is not about resources but about the prioritization process, which is lacking, and that there currently are enough resources. Oppositely, both the MMs and PMs were more homogenous groups, where only individual outliers were different from the common understanding that there is a lack of resources. Some PMs mentioned that, even though there are resource bottlenecks, there are no overall key resources that can be pointed out, but it is different for each individual project.

This was additionally supported by the fact that poor resource planning and a lack of resources were mentioned by several managers on all levels when asked about the main challenges in PPM, with poor resource planning primarily being mentioned by SM and lack of resources primarily being mentioned by PMs. Another challenging factor mentioned by some managers in the senior and middle management groups was low competence in projects, meaning the competence of managing projects and the understanding of the project methodology. An issue mentioned by one in SM and some PMs was the difficulty of estimating the resources needed for a certain project, which is required at the pre-stage of a project, meaning it seldomly is a correct prediction of either time or competence requirement.

> *"Most often it is difficult to estimate how much time you need from a resource, especially if it [the project] is something new. [...]. You simply have to guess how much you need them [the resources]." – Project Manager*

A final issue mentioned by a SM is the lack of specifically dedicated project resources in the operational functions. There were, however, other SMs stressing the importance of not having operational resources specifically dedicated only to projects. No one mentioned anything related to resources or resource management as a positive aspect of PPM.

The understanding of the resource allocation process was fragmented, where only the major projects were mentioned by some to have a relatively clear resource allocation process. Most SMs pointed to the priority/start meeting, while some MMs and only a few PMs mentioned it. Apart from those points, most MMs and PMs state that it is done individually for each project and that there is a clear lack of structure around how to allocate resources to major projects. A general understanding among all three groups is the lack of resource allocation structure for all projects outside the strategic and major ones. Similarly, there was a general consensus at all levels that no structure exists for reallocation of resources and that the most common consequence was to simply postpone the project timeline. The course of action that people now employ was presented somewhat differently among the interviewees, with the most common process being that one goes to the steering group or the resource owner and discusses it in that forum. No matter the group, most interviewees agreed that "you just work it out together somehow". Extending on this issue, there was also a general understanding that there is no continuous evaluation and follow-up of resources, but that issues are taken care of as they arise

in individual projects. Both MMs and PMs acknowledge the responsibility of the PMs to escalate the issue, in that case. Similar to the reallocation process, or lack thereof, the consequences of there not existing enough resources in a project is never to terminate the project, but to delay the timeline and simply "solve" the issue within each project. The understanding of where the responsibility lies to terminate a project differs between the three levels, where SMs states either the steering group or the senior management team, MMs states the different managerial teams for each respective strategic level, and the PMs questions if such a responsibility exists at all but that if it does, it could possibly lie with the steering group.

All three managerial groups agree that there currently is no competence mapping, but that each function with its respective manager is responsible to individually handle their part of the organization. There is, however, also a mutual understanding that you are aware and know the competences existing within your function. Most interviewees agree that there could be benefits with such a mapping structure, leading to a better understanding of existing know-how, even though some mentions the apprehension of it becoming too administrative and emphasize the importance of simplicity in that potential structure. In general, interviewees claim no overall structure relating to future competence planning, but that it is handled individually for each function, where the responsibility lies with each respective manager. Here, several examples are given on how this is done, each specific and different from the other examples, further supporting the earlier claim that the competence planning is made individually for each function.

> *"I have implemented it [the competence plan] myself. There is no general framework or method, it is up to each manager. I definitely see the need for a shared competence plan in our strategy" – Middle Manager*

Looking ahead, better resource planning was one of the most emphasized points brought up by SMs, as a wish for the future PPM structure. Additionally, better competence planning was also mentioned by several SMs and one MM when looking forward. No PMs specifically mentioned resource management, resource or competence planning when asked the same question. A point some PMs made as an additional input to the interviews was the need for a longer and more thorough pre-study before the projects go-live, as an antidote to the challenge of estimating resource need within projects. Additionally, some PMs also point out a part of that challenge relates to the need drastically differing week-to-week in certain projects, further extending the issue of specifying the time needed of any specific resource.

5.3 Strategic Alignment

The perception and the understanding of PPM are on a general level shared across the three managerial levels. To conclude, the interviewees define PPM as "a

tool/way to manage/control and prioritize projects, initiatives and resources in order to get an overview linked to the strategy in order to reach our goals". The interviewees also agree on the importance of project portfolio in the operations organization and the overall absence of a clearly defined PPM framework today, resulting in a lacking overview across all projects, initiatives, and programs in the organization. Related to this, while SMs emphasize the long-term planning need and a holistic view of PPM, MMs and PMs generally point out the resource coordination and prioritization need among projects from a shorter time perspective.

Today's main challenges, and the most commonly mentioned issues, regarding PPM within the organization were a "lack of overview" and a "lack of a common strategy". A majority in each managerial level emphasized the importance of having a clear overview of active projects and future initiatives, in order to increase visibility and transparency, to be able to understand what is going on right now and to prepare for what is to come. The future wish of having a visualization or roadmap of projects in the future was also one of the most common answers among interviewees.

> *"[We]lack visibility and transparency in what we do, which means we don't know what to get out of the projects and what NOT to do. A roadmap over several years is missing to see what we should do and how we prioritize."- Project Manager*

> *"[We should] get an overview of major projects and common picture that we can share with the rest of the organization. This should provide better resource planning, clearer vision of the future, identify what capabilities will we need for the future. Also, better connections to the scorecard" – Senior Manager*

The issue of the absence of a common terminology in project management was also shared among interviewees. Some SMs claim there is a common understanding to some extent but points out that there may occur differences between functions. Due to the lack of a common language, MMs and PMs believe that employees use words based on their own experience and vary between forums. On the other hand, all groups highlight a main positive aspect in the current structure, namely a supportive culture together with a clear willingness to change and adapt across the organization. An additional positive aspect mentioned by several SMs and PMs is the active and improved process of continuously working with the overall strategy.

The understanding of the organizational goals, vision and how it is communicated throughout the organization was shared across all the groups. All the interviewees agreed that the strategic priority's (SP) and "We R" were continuously communicated by the SM through All-Employee meetings. Both MMs and PMs believed it was straightforward to track ongoing SP developments. "Managers days" was also mentioned by SMs and MMs as a continuous communication channel since they are included in the forum. However, there is a consensus regarding insufficient communication concerning the project portfolio and projects other than the strategic priorities. Consequently, it is believed that it is unclear among operations employees

regarding current projects and programs. But how the communication should be organized and who the responsibility lies with varies between the different groups. SMs questions whether all information is needed to be communicated and stresses the person's own responsibility to keep up to date. MMs believe it is their responsibility to pass on the information to their own function, but they agree with SMs that it is important to balance the amount of relevant information being communicated with the employees own responsibility to be updated.

> *"It is difficult to find a good balance and a way to communicate that much information. Therefore, self-leadership is also a very big part of this" – Middle Manager*

Looking ahead, the most emphasized point made by all groups was to create and visualize a clear and shared overview of both active and upcoming projects, with several people mentioning a roadmap as a potential overview. This in turn was mentioned to serve as a basis for aligning the different functions and its employees in order to enable better resource and competence planning and ensure efficient and effective work.

5.4 Governance

There are fragmented perspectives of the current issues and challenges related to governance, with several managers mentioning different issues and in one aspect, opposite opinions. Some SMs mention clear roles as a positive aspect of the current structure, while a SM and a MM specifically state unclear roles and responsibilities as a main issue. Another issue mentioned by a minority in each group is the lack of a clear follow-up governance of projects. Lastly, two current issues stated by a SM and two PMs, respectively, was a slow decision-making process and a lack of key performance indicators (KPI) for project evaluation. One SM mentions the positive aspect of good internal relations between different stakeholders.

Regarding stakeholders in the PPM structure, all groups agree that everyone in the operations organization is responsible to come up with and contribute with project proposals, emphasizing a clear bottom-up approach. Some of the interviewees do however extend on the lacking structure of how to capture and evaluate all the different ideas from members of the operations team. Similarly, all groups agree that the managerial team for each respective strategic level is responsible for the screening and selection of projects within that forum, where the senior management team is responsible for the SPs and major projects. There is also an aligned understanding in a majority among all three groups, with regards to the execution, implementation and hand-over of the projects, being the responsibility of the PM, with several interviewees pointing out the importance of also having a clear receiver of the project. The final question on the stakeholder responsibility about strategic

relevance evaluation of projects shows several different perspectives within each managerial group, with the senior management team, the steering group, and the PM given as examples. Some interviewees claim there is no evaluation of strategic relevance related to projects.

There is a shared understanding of the lack of KPI evaluation on projects among PMs, while both MMs and SMs have different views within each group. Some mention a continuous evaluation, some do not know, some refer to the tollgate structure while other states there is no evaluation of projects.

> *"We very seldomly make the connection between a project and the balance score card KPIs. That would, however, be very interesting to see. But it is very hard to make that connection" – Project Manager*

There are several perspectives on how AO manages risks related to projects and the project portfolio. Some SMs state it is considered and handled in the yearly strategic assumption analysis while others state that it is handled individually for each project or not at all related to PPM. There is a greater consensus among MMs and PMs, stating that it is not handled outside of individual projects, and that the risks identified in each project are not mitigated anyway.

> *"There is not even any risk assessment template to evaluate risks [at the start of a project], so then I had to create my own. And maybe there is one that someone has that is great, but it is not shared or established in the organization" – Project Manager*

Others in these groups mention the senior management team's strategic work, but also questions the overall structure of the risk management.

Looking forward, there were different individual answers scattered among the groups in regard to the future governance structure in PPM. Single answers mentioned were KPI-driven projects, encouragement in regards of possibility to terminate projects, and clearer areas of responsibility. In regard to potential KPIs that could be used for projects, the common theme was that most interviewees found it difficult to identify KPIs that would work for all projects. The most mentioned KPIs were, however, time and timeline, cost, quality of delivery, and strategic significance. There were also examples such as customer satisfaction contribution, tollgate demands, and some kind of connection to today's balance score card (BSC).

Regarding stakeholder management, as mentioned in 5.1, several PMs and one SM expressed a wish for a structure around a portfolio owner, who is responsible for the PPM. This ownership was also mentioned by both MMs and PMs as a future role that could be needed to manage the growth journey Axis has embarked. Several managers in all groups also mention new or improved processes, with some stating process owners as being an important aspect of those improvements.

5.5 Project Management

There are fragmented opinions and perceptions about how resources and projects today are managed and prioritized among the interviewees. There is a shared understanding that the SPs and major projects follow a structured prioritization process among all the interviewees. However, MMs and PMs who are not involved in any steering groups or in the priority-start meeting, lack awareness or clarity regarding specifically when and how this process occurs, even though some PMs highlighted the clear OP list as a positive aspect of the current structure. Some managers in each group also point out that it currently is difficult to understand what and why certain projects are included, and others are not.

> *"It is not clear what it is that qualifies and how we prioritize within the portfolio. Axis has a tendency to start many projects and initiatives. The same things are touched upon in several projects. Decisions are made in a project that are not synchronized with other projects - Axis is ambitious, but sometimes this can lead to us working sluggishly."- Senior Manager*

There was also a shared understanding that projects outside of the SPs and major projects are managed and selected by the managerial team at each respective strategic level. The only example mentioned of a priority process, except discussions, was a forced scoring methodology to provide a basis for discussions.

One process that divides SMs, was the opinion of the current project start-up process. Some SMs positively highlight the priority/start-process while other SMs, together with a MM and a PM, point out the lacking project priority process. Additionally, a SM and a MM point out a poor project process after the prioritization. A subject several interviewees touch upon, but two MMs and two PMs specifically state is scope creep, where several projects have experienced a prolonged timeline due to changes in the project scope. A final challenge highlighted by two PMs was the current lack of project categorization, as the definitions and tags of the projects are unclear and undefined.

There are different opinions on the number of projects the organization currently can or should handle, however, a majority of the interviewees believe there are too many projects active today. The others are divided on either stating that the operation has the right amount of projects or that it is impossible to say due to the lack of an overview of active projects. Regarding the appropriateness of the current projects, certain interviewees within each group emphasize that the emphasis should not be on the amount of projects, but rather on selecting the ones that allow the most efficiency. Oppositely, some SMs and several PMs think the current projects are relevant and the right ones.

Several PMs state the absence of any onboarding process, meaning there was no proper introduction to the project methodology, process, or management. Instead, each interviewee stating this fact mentions how they would rely on previous

experience and expertise, or simply asking around at the department, picking and choosing the practices they deem most relevant and useful.

> *"No [didn't receive any onboarding]. Sure, there's information on the intranet, but you quickly realize that everyone does things differently and has different expectations. [...]. It was tough at the beginning, not knowing what was expected of you. And there was no support from various stakeholders because everyone sees it differently." – Project Manager*

Some interviewees mention an opportunity in regard to improving the feedback structure, especially the constructive feedback. Even though there is a great willingness to help and assist on another, this sometimes comes at the cost of being too kind.

> *"Axis is a very kind company, it is not like someone is standing there whipping you [to get results], but then you also do not get the results you expect."- Project Manager*

According to these interviewees, this hinders constructive criticism and does not allow for a proper lesson learned structure. The interviewees state that a future opportunity is to implement a culture where not only positive, but also constructive feedback is part of the feedback loop where one can expect more accountability, which in turn will lead to a more efficient project portfolio.

Several managers at all levels agree that few or no projects are terminated, and that there is no clear structure on how to do it. They state that projects most often are simply postponed, and the timeline gets expanded and that a limitation in the project never results in terminating the project.

> *"I think people just roll up their sleeves and help each other. Or there will simply be a delay - that is probably the most common way" – Senior Manager*

> *"You help each other. This characteristic can be both positive and negative. The fact that we work this way may indicate that the priorities that are being made are not the best. It is taking longer than we have expected. I had hoped that discussions around resource scaling had happened more often and in a structured way." - Senior Manager*

When asking about the future state of PPM, four main factors were stated; a better prioritization process, project categorization, a set amount of active projects, a clearer project methodology, and a visualization of project interdependencies. Several SMs and two MMs mentioned an improved prioritization process, while one SM and several PMs mentioned the need for improved categorization of projects. Finally, two MMs touch upon a clearer and better project methodology and several PMs request a visualization of project interdependencies. The last question, asking what projects to include in the PPM structure, provided an overarching perspective that the SPs, major projects, and the most important cross-functional project should

be included. However, several PMs point out that it is difficult to know and set the exact boundary on which projects to exclude in the portfolio.

5.6 Summary

To quantify and clarify the main challenges, positive aspects, and future wishes related to the current PPM structure from the interviews, the most reoccurring and the most divisive answers have been presented in table 5.1, 5.2, and 5.3. Minor factors have been presented in appendix E, F, and G. This was done in order to enhance the manageability and readability of the lists. For each factor, the number of answers related to that point has been set divided by the three different managerial groups. Some statements did not mention the exact words of the factor, but the essence of the statement has the same meaning as the factor and is therefore included. This structure ensures that the main findings are readily accessible in the main body of the text, while additional details are provided for reference in the appendix**.**

Table 5.1 The main challenges and issues regarding the current PPM structure.

Main Challenges and issues [#interviewees]	***Senior Management [6]***	***Middle Management [4]***	***Project Managers [6]***
Inadequate project portfolio management	3	0	1
Lack of an overview	3	3	5
Poor resource planning	3	1	0
Lack of a clear and shared PPM strategy	2	3	3
Limited resources	0	0	3

Table 5.2 The main positive aspects of the current PPM structure.

Main positive aspect of current structure [#interviewees]	*Senior Management [6]*	*Middle Management [4]*	*Project Managers [6]*
Great culture with a willingness to change	4	2	2
A clear starting process for projects	3	1	0
An active work with strategy	2	0	4

Table 5.3 Future wishes to ensure PPM success.

Future wishes for PPM success [#interviewees]	*Senior Management [6]*	*Middle Management [4]*	*Project Managers [6]*
Better resource planning	5	0	0
A clear and shared overview of the portfolio	5	3	6
A better prioritization process	3	2	0
Categorization of projects	1	0	3
Appoint a portfolio owner	1	0	4
Visualizing project interdependencies	0	0	3

6 Gap Analysis

This chapter undertakes a comprehensive gap analysis to evaluate disparities in outcomes within and across the managerial levels, while also comparing these findings with insights from the literature review, in this chapter referred to only as literature. By identifying gaps and differences, it is possible to find areas for improvement, outline necessary actions to align the stakeholders and achieve the objectives of the thesis effectively.

The following gap analysis is the result of an iterative process, where literature, case studies, interview insights, and the authors own knowledge and perspective have been considered to produce and discuss key insights. The identified gaps between the literature review and the result, and between different managerial levels presented in table 5.1, 5.2, and 5.3 will be analyzed and discussed in this chapter. The analysis has been developed with the vision and the "We R" framework, where each insight ultimately will result in a potential improvement in becoming more resilient, robust, or responsible, described in subsection 1.2. The gap analysis will also provide an analytic foundation for the final recommendation, where the most relevant improvement areas are identified and presented. Figure 6.1 presents an overview of the key points discussed and analyzed under each subsection.

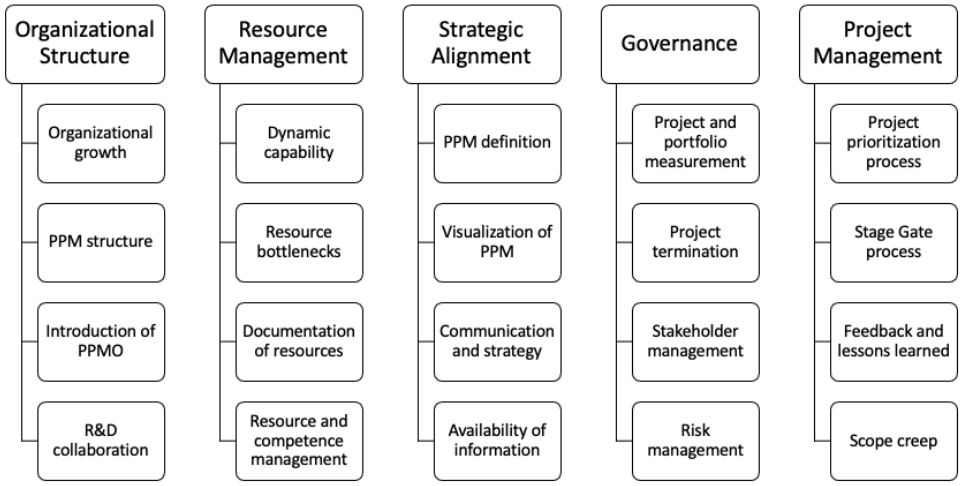

Figure 6.1 Summarized overview of subheadings with respective key points discussed.

6.1 Organizational Structure

The literature states a strong correlation between organizational growth and great impact on organizational structure and culture (Greiner, 1998). Axis Operation (AO) is facing these kinds of structural challenges since growth has been and will continue to be an inevitable part of the upcoming future. This demands AO and its employees to be adaptable and dynamic in their structure and way of working in order to address these associated issues that arise, e.g., the decision-making speed that will strain managers and the organizational structure (Kotter & Sathe, 1978). The fact that AO will need to change its structure and culture in order to manage the growth journey and achieve the organizational targets, is also confirmed by the interviewees, especially the project managers (PM). They stress that improving Project Portfolio Management (PPM) structure is crucial for enhancing the project efficiency, which they believe can be achieved by implementing more straightforward processes and roles.

As an organization grows and it goes through different stages, they encounter distinct challenges and necessitate different management approaches, priorities, and structural configurations (Greiner, 1998). These challenges can be difficult to face and hard to admit, since it is easy to become blind to your own flaws, as mentioned in the interviews. This goes in line with Greiner (1998) suggestion that many companies organization's future is often shaped more by its internal history than external forces and therefore fail to recognize the valuable insights within their own developmental stages. Currently, AO has grown to a size where it seems that change is driven primarily based on internal history and less by external forces. This could indicate that a *revolution* is needed in certain areas, as one interviewee mention.

As mentioned, AO's PPM has been a subject of interest in recent years and the organization has risen to the challenge to improve its structure and efficiency. When looking at the different life cycles presented in table 3.3, it is possible to see that AO has come a long way and is currently placed in the later stages. The main focus for AO now could be to focus on the third and fourth step of Dufour, Steane and Corriveau's (2018) model; acting the past and thinking about the future, with the respective questions "how can we do even better what we are already doing?" and "where are we now? Where do we want to go and how do we get there?".

However, senior managers (SM) emphasize the importance of maintaining the organization's creativity and preventing it from becoming too bureaucratic and administrative. They do not want to inhibit the individual's ability to be creative, innovative and to contribute to the organization's success. This is in line with Churchill and Lewis's (1983) fifth step in their life cycle model; a risk of stagnation and low innovativeness when in the later stage of the life cycle. This highlights a notable gap between the perceptions of change of structure and processes needed between the different managerial levels, specifically PMs and SMs.

As stated by Singh, Keil and Kasi (2009) and Kendall and Rollins (2003), there are both positive and negative aspects of introducing new roles into an organization, specifically related to PPM. The interviewees agree with Müller, Martinsou and Blomquist (2008), that projects can no longer be treated individually, however, the complexity increases as the number of projects increases as well. The majority of the interviewees believe there is a lack of strategic management of the portfolio, making it challenging to obtain a comprehensive overview of ongoing projects within AO, their interdependencies and how they affect each other. Just as Unger, Gemunden and Aubry (2012) and Mosavi (2014) states, the several interviewees believe these challenges and issues should be responded with a clear ownership of the portfolio. The literature states ownership of the PPM process belongs to either a portfolio manager or the project portfolio management office (PPMO) (CapGemini, 2010; Unger, Gemünden & Aubry, 2012). Several aspects, mentioned by the interviewees who argue for an implemented ownership, can be compared to the three roles that Unger, Gemünden and Aubry (2012) presents in their paper and in some way with Ajjan, Kumar and Subramaniam (2016) perception of what PPMO should do. The coordinating role of a PPMO could work as an antidote at AO related to improved resource management and a visualization of project interdependencies across the portfolio. The controlling role could help AO design, develop, implement, and especially maintain a continuous and transparent information structure related to projects and the portfolio. The supporting role could help AO to develop standards, methodologies, and tools in order to improve project quality, which is requested by some interviewee, especially PM. Overall, the implementation of a PPMO has the potential to strengthen AO by establishing clear ownership and responsibilities, as well as fostering transparent expectations and communication with both internal and external stakeholders, aligning with their defined We R framework.

In accordance with Singh, Keil and Kasi (2009) and Kendall and Rollins (2003), some interviewees are hesitant and somewhat resistant to the introduction of a PPMO. There is an apprehension that a centralized unit, who's only job is being responsible for managing development projects, could be perceived as an unnecessary overhead and an inefficient use of company resources and finances. This underlines the importance of clearly defining the responsibilities and value propositions of a PPMO in order to avoid misalignment, stated by Kendall and Rollins (2003). If the PPMO can demonstrate clear benefits to the organizations, it is easier to prove it is not wasteful and get the "buy-in" from all PPM stakeholders.

Another aspect of successfully implementing a PPMO related to resistance, is having "the right people, tools and data" (Kendall & Rollins, 2003). By having the right people or a designated PPMO champion, as mentioned in the literature, who supports and promotes the value of PPMO, the organization ensures representation in senior management and proper mandate (Singh, Keil & Kasi, 2009). It is, however, equally important to have the right skills and expertise in place. Without adequately experienced PPMO leadership, implementation efforts may falter due to

a lack of understanding of the scope, inaccurate resource estimation, and insufficient consideration of internal and external changes, such as budget adjustments or sudden compliance requirements.

As seen in subsection 4.2.5, the research and development department (R&D) could have a lot of useful insights on tools and structure regarding PPM. This was also stated specifically by a senior manager, adding that there is no need to "invent the wheel twice". As stated by some interviewees, there already exists a lot of expertise in the portfolio management area and AO could utilize this in a better way. In an informative walkthrough with a R&D portfolio manager, it became clear that certain issues AO currently faces, has already been worked through by the R&D department. Even though the end product and the project content differ between the two departments, many of the lessons learned and the organizational structure is still generalizable.

6.2 Resource Management

The foundation and one of the main points of PPM, according to literature, is its dynamic capability and ability to be flexible regarding allocation and reallocation of resources (Blichfeldt & Eskerod, 2008). There is a clear gap in the structure and utilization of that flexibility, as mentioned by several interviewees. One of the consequences of this poor dynamic capability is the continuous scope creep experienced in several projects, where resources are spread so thin in some projects, they seem to "go on forever". As seen from the case studies, the resource allocation capability is one of the main challenges for many organizations, meaning this is one of the hardest nuts to crack when it comes to PPM. These insights go to show that both time and investments need to go into resource management in order to find a structure that provides an effective and practical process that will continuously work in practice.

Literature also put emphasis on the need to identify resource bottlenecks (Kendall & Rollins, 2003), one of the areas where many interviewees mention challenges in the current structure. There is an overall acknowledgement of both what and where the resources are bottlenecks, and in order for PPM to succeed it needs to be able to handle variations in resource availability from the resource pool. Some of these resources are operational employees with a holistic and "outside-the-box" mindset, IFS expertise, and certain IT resources.

The current structure puts too much focus on individual projects and their respective resource evaluation, and the organization can therefore miss out on the overall picture and understanding. Some PMs mention certain key resources being replaced by the resource owner in order to fix the problem of those resources being in high demand, resulting in the replacement being put on the project not having the capacity or understanding to maintain and assist in the progress of the project.

There are examples from case studies of documentation of key resources and competencies, where the managers emphasize this need in order to visualize the use and future need of resources (Miguel, 2008; Lundell & Roxlin, 2021). There are relevant challenges with such a structure one needs to be aware of, with some interviewees mentioning a fear of an overly administrative process and the difficulty of quantifying time needed of any one resource. This issue then becomes a balancing act of evaluating the issue of over-committing key resources with the structure and time needed to continually quantify project's resource requirements. We argue that if such a structure were to be implemented, it is vital for it to be an iterative process, with continuous evaluation throughout the project's timeline and not simply a one-time estimation at the beginning of a project.

Some PMs mention the lack of a proper communication structure and have often experienced one of the resources in their projects being taken away without any warning or mention from other stakeholders, such as the resource owner. This is also highlighted in case studies as a frequently occurring issue in project-intensive organizations (Lundell & Roxlin, 2021; Miguel, 2008). This results in ad hoc solutions and suboptimal ways of consequential communication, where the PM often must take the responsibility of chasing replacement resources in order to be able to proceed with the project. This is not only a consequence of a lacking communicational structure, but also poor adherence to the existing work process and the fact that the organization currently mainly works with short-term planning of resources. None of the interviewees mention any existing structure for long-term resource planning and relatively poor medium-term resource planning, something literature names as an important balance to short-term planning (Hendriks, Voeten & Kroep, 1999). At the same time, it is important to remember the point several PMs make in that the resources needed in projects often drastically shift throughout the project's timeline, with the need, at times, of a key resource shifting from 100% to 0% one week to another.

Therefore, despite its mention in the literature, it is not possible to put too much emphasis on long- and medium-term planning, as the benefits of that investment would be diminished by an ever-changing need of certain resources. This is also one of the major differences between traditional R&D-projects and organizational development projects, where the former often or always have the same project steps and structure and the latter has more project-to-project difference. This should, however, not be understood as the disregard of long-term planning, but the importance of finding the balance between the three timeline perspectives to build a sustainable resource management structure in the organization.

The changeable nature regarding resource needs of organizational development projects also inhibits the ability to provide early reliable resource information. Some interviewees mention several projects today are rushed into action, often without a proper analysis and preparation stage, meaning the little information produced, related to both scope and resource needs, often is inaccurate and results in changes along the project timeline. Reliable resource information is named as a main

challenge by literature (Abrantes & Figueiredo, 2015), with the statement that it often is assumed that reliable information simply exists or is estimable at the beginning of a project matching interview insights well. Further, it also correlates with what the consequences are, namely resource conflict situations later on. It is therefore emphasized that sufficient time should be given to the PM and related stakeholders to properly evaluate and understand the scope, time, and resources needed in the project. Even though it will not eliminate the challenges related to resource reallocation later on in the project, it can mitigate some of the "bullwhip"-effect currently experienced due to poor preparatory work.

> *"Since you do not have time for a proper preparatory analysis phase, you cannot be clear on what competences you need for the project, which results in the project members often being of very variegated quality" – Project Manager*

Competence management is also lifted by literature as an ever increasingly important topic for organizations to manage and an area where Axis has an opportunity to improve its ways of working (Medina & Medina, 2015; Laakso-Manninen & Viitala, 2007). A proper competence management plan is also important as a complement to enabling PPM to be a dynamic capability. Currently, there is no mention by interviewees of any competence planning structure outside a one-year perspective, resulting in a risk of not understanding and fulfilling the long-term needs of the organization. The interviews paint a picture where functions and their respective managers handle competence planning individually, with several completely different methods mentioned by managers. Some interviewees also state that, due to the lack of a shared structure and methodology, one often relies on previous experience from other workplaces and utilizes the lessons learned and best practices. While the experience and lessons learned from other organizations are important and valued, this structure, or lack thereof, results in that for each function, another way of working presents itself.

Considering the significant growth journey Axis is on, with many more competences and hundreds of people joining each year, this is an unsustainable path long-term. Therefore, the authors argue Axis needs to implement a shared and commonly understood structure for competence planning that allows each function to highlight their respective need, but also provides a possibility to plan long-term needs from a holistic perspective.

Some interviewees also mention the need to broaden and strengthen the project competency. This requires some kind of structure to understand and map the competencies needed. One simple example on how to do this is shown in figure 3.3 (Laakso-Manninen & Viitala, 2007). This is one example, which can help managers throughout the organization understand their needs related to improvement projects, especially helping senior managers visualize these needs on a broader and longer scope. The authors argue a version of a competence map and a visualization tool, to help understand and plan the current and needed competencies, would aid the

planning process and streamline how managers work with competence planning throughout the organization.

6.3 Strategic Alignment

When comparing the definition given by the interviewees with the definition set in the literature review, it can be concluded that they have several aspects in common, such as managing and prioritizing projects and resource, aligned with strategy. Even though the definition from the literature is more thorough, key aspect were named by interviewees, indicating a good understanding of what PPM is and should contribute with to the organization.

The ability for PPM to provide an overview of projects, both current and upcoming, was part of the way most interviewees defined the area and the most mentioned current issue. A positive aspect within this area is relatively new discussions and work among senior managers on creating a visualization, especially during the last year. This could also be a contributing factor on why the issue is mentioned by so many interviewees. As the need for this visualization, or roadmap as some interviewees call it, is rather apparent/obvious, the question then becomes focused on how. No academic literature or case studies analyzed give any specific examples of what this visualization should or could look like, but there is an internal tool used by the R&D department at Axis. As mentioned previously in subsection 6.1, the R&D department struggled with similar challenges and issues regarding lack of overview, interdependencies, and clear vision for the future, as AO is today. As the tool is already readily available on the intranet for all employees at Axis, it could easily be adapted to fit AO, with the right parameters and information connected to each project. This could improve AO in regard to several challenges stated in both interviews and literature, such as project interdependencies, resource and competence planning, ensuring strategic alignment and a shared vision among employees, and visualizing the future. It can also aid in minimizing the scope creep currently experienced in several projects within AO, further discussed in section 3.3.5.4. The future wish of having a visualization or roadmap of projects in the future was also one of the most common answers among interviewees.

Communication is a constant challenge related to PPM, as stated by literature and several case studies, and can be found as a potential improvement area at AO (Ramsing, 2013; Delilbasic, 2013; Lundell & Roxlin, 2021; Shaltry, Drew & Horgan, 2002). Some PMs have several times experienced little to no communication regarding changes in resources or scope within their projects. Often this information also came when the decision already had been made or even implemented, meaning urgent workarounds are needed as quickly as possible, leading to a prolonged project timeline in many cases. This correlates with arguments in literature, where informal communication channels are used instead of

the proper ones, leading to some stakeholders being left out of critical information (Macheridis, 2010). This becomes a responsibility of each stakeholder in the PPM framework, not only to maintain and stick to formal channels for important information, but also hold each other accountable for doing so. Some managers also state the importance of finding a balance in how much information senior management should provide. They state that at some point, "self-leadership" is a necessary responsibility for each employee to stay informed on relevant matters.

A factor, discussed in subsection 3.3.1.1., that could improve communication and especially its facilitation is implementing a portfolio manager, which is also stated by literature (Rad & Levin, 2006). Communication is also a prerequisite of ensuring reliable project information is provided and updated throughout each project, thereby improving efficiency and effectiveness.

A positive aspect of the current focus and structure is the clarity and shared understanding of the strategy and the "We R" vision, and as a result the culture is imbued by it. Interviewees mention and often appreciate the continuous focus and work senior management has put into formulating, updating, and communicating, which has successfully been put in place in the current structure. This is further emphasized with several interviewees highlighting the organizational culture, supportive atmosphere, and shared drive to keep developing and evolving, something certain case studies specifically mention as a challenge. This alignment in pushing towards progress and further development is likely to be vital when growing and expanding the organization in accordance with the current strategy. However, some concern was raised by some of the interviewees that the organization can become too ambitious which in turn lead to poor efficiency.

> *"We want to grow fast, save money, be more environmentally sustainable. We want to do everything at the same time, but it is impossible to juggle everything because it means that we go at half speed instead. […]. Less is more, we achieve more with fewer projects and a better focus" – Middle Manager*

A final improvement area within communication is the availability of information regarding PPM on the current intranet at AO. Currently, information is not collectively gathered or easily accessible, with some web pages being poorly updated or outdated, which was specifically mentioned by some interviewees. This could either be a result of vague ownership and responsibility regarding the web pages on the intranet, or the fact that the information on the intranet is unclear or poorly planned to provide the best possible presentation regarding availability for employees. Either way, there is room for improvement. This improved structure could also help spread the understanding and possibility for employees, especially stakeholders in the PPM structure, to keep up to date on current projects and relevant information.

6.4 Governance

In regard to measurement of both projects and portfolio there seems to be a severe lack of structure, meaning a lack of existing key performance indicators (KPI) or a lack of a common understanding of what and how measurements are made. Several interviewees mention the current lack of KPIs, which literature states as necessary in order to effectively manage the portfolio and each project (Bivins & Bible, 2012). The relevance of performance measurement is highlighted especially regarding project selection and prioritization, where a quantifiable way of comparing projects is an important tool in that process. A major positive aspect currently in place is the existence of a BSC and its accessibility to any employee in AO. However, despite this, the connection to project and portfolio measurement seems to be near-to-none and some interviewees mention that connection as a potentially helpful tool in PPM.

In regard to potential KPIs, even though most interviewees had a hard time coming up with ideas, time, cost, quality of delivery, and strategic significance were mentioned. These correlated relatively well with sources from literature, indicating an alignment between insights from the organization studied and literature (Rad & Levin, 2006; Levine, 2005; Baradari & Doloi, 2013). Despite apparent challenges in implementing performance indicators in a manageable structure, this could be one of the improvement areas regarding the PPM. Though there were only a few examples of portfolio KPIs from interviewees, these insights combined with the literature suggest potential portfolio KPIs could be the amount of project timelines met, amount of project budgets kept, and strategic improvement. Regarding the evaluation methodology, forced scoring was the only one mentioned in an interview and in a case study and is arguably the easiest one to use in practice (Shaltry, Drew & Horgan, 2002). As an important factor regarding the recommended structure lies in the simplicity of use, to ensure adherence and acceptance, a forced scoring methodology can be a good fit in the future. In comparison, an Advance Hierarchal Process (AHP) would make for a more thorough and extensive measurement methodology but could also prove too complicated for actual implementation and adherence in the organization. The forced scoring could however be complemented by scoring categories, as shown as an example in the case study by Miguel (2008). This could help clarify the most important factors to consider for senior management when ranking different current and potential projects, but also provide an insight for other employees on the prioritization process, which was requested by some interviewees. Additionally, it could provide an understanding into what is important when considering and suggesting new project ideas to one's manager. This could also provide an opportunity for another request made by some interviewees, namely connecting the projects to the current balance score card (BSC) and its measurements.

One of the main challenges related to performance measurements related to improvement projects in operations is the variability of the content in them. Some

interviewees mention this as the reason for finding it difficult to come up with potential KPIs to be used collectively for projects, an area rarely mentioned in case studies as well. Another challenge mentioned is the difficulty of quantifying some of the potential KPIs, such as cost and strategic significance, as these factors are often hard to estimate as a totality for a project at any given moment. This is especially true at the start of a project, as mentioned by several interviewees. One example of quantifying cost, and by doing that combining resource requirements and cost, given by an interviewee is to estimate the hours required for a specific project and set an average cost of hourly cost per person. As the main, and often only, resource used in several projects is operational employee's time, this could give a relevant insight of total project cost.

A reason for quantifying project and portfolio KPIs is to improve project termination possibility, a challenge several interviewees and case studies mention. The fact that a poor, or according to some, non-existent project termination structure exists impedes portfolio efficiency and effectiveness, something literature clearly highlights (Unger et al., 2012; Cooper, 2008). One of the major challenges that appeared from the interviews was how a project would potentially be terminated, namely by the steering group deciding on it. The lack of a holistic picture and understanding of the total project portfolio is likely to be a significant factor in why projects are "never terminated".

> *"That type of discussion [on terminating a project] very rarely comes up, if ever. For the most part we are trying to wing it, so to speak" – Senior Manager*

Since the steering group of a project consists of people with a specific investment and interest in that project, the evidence Cooper (2008) presents seems likely, where managers foster their own projects and are reluctant to terminate it. Combining this factor with what Schmidt and Calantone (2002) mention, with the sunk cost effect or escalation of commitment, and you find yourself in a situation much like the situation several interviewees mention. This could also be an explanation of why so few of the interviewees identify the reason behind the poor project termination governance, as one often is blind to one's own bias. A potential improvement factor could be the forced scoring with BSC categories, discussed previously in this subsection, as it would provide an objective measure to potentially terminate a project. Another improvement factor could be the implementation of an overview or roadmap, which visualizes project interdependencies, since it allows the steering group to understand how the continuation of their project affects other projects.

Another area highlighted in both interviews and literature is stakeholder management and how to define and include relevant stakeholders in PPM (Beringer, Jonas & Kock, 2013). A positive aspect at AO is the clarity of who the senior managers are and their collaborative forum, which all interviewees understand relatively well. Another current positive aspect is the level of engagement among all senior managers, with clear interest and ambition clearly showing. The only difference between AO's and Beringer, Jonas, and Kock's (2013) structure is the

lack of PPMO managers at AO. In regard to the other three roles, senior, middle, and project manager, all of them correlate relatively well with AO's current structure. One major difference, however, is the fact that at AO, senior managers are more engaged in projects than literature suggests, as most of the senior managers are a part of one or several steering groups, continually working with individual projects (Beringer, Jonas & Kock, 2013). A potential improvement area stated by interviewees is to clarify and streamline the understanding of each stakeholder's role even further, clarifying responsibilities and related expectations one can put on each stakeholder. A specific example given by some interviewees was the lack of a clear "receiver" as a stakeholder in projects. Some interviewees also experience situations where responsibility and certain work tasks are put on the wrong stakeholder, further emphasizing the need for aligning the understanding of each stakeholder's role. One explanation for this, mentioned by some interviewees who all have been a part of an introductory period within the last three years, is the lack of a structured onboarding process. None of the interviewees who mention this has experienced a proper onboarding process on project methodology, the different PPM roles, or the PPM structure. Similar to the consequence of different competence planning structures, mentioned in subsection 6.2, the lack of an onboarding structure leads to every new stakeholder introduced in the organization also introducing their own way of working.

One potential improvement area is the risk management process, with several interviewees mentioning certain challenges in the current project methodology structure, especially in the preparatory phase of the projects. As risk is always going to be a part of any project it is vital to have a structured way of managing it, as stated by literature (Sanchez et al, 2009). Currently, there is no common understanding or use of shared templates on risk management.

Having a few standardized templates gathered on the intranet for project managers to use would not only simplify the preparatory phase of projects, but also ease the understanding of such documents by the steering group. Additionally, it could help with project comparison, as one could compare reasonably similar documents to each other, instead of comparing individual versions every time. Consequently, the project prioritization could also be simplified and more efficient.

Another potential improvement area, part of the risk management process, is the risk mitigation structure, where there is little to no mitigation in the current structure. This is also a factor specifically stated as one of the three R's in AO's organizational vision; resilient – proactively resist disruptions. The current structure implies a very reactive setup. As Kwak and Stoddard (2004) states, the risk management process is often pushed to the sidelines and therefore the potential benefits are lost. Even though risks are mentioned in the beginning of most projects, there is no action plan on how to manage and mitigate them. According to interviewees, it is up to each project manager to decide how to handle risk. This also relates to several other challenges, such as scope creep and resource deficiency, which are continuous challenges in projects. In accordance with internal documentation on the intranet

and background walkthrough meetings, the steering group is supposed to be responsible for the risk management process. The lack of adherence indicates a need for clarification of this responsibility. Additionally, a tool that would facilitate this process would be the previously mentioned standardized templates for project managers to use.

6.5 Project Management

As both interviews and literature state that there is no lack of project ideas and potential improvement initiatives, a structured prioritization process is vital in order to ensure a successful PPM and maintain efficiency and effectiveness (Blichfeldt & Eskerod, 2008). This is a clear opportunity for improvement, with the majority of interviewees believing AO currently has too many active projects. Some also mention uncertainty in regard to the relevance of current projects. The current fragmented view on how and why certain projects are prioritized could be related to the few or non-existing KPIs or evaluation criteria currently in place. As the focus has been on a bottom-up approach, where individual creativity and freedom is emphasized, the implementation of quantifiable performance measures has not been a focus at AO. Even though this has been a major part of the organization's success, it could currently be an inhibitor for clarifying and improving the prioritization process for projects. As both literature and several interviewees state, the prioritization process needs to be clear and structured and is intertwined with several other key success factors in PPM (Ghasemzadeh & Archer, 2000). As mentioned in subsection 3.3.4.1, the use of a forced scoring with measurement criteria, potentially connected to the BSC, could be an initial step in structuring the prioritization process while also providing insight on how projects are chosen or what factors lay the foundation for the prioritization discussion among senior management.

Another factor related to the prioritization process mentioned by some managers was the lack of categorization of projects. Though a positive improvement has been the different lists of SP- and OP-projects, there is still no clear structure for projects that are either compliance, function-based, deprioritized or awaiting projects. This means some project ideas overlap and reoccur time and time again, as employees have no way of knowing or visualizing what other employees are suggesting or, to an extent, working on, which was mentioned by a few interviewees. A clear categorization, such as putting tags on each project and sorting them based on that, could help align the understanding of which projects are active and relevant and which projects are not. One interviewee suggests introducing "must-do" and a waiting list of projects as a complement to the current structure, which could improve the visualization of projects chosen and not chosen. A case study divided the waiting list into two parts; one for potential ideas awaiting development and another for projects placed on the list until resources become available (Miguel, 2008). Further, categorization of initiatives could also clarify what PPM level of

decision making, namely portfolio, program, or project level, and each respective main objective.

Even though the intranet suggests a set stage-gate (SG) process, with different phases and tollgates (TG), its adherence in the organization seems very low, as few interviewees even mention the use of any SG structure. The ones who do mention the process also confirm its poor adherence.

> *"No, I have never used a tollgate structure in my projects, its milestones you use sometimes. But those [milestones] are not the same for all projects as the tollgates are. […]. If we want to improve our project methodology, we will need to improve the tollgates" – Project Manager*

This indicates two potential causes; either the SG process is insufficient and poorly designed, resulting in it not being used, or it is not properly communicated and established in the organization. Either way, action is needed if AO wants to pursue a future where this structure is utilized and follow up on adherence continually. One of the reasons for the lack of current use could be the previously mentioned lack of structure, where interviewees state that there was hardly any proper introduction to the project methodology. Similar to the issue of understanding of different stakeholder roles and responsibilities, without a proper onboarding process, every employee will add their own take on the project methodology. Another potential cause for the low adherence is the inherent complexity and disparity of improvement projects in operations, where the TGs cannot be as standardized as in for example R&D projects. If the TGs are not relevant, or even outright incorrect, in regard to one specific project, the SG structure's irrelevance causes it to fail. It therefore becomes important to set each TG's requirements to a generalizable level, where any project can fit into the frame of those requirements. Some interviewees also mention a need for a simplified SG process regarding minor projects, meaning projects and activities within functions. Since there is a lack of a structured process for the major projects today, the process for minor projects is even less formalized. As the interviewees suggest, a simple and easy-to-follow structure could help streamline the work for those involved in the minor projects, thus increasing efficiency and effectiveness.

Some interviewees state that AO today is too kind and that there are no consequences for not maintaining the proper timeline or deliverables. In order to enhance a continuous improvement cycle where the organization learns from its mistakes and misunderstandings, a proper feedback loop and lessons learned must be implemented. Without a culture where constructive criticism and accountability is possible and preferably encouraged, efficiency and results will suffer.

A final issue of scope creep seems to be a consistent iss mentioned in literature, several case studies, and interviews (Delilbasic, 2012; Appelberg & Stenbeck, 2018; Lundell & Roxlin, 2021; Schoonwinkel, 2016). As projects drag on for an extended period of time, their initial scope often expires and is updated and changed along

the way, meaning a prolonged timeline and an ever-changing resource requirement plan. Several interviewees' answers can be compared, and to an extent summarized, with a respondent's answer in Delilbasic's (2012, p. 57) study: *"We never kill projects; we just wound them. The resources are often just removed from projects little at a time and end up being spread so thinly that all projects are set up for failure"*. This is similar to what is stated by several interviewees in regard to the continuation of projects, no matter the situation or potential consequences.

Literature and the case studies mention several potential antidotes to this phenomenon, some examples being increased project termination quality (PTQ), a clear SG process, ensuring a thorough analysis in the preparatory phase, and a visualization of interdependencies (Unger et al., 2012; Cooper, 1990; Killen & Kjaer, 2012; Appelberg & Stenbeck, 2018). As mentioned in subsection 3.3.4.2, implementing a culture where project termination is a viable and relevant alternative and establishing a project termination methodology are important steps in increasing PTQ, and thereby counteract scope creep.

> *"We have to dare to prioritize projects and not get stuck in the fact that it is just postponed and postponed, so it takes much longer than intended."- Middle Manager*

A clear SG process provides a basis for potentially terminating a project, as mentioned previously, and can provide insight to the decision forum on when and why the project should be terminated. An additional part of the clarified SG process is ensuring a proper preparation and analysis is conducted before initiating a project, thereby minimizing the risk of both scope and resource needs changing throughout the project's timeline. Finally, a visualization of projects and how they interrelate, discussed in subsection 6.3, further provides insight into the severity of scope creep, as it often affects other interdependent projects as well. If a steering group wants to prolong a project by changing or expanding the scope, the visualization of how it will decrease and perhaps inhibit more important initiatives could support a decision on project termination.

7 Final Recommendation

The following chapter provides the final recommendations for Axis Operations based on the gap analysis.

7.1 Overview

The gap analysis highlighted several challenges and potential improvement areas. This final recommendation is based on the gap analysis and is presented as five main improvement recommendations, each with subsequent improvements. Additionally, in order to tailor the recommendations to Axis Operations (AO), insights from the three feedback sessions are included. Most of these recommendations include several parts of the gap analysis and the previously mentioned key success factors and can therefore not be confined to a single key success factor. Hence, the following subsections does not follow the structure of previous chapters.

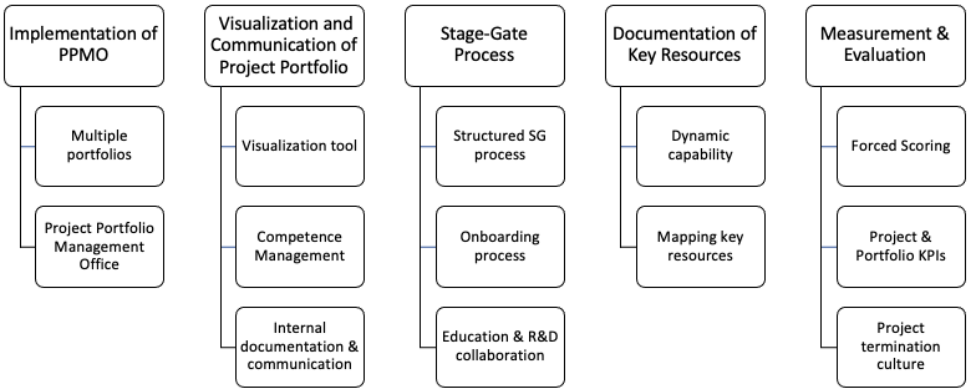

Figure 7.1. Overview of the main improvements, each with subsequent improvements

7.2 Implementation of PPMO

In order to proceed towards the next step on AO growth journey, this study suggests a revolution is needed, as discussed in subsection 6.1. To ensure a scalable and sustainable organizational structure, which allows for ownership and a clear structure to be implemented, AO needs to strengthen the project portfolio management (PPM) structure. The first main improvement recommendation is therefore to implement a main portfolio for AO and four additional portfolios, one for each function in the current structure, each with its own portfolio manager. The main portfolio includes projects similar to the current strategic priority (SP), major, and operational priority (OP) projects. The suggested requirements for a project to qualify to be included in the main AO portfolio are that it needs to be cross-functional, meaning the project includes more than one function, or involve and rely on key resources. The functions' portfolios only include projects that involves that specific function or requires resources from that function. Additionally, it is suggested that a project portfolio management office (PPMO), consisting of the five portfolio managers, is implemented to establish a forum for alignment between each function's projects and the cross-functional projects. It is recommended for the PPMO to have continuous meetings to synchronize each portfolio, streamline information gathering and sharing, and ensure effective use of resources. To visualize this structure, see figure 7.2.

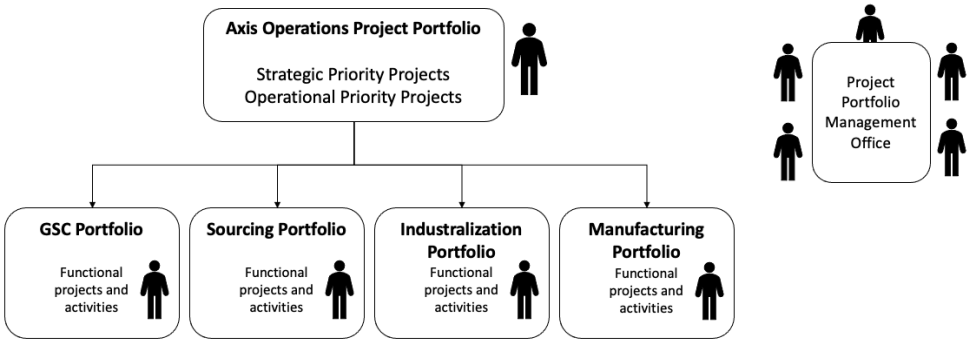

Figure 7.2. The recommended portfolio and PPMO structure.

The ownership of the portfolio does not only provide a clarity and increased understanding of the portfolio structure, but also a responsibility of communication and information regarding the portfolio. This ensures a streamlined communication channel, and could facilitate adherence with proper PPM, expanded upon in subsection 7.3.1.

7.3 Visualization and Communication of Project Portfolio

In order to address the challenge of insufficient visibility into active projects and alignment with organizational strategy, it is recommended to deploy the internal research and development (R&D) visualization tool, and tailor it to the specific requirements of AO. The aim of the visualization is to display active projects along with relevant details, such as their current stage, project leader, team members, and associated documentation. This also provides an opportunity to visualize future projects and the related project interdependencies.

The visualization of active and future projects provides several potential advantages. By visualizing the projects, it would be possible to create a clear overview of the current portfolio at AO. With this overview, it would be easier to identify interdependencies, mainly related to resources, between projects and to avoid starting similar projects. This overview would also act as a road map, visualizing the way forward for the organization. By planning and showing what the organization will do, AO employees will gain insight into the future directions, fostering alignment and strategic focus.

This tool also enables a competence management structure within the organization. This structure will provide an overview and better understanding of the long-term aspects in regards to human resources and competences. Moreover, having a visual representation of projects can improve the communication and transparency across teams and enable better coordination and resource allocation. It facilitates decision-making processes by providing stakeholders with real-time updates on project statuses and potential bottlenecks.

However, the amount of information that should be available and shown must be determined by the senior management. It is vital to find the correct balance between providing relevant information so each employee can keep updated and information overload, meaning employees not having the time or interest to keep updated. An important aspect of this issue is the need for each employee's "self-leadership", meaning the information cannot always be provided on a silver platter.

7.3.1 Internal documentation and communication

In addition to the visualization tool, it is crucial to gather and maintain accurate information regarding projects easily accessible and in the right place. This means using appropriate and correct communication channels for critical information, such as sudden changes, while keeping the intranet updated with up-to-date and relevant internal documentation. This will ensure timely dissemination of critical information and maintain consistency and clarity across the organization. By centralizing the information, it will become easily accessible for all employees and

reduce the risk of miscommunication or outdated information causing issues. The employees will be able to work effectively and stay aligned with the goals and progress of each project.

To ensure the management and transparency of project and portfolio information, it is recommended that the responsibility be assigned to the PPMO. This entails supporting centralization of information on the intranet, establishing standardized documentation procedures, and implementing effective communication channels in order to avoid “hallway talks” and decision being discussed and made outside the correct forum. This requires each stakeholder to be held accountable in providing information and updates on each project and the portfolio as a whole.

7.4 Stage-Gate Process

A vital part of ensuring adherence and clarifying the project methodology is to have a clear and streamlined project process, in this case a stage-gate (SG) process. As several managers, on all three levels, indicate uncertainty and confusion on one or several parts of the project process, it is clear that the process needs to be clarified and better implemented throughout the organization. One specific part several managers highlights is the preparatory analysis phase, where a current issue lies with certain projects being launched too quickly and without proper consideration and preparation. Setting a clear and better defined first tollgate (TG), the TG Start, would implement the correct requirements on what considerations each project team, mainly being the project manager, must have worked through before the project is fully approved. Also, an addition to the current steering group structure is to have a “receiver” of the project, which would, in most cases, be someone responsible for the results in the receiving line organization. In its whole, it is recommended this TG sets the requirements, specified during the feedback sessions, presented in figure 7.3.

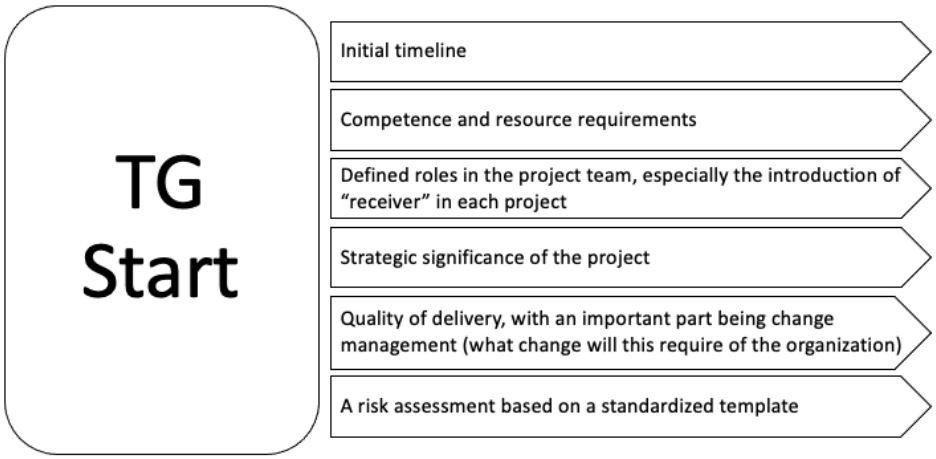

Figure 7.3. The requirements recommended to pass the starting TG.

Even though risk assessment and risk mitigation templates were specifically mentioned in the interviews, it is also recommended to evaluate and implement standardized templates for other factors as well, such as resource documentation, further discussed in subsection 7.5. These should be gathered and easily accessible on the intranet, as mentioned 7.3.1.

Furthermore, a "light" version of the SG process is recommended to be presented for smaller projects, such as functional projects or activities. These would not have any TG requirements, but more of a soft approach to the structure, with TGs being recommended milestones or progress. The emphasis for this light version lies with it being easy to follow and each process having a clear structure that is general enough for each project to follow it.

The lack of an onboarding or introduction process for new employees can be one of the potential causes to the current confusion and unclarity around the project management and SG process. It is recommended to implement a proper and thorough onboarding structure for each employee joining AO, if they could be a project member. What this onboarding process should include is up to middle- or senior management to decide.

Another important step in improving the project management and SG process at AO is educating the existing stakeholders in the PPM structure, especially the project managers. There are several lessons to be learned from the R&D department in this area, as they have a clearer and better structure when it comes to both onboarding and continuously working on the team members competencies. Utilizing the current competence and expertise already existing at Axis is both the most financial and most efficient way of raising project management competence within AO. A clear willingness and eagerness to help and improve from R&D's side was also emphasized during one of the feedback sessions.

These recommendations will fall flat without proper adherence and accountability in the AO organization. It is therefore vital that senior management, with the support of middle management, sets a culture and an expectation within each team to uphold adherence and accountability to the SG process and each other's roles. This means implementing a culture where not only positive, but also constructive feedback is a natural part of any project team and process, to ensure not only process improvement but also personal improvement within project management. These feedback loops will additionally support a continuous improvement in PPM.

7.5 Documentation of Key Resources

To effectively manage resources and address limitations, optimizing PPM resource utilization is essential. This includes implementing PPM as a dynamic capability, meaning it can effectively prioritize available and critical resources, enabling timely responses to changes within the competitive and dynamic environments AO operates in. To achieve this, it is recommended to set a structured way of documenting key resources, in order to strengthen the position of PPM as a dynamic capability.

Due to the ever-changing resource requirements in improvement projects, the resource requirements for each project should be updated each month, documenting the upcoming month's needs. Each PM should map out the key resources and its estimated working hours related to the PMs active projects. Then, by summarizing all the working hours for each key resource, the difference between available and requested manhours can be calculated.

There are several benefits to track and document resources. Firstly, it enables the PPMO to track key resources' workload and avoid resource conflicts both within and across projects, as they in many cases end up in too many projects, resulting in an excessive workload. Secondly, the results can later be used as a basis for discussion on where AO needs to invest in strategically important resources. Thirdly, understanding resource conflicts can highlight the need to limit the number of projects and in turn foster a better project termination culture.

7.6 Measurement & Evaluation

The final part of the recommendation relates to the potential improvements in quantifying and evaluating projects within the PPM structure. Due to its simplicity and clear process, forced scoring is recommended to be used as a basis for discussion and understanding when prioritizing projects. Additionally, the forced scoring categories is recommended to be based upon the AO balanced scorecard

(BSC), in order to both ensure strategic significance for projects and increase transparency in how and what projects are evaluated against. This would provide an easily communicated and understandable way for AO employees to get an insight in the current prioritization process of projects.

Furthermore, it is recommended to evaluate the possibility of implementing project and portfolio key performance indicates (KPI). The project KPIs are recommended consist of two quantifiable measurements, cost and time, and two qualitative, quality of delivery and strategic significance. These should be applicable to all projects in the portfolio. Time translates to man hours needed for a project. Quantifying cost is trickier, as the biggest cost factor in most operational improvement projects is the cost of labor. One alternative can therefore be to set an average hourly rate and multiply that with the amount of man hours needed in a project. The two qualitative KPIs will need to be evaluated and decided by one or several people from the steering group or a management team. Regarding portfolio KPIs, it is recommended to implement number of project timelines held, number of project budgets held, and strategic improvement. Though it is important to consider and understand the underlying reasons to why a timeline or budget was not held, these two KPIs can provide a basis for discussion and a higher-level analysis of the entire portfolio. If 95 percent of the project timelines are never met, though each project could have its own specific reasons, this could indicate too many active projects or key resources being stretched too thin. Strategic improvement relates back to the project KPI of strategic significance and is measured by the improvement on the BSC.

These KPIs, and the use of forced scoring, are all contributors to improving the project termination potential. As project termination is something that is not a part or an option in the current culture, it is important to set a new culture which allows and, to an extent, encourages project termination. In order to build an effective and sustainable PPM structure, project termination has to be a part of it. Even though a project, in an optimal world, never should be terminated, the history and the current reality of AO PPM indicates otherwise.

The final part of the evaluation in PPM is the major feedback loop, meaning setting a more structured way of discussing and understanding the lessons learned. Here, it is recommended to set a lessons learned meeting after each project handover and finish to evaluate project impact, success, and potential improvements. The success and impact of the project relates back to the potential BSC impact and improvement. Potential improvements include both personal and organizational improvements for future projects.

8 Conclusion

In the final chapter the results, discussion, and final recommendation are summarized. In addition, the section reaffirms how the research questions have been addressed, as well as proposed future research and the limitations of this study.

The overall goals of this master thesis were to (1) identify and describe the key success factors to project portfolio management performance in operations, (2) investigate the current structure around Axis Operations (AO) project portfolio management (PPM), with each management level involved, and finally (3) identify the main improvement areas and provide recommendations to AO's PPM. In order to fulfill these goals, an abductive approach, where a literature review, case studies, internal documents and interviews were iterated, resulted in five key success factors for operations PPM. The literature review and the case studies were the main sources of data for the first research goal, while the interviews and internal documentation provided insights for the second research goal. The five key success factors were *organizational structure, resource management, strategic alignment, governance* and *project management.* Each success factor included additional subfactors within the respective key success factor.

Following the literature review, interviews, and case study, a gap analysis was conducted, highlighting several challenges and respective improvement areas similar to findings in academic literature and other case studies. Based on the key success factors, the results of the interviews, and the subsequent gap analysis, final recommendations were provided specifically related to AO's PPM. These recommendations provided the answer to the third and final research goal. The main improvement recommendations included implementation of a project portfolio management office (PPMO), visualization and communication of project portfolio, a structured stage-gate process, documentation of key resources, and implementation of evaluation and measurement in the PPM structure. These recommendations differ in urgency and relevance, in regard to the current state of AO's PPM, meaning certain recommendations can be looked into and potentially implemented in the near future, while others are improvements to consider on a longer timeline.

8.1 Limitations

Every academic paper has limitations and weaknesses, and it is crucial to reflect and to evaluate these shortcomings. To ensure sufficient quality and academic excellence in the master thesis, potential limitations and weaknesses were identified through the evaluation of the factors, mentioned in section 2.9, *construct validity, internal validity, external validity, and reliability*.

By applying an abductive research approach in a qualitative research, depth is prioritized over breadth. While this depth can provide valuable insights, it may also limit the scope of measurement and the ability to assess all relevant aspects of the phenomenon in this case. This implies employing multiple data sources or conducting follow-up studies which can provide additional perspectives and enhance the validity of findings. Qualitative research with an abductive reasoning relies on interpretations and perspectives of the researchers and interviewees. This involves interpreting data and generating explanations, which can be influenced by the researchers' subjective interpretations and biases. In order to mitigate bias, increase the *reliability* and enhance *internal validity*, triangulation of multiple sources, data, theoretical perspectives were performed continuously.

Several challenges found at AO was similar to the findings in both academic literature and case studies, indicating good *external validity* of the study. As mentioned, an abductive research approach emphasizes the importance of generating rich, detailed descriptions of phenomena. This could inhibit the *external validity* of the study, as the focus on detailed descriptions may limit the generalizability of findings to broader contexts. While the findings may hold significance within the specific context of AO and provide valuable insights of the challenges faced, the applicability of the master thesis to other organizations may be constrained.

One potential improvement area would be the sample size and representativeness of the interviewees, as it could affect the *reliability* and the *internal validity* of the master thesis. The limited number of conducted interviews could be questioned, as a higher number of interviews would have increased the *reliability* and *internal validity*, and it would allow for a more comprehensive exploration of the differences and similarities among the three managerial levels. Moreover, given the dependency of this master's thesis on the Axis supervisor, the selection of interviewees and their biases could potentially influence *reliability* and consequently affect the outcomes.

8.2 Contribution to existing knowledge

This master thesis intended to contribute with in-depth knowledge of PPM by evaluating and finding the most important factors to consider when managing the

PPM structure in operations, prioritizing projects, and optimizing resources. There is a lack of academic research on PPM specifically related to operations, which can provide a theoretical foundation and additional perspectives to operations organizations (Petit, 2012). There is a call for better implications to broaden the research available to include a more strategic view on the portfolio and how it affects the organization (Martinsuo & Geraldi, 2020). The report's contribution to existing knowledge can be divided into three parts. Firstly, it proposed key success factors building on both literature and insights from Axis, and by that contributing to the understanding of PPM within operations. This helps bridge the gap between theory and practice. Secondly, it identified and recommended best practices in PPM, offering practical recommendations for the organization related to its operations, which can be of assistance to other companies with similar challenges. Thirdly, it provided a case study of how PPM can be applied and enhanced within operations in a global company relating to its improvement projects. These three factors can help similar organizations increase their efficiency and effectiveness within PPM in operations. This also contributes to the lack of academic literature on PPM specifically related to operations, as the focus of research within the area has long been specifically on product development, research and development (R&D), and financial portfolios (Blomquist & Müller, 2006).

8.3 Future research

This master thesis focuses on one specific organization and its operations department, an area where there currently is limited amount of research. In order to expand and ensure the validity and transferability of the key success factors and the following recommendations, more case studies can be carried out at other organizations and companies, within the area of PPM specifically related to operations.

A more detailed investigation and analysis of the differences between R&D and operational improvement projects would improve understanding of the PPM structure in operations and how to increase its efficiency. A major difference today is the end user of the projects, where R&D's major focus is on the customer, while operations major focus is on internal stakeholders and efficiency. Future studies could investigate how this difference influence the structure of the PPM and the key success factors highlighted in this report.

Additionally, a follow-up study based on this master thesis can provide key insights in how the implementation and actual impact of the recommendations provided was received. Such a study could indicate if the key success factors and the recommendations were relevant and implementable in an operations organization. Additionally, supplemental gaps and recommendations could be identified to further complete the findings in this study.

Finally, a general expansion on how PPM optimally is set up and utilized specifically in an operations department is needed. As most of the case studies and literature focuses on either R&D or a more general organizations, the specific challenges in regard to operations might be missing. Even though several challenges and recommendations found and provided in this study has many similarities to current academic literature, some differences were found, for example the inherent complexity of different organizational improvement projects. Research on how to account for and manage this complexity would further improve the understanding of PPM within operations.

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Appendix A - Literature review

Table A.1 Literature review with author(s), title and the article's ranking.

Author(s)	*Title*	*Ranking*
Bible, M. & Bivins, S. (2011)	Mastering Project Portfolio Management: A Systems Approach to Achieving Strategic Objectives.	5
Rad, P. F. & Levin, G. (2006)	Project Portfolio Management Tools and Techniques	5
Blichfeldt, B.S. & Eskerod, P. (2008)	Project portfolio management – There's more to it than what management enacts	5
CapGemini (2010)	Project and portfolio management: Experiences taken from Swedish companies and organizations	5
Stenbeck, H. & Appelberg, O. (2018)	Project Portfolio Management at Alfa Laval	5
Doloi, H. K. & Baradari, I. (2013)	Impact of Applying Project portfolio management on project success	5
Lundell, F. & Roxlin, V. (2021)	Achieving a strategically aligned project portfolio - Case Study Medex	5
Singh, R., Keil, M. & Kasi, V. (2009)	Identifying and overcoming the challenges of implementing a project management office	5
Cooper, R., Edgett, S. and Kleinschmidt, E. (2001)	Portfolio management for new product development: results of an industry practices study	5
Ghasemzadeh, F., & Archer, N. P. (2000)	Project portfolio selection through decision support.	5
Killen, C. P., Hunt, R. A., & Kleinschmidt, E. J. (2008)	Learning investments and organizational capabilities: Case studies on the development of project portfolio management capabilities.	5
Petit, Y (2012)	Project portfolios in a dynamic environment: Organizing for uncertainty	4
Meskendahl, S. (2010)	The influence of business strategy on project portfolio management and its success — A conceptual framework	4
Hyväri, I. (2014)	Project portfolio management in a company strategy implementation, a case study	4

Martinsuo, M. (2012)	Project portfolio management in practice and in context	4
Beringer, C., Jonas, D. & Kock, A. (2013)	Behavior of internal stakeholders in project portfolio management and its impact on success	4
Bible, M. & Bivins, S. (2012)	Evaluating Strategic Project Portfolio Performance	4
Unger, B. N., Gemünden, H. G. & Aubry, M. (2012)	The three roles of a project portfolio management office: Their impact on portfolio management execution and sucess	4
Levine, H. A. (2005)	Project portfolio management: a practical guide to selecting projects, managing portfolios, and maximizing benefits.	4
Patanakul, P. (2020)	How to Achieve Effectiveness in PPM	4
Beringer, C., Jonas, D. & Kock, A. (2013)	Behavior of internal stakeholders in project portfolio management and its impact on success	4
Kendall, G. E. & Rollins, S. C. (2003)	Advanced project portfolio management and the PMO, multiplying ROI at warp speed	4
Shaltry, P. E., Drew, E. J., & Horgan, B. (2002)	Journey to project portfolio management, a case study	4
Delilbasi, R. (2012)	Project Portfolio Management, case study transportation company	4
Unger, B. N., Kock, A., Gemünden, H. G., & Jonas, D. (2012)	Enforcing strategic fit of project portfolios by project termination: An empirical study on senior management involvement	4
Kendall, G. I., & Rollins, S. C. (2003)	Advanced project portfolio management and the PMO: multiplying ROI at warp speed.	4
Hobbs, B., Aubry, M., & Thuillier, D. (2008)	The project management office as an organisational innovation.	4
Engwall, M., & Jerbrant, A. (2003)	The resource allocation syndrome: the prime challenge of multi-project management?	4
Berkun, S. (2008)	Making Things Happen – Mastering Project Management	4
Archer, N. P., & Ghasemzadeh, F. (1999)	An integrated framework for project portfolio selection.	4
Runghi, M. (2009)	Managing resource and technology interdependencies in project portfolio: A case-study results.	4
Rajegopal, S., McGuin, P., Waller, J., (2007)	Project Portfolio Management, Leading the corporate vision	4

Chao, R. O., Kavadias, S., & Gaimon, C. (2009)	Revenue driven resource allocation: Funding authority, incentives, and new product development portfolio management.	4
Killen, C. P. & Hunt, R. A. (2010)	Dynamic capability through project portfolio management in service and manufacturing industries	4
Teece, D. J., Pisano, G., & Shuen, A. (1997)	Dynamic capabilities and strategic management	4
Engwall, M. & Jerbrant, A. (2003)	The resource allocation syndrome: the prime challenege of multi-project management?	4
Jonas, D (2010)	Empowering project portfolio managers: How management involvement impacts project portfolio management performance	3
Cooper, R. G., Edgett, S. J., & Kleinschmidt, E. J. (1997)	Portfolio management in new product development: Lessons from the leaders—I.	3
Kotter, J., Sathe, V. (1978)	Problems of Human Resource Managmemt in Growing Companies. California Management Review	3
Medina, R. & Medina, A. (2015)	The competence loop: Competence management in knowledge-intensive, project intesive organizations	3
Laakso-Manninen, R., & Viitala, R. (2007)	Competence management and human resource development: a theoretical framework for understanding the practices of modern Finnish organisations.	3
Jenner, S., & Kilford, C. (2011)	Management of portfolios.	3
Robert G. Cooper, Scott J. Edgett & Elko J. Kleinschmidt (2000)	New Problems, New Solutions: Making Portfolio Management More Effective	3
Ajjan, H., Kumar, R. L. & Subramaniam, C. (2016)	Information technology portfolio management implementation: a case study.	3
Augusto Cauchick Miguel, P. (2008)	Portfolio management and new product development implementation: A case study in a manufacturing firm.	3
Martinsuo, M., & Geraldi, J. (2020)	Management of project portfolios: Relationships of project portfolios with their context	3
Cooper, Robert G, Edgett Scott J, Kleinschmidt, Elko	New problems, new solutions: managing portfolio management more effective	3
Teller, J., Unger, B. N., Kock, A., & Gemünden, H. G. (2012)	Formalization of project portfolio management: The moderating role of project portfolio complexity	3

Aghajani, M., Ruge, G. & Jugdev, K. (2023)	An integrative review of project portfolio management literature: thematic findings on sustainability mindset, assessment, and integration	3
Killen, C. P. & Hunt, R. A. (2013)	Robust project portfolio management: capability evolution and maturity	3
Leonard, A., & Swanepoel, A. (2010)	Project portfolio management implementation pitfalls	2
Voss, M. (2012)	Impact of customer integration on project portfolio management	2
Guo, F., Ma, L. (2010)	Research and application of multi-project portfolio management based on constraint theory	2
Kasvi, J. J., Vartiainen, M., & Hailikari, M. (2003)	Managing knowledge and knowledge competences in projects and project organizations	2
Filippov, S., Mooi, H. G., Weg, R., & Westen, L.-J. (2012)	Strategic alignment of the project portfolio: an empirical investigation.	2
Fricke, S. E., & Shenbar, A. J. (2000)	Robust project portfolio management: capability evolution and maturity	2
Ye, K., Li, H., Shi, X., & Shi, N. (2014)	Resource Allocation Problem in Port Project Portfolio Management	2
Sirmon, D. G., Hitt, M. A., & Ireland, R. D. (2007)	Managing firm resources in dynamic environments to create value: Looking inside the black box	2
Filippor, S., van der Weg, R., van Ogtrop, F., Beelen, P. & Mooi, H. (2014)	Exploring the projet portfolio manager's role: between a data mangager and strategic advisor.	2
Simion, Verboncu and Savga (2018)	Project portfolio management in Romanian R&D organizations	2
Young and Conboy (2013)	Contemporary project portfolio management: Reflections on the development of an Australian Competency Standard for Project Portfolio Management	2
Faems, Looy and Debackere (2005)	Interorganizational Collaboration and Innovation: Toward a Portfolio Approach	1
Cihan, E. E., Uslu, C. A., & Kabak, Ö. (2023)	Hyper-project portfolio management: post-merger project portfolios	1
Mohammad J, Yu-Chun Pan (2022)	Sustainability, the fourth pillar of project portfolio management–a holistic approach	1
Buys and Stander (2010)	Linking projects to business strategy through project portfolio management	1
Peter W.G Morris & Jeffrey K. Pinto (2007)	The Wiley Guide to Project, Program & Portfolio Management	1

Chen, M and Zhang, Z (2015)	A Bid & Auction Mechanism for Resource Management in Project Portfolios"	1

Appendix B - Case Study Protocol

B.1 Case Study Protocol

B.1.1 Overview of the Case Study

This study aims to analyze PPM within operations and identify key success factor to PPM success. Additionally, the study aims to investigate Axis Operations' PPM structure and provide recommendations on how to improve the structure to ensure effective management of the portfolio, programs, initiatives, and resources.

In order to fulfill the research purpose, the following research goals will be answered:

> RG1. Identify and describe the key success factors to PPM performance in operations.
>
> RG2. Investigate the current structure around Axis Operations PPM, with each management level involved.
>
> RG3. Identify the main improvement areas and provide recommendations to Axis Operations PPM.

The interview protocol will hence be used as a guide to follow freely during the interview. Relevant readings on the subject can be found in the literature review of this thesis. The structure of the case study is based on Yin's (2018) six steps of a systemic framework for case studies. Furthermore, the study was completed with guidelines and suggested actions, according to the structure of Björklund and Paulsson (2012).

Role of the protocol

This protocol has guided the authors throughout the project's timeline, providing a clear methodology at each step.

B.1.2 Data Collection Procedures

Conducting interviews is the main way to collect data for the research. The interviews are held with key stakeholders at the Axis Operations office and in person. In order to protect human subjects, a confidentiality note was presented before each interview. Additionally, one week before each interview, a reminder including the interview questions will be sent out to the participants.

The interviews are semi-structured and are expected to be 1 hour long. The two researchers, responsible for the master thesis, will be conducting the interviews, during which one of them will lead the interview while the other one is responsible for taking notes and following up with questions if needed. All of the interviews will be conducted during a period of two weeks, between the 12th of February and the 8th of March. In addition to notes, the interviews will be recorded if permitted by the participant, with the purpose to ensure reliability related to what each interview participant says.

The interviews will be listen to again and notes will be taken, and lastly the final analysis will be conducted. Finally, corrections are based on the participants' validation after the initial draft.

B.1.3 Data Collection Procedures

Område 1. Introduktion och generellt om PPM

Syfte: Skapa en övergripande bild av respondenten och dess relation till PPM idag.

1. Beskriv kort din bakgrund och din roll på företaget.
2. Vad är PPM för dig? Beskriv kortfattat.
3. Varför ska man ha PPM i Operations?
4. Anser du att ni har en tydligt definierad projektportfölj idag?
5. Vad är din relation/koppling till PPM/projektportfölj inom Operations?
    a. Hur mycket av ditt arbete berör PPM? Kan du ange det i % eller antal timmar per månad?
6. (Ifall man inte har koppling till det) Har du några tidigare erfarenheter med PPM? Tex från andra arbetsplatser.
7. Har du någon aktiv roll i något projekt just nu eller de senaste två åren? (Chefer kan vara med i styrgrupper som specialist, resursägare, beställare av projekt eller sponsor)
    a. Vad var din roll och uppgift då?

Område 2. AS-IS PPM

Syfte: Kartlägga Axis PPM idag, enligt personen, hur den används och förstå styrkor och svagheter. Överlag förstå ifall stakeholders har samma syn och förståelse av PPM.

1. **Vilka huvudsakliga utmaningar/problem ser du idag med strukturen kring er projektportfölj?**
2. **Vilka delar fungerar bra kring strukturen i er projektportfölj?**
3. Tycker du att din roll inom PPM är tydlig, med ansvar, skyldigheter och rättigheter?
4. Var i organisationen ligger ansvaret för PPM idag?
5. Vem har ansvar att ta fram vision och mål?
6. Vem har ansvar att ta fram förslag på projekt?
7. Vem har ansvar för screening och selection/urval av projekt?
8. Vem är ansvarig för implementeringen?
9. Vem är ansvarig för överlämning av projekt?
10. Vem är ansvarig för utvärdering, det vill säga om det är rätt projekt och hur kopplingen är till strategin?
11. Hur kommer ni fram till vilka projekt ni väljer att genomföra idag?
    a. Finns det någon struktur i valprocessen?
12. Hur kommuniceras projektportföljen och de strategiska målen i organisationen?
    a. Tror du att det är tydligt för samtliga? Vad är din uppfattning?
    b. Finns det en gemensam terminologi för projekthantering i hela Operations?
13. Gör man någon utvärdering av projektet under projektets gång? (program, projekt, aktivitet osv)
    a. Hur i så fall? Och hur ofta?
        i. Vilka parametrar/mätetal utvärderar ni utifrån då?
14. Anser du att ni har för många/få projekt idag?
    a. Anser du att ni har rätt projekt idag? Matchar projekten er strategi?
15. Hur hanteras osäkerhet (uncertainty) och risk i projektportföljen och de strategiska målen? (tex krig, covid, suez-block etc)
    a. Hur ofta ses det över?
    b. Hur hanteras och kommuniceras dessa förändringar?

Område 3. AS-IS Resource planning

Syfte: Kartlägga hur resurshanteringen går till i anknytning till projektstyrning och vart bristerna finns. Även förstå resurser i form av kompetenser i och mellan avdelningar som är tillgängliga/behövs för projekt.

1. Har ni tillräckligt med resurser inom projekt och projektportföljen?
    a. Vilken resurs är mest begränsad inom projekthantering och projektportföljen?
2. Hur prioriteras resurser inom projektportföljen?

    a. Ifall något förändras, till exempel ett nytt projekt eller om någon blir sjuk, hur omprioriteras resurser då?
3. Gör ni någon uppföljning av resurser under projektets gång?
    a. Hur i så fall? Hur ofta?
    b. Vad gör ni om resurserna inte räcker till?
    c. Vem tar det ansvaret och valet på vilket projekt som dödas?
4. Har ni en kompetenskarta över er avdelning? Har du koll på vilka kompetenser ni har på er avdelning?
    a. Om inte, tror du att det hade gynnat er?
5. Har personer i andra team (tex project managers eller andra chefer) koll på kompetenser i ert team?
6. Har ni en plan för kompetensbredd/försörjning inom ert team? Vet du vad för kompetenser teamet behöver framöver?

Område 4. TO-BE

Syfte: Se vad personen visualiserar som ett optimalt scenario kring strukturen med PPM och beslutsfattarna inom varje nivå. Även se över hur PPM utvärderas, av vem och med vilka KPI:er. Slutligen en fråga kring tillväxten och hur det påverkar PPM för att runda av med en öppen fråga för tillägg.

1. **Hur tycker du att PPM optimalt ska utformas på Operations, gentemot hur det är idag?**
    a. Vem borde vara ansvarig för att komma på och utveckla förbättringsprojekt inom portföljen?
    b. Vilka typer av arbeten/projekt bör inkluderas i projektportföljen? Tex bör alla aktiviteter inkluderas/exkluderas?
    c. Vem ska ha ansvar för att följa upp projekt? (Utvärdering, resursfördelning och kill switch)
    d. Hur ska ni hantera förändringar och justeringar i projektportföljen? Vem borde ha ansvar för att koordinera projektportföljen? Tex nytt projekt (lagkrav) som måste göras nu.
        i. Hur ska en sådan förändring kommuniceras inom operations?
2. Hur tycker du att PPM bäst utvärderas? Alltså i mätbarhet? (KPI?)
    a. Hur ska individuella projekt utvärderas?
    b. Hela portföljen?
3. Ni växer och ska fördubbla omsättning på 5 år, tror du ni behöver ändra ert arbetssätt för att kunna hantera det?
    a. Hur kommer strukturen behöva förändras med tillväxten?
    b. Hur kommer koordineringen kring projekt att förändras med tillväxten?
        i. Om ja, behöver man tillsätta specifika roller kopplat till det?

Är det något annat du vill tillägga kring ämnet som du känner att du inte fått sagt här

B.1.4 Tentative Outline for the Case Study Report

The aim of the case study is reported as three major parts; describe the key success factors to PPM performance in operations, identify challenges around Axis Operations PPM and finally recommend the main improvement areas within Axis Operations PPM based on best practices. This is provided to an audience of engineering professors and students as well as parties specifically related to the PPM organization at Axis Operations. Results are summarized in themes based on the key success factors and then compared and analyzed to the literature review to identify the final recommendation.

Appendix C - Pilot Case Report

The pilot case interview was conducted on February 5th, 2024. The main purpose of the interview was to fine-tune the interview questions in order to ensure the right questions. The title of the interview participant was Project Manager, which means the person works closely related to the project portfolio. The main feedback from the pilot interview is summarized below:

- Add a question about who has the responsibility for the handover at the end of the project. This question will be added since it is an important part of the project portfolio management.
- Specify follow-up questions under the initial "to-be" question, about how PPM should be structured to help the interview participant if they experience difficulties in answering.
- Add a question about how the participant thinks the rapid growth will affect the organizational structure and culture of the company. Ask if they believe new roles and responsibilities will need to be established within the organization.
- Ask the participant to clarify their answer if something is unclear, to avoid misinterpretation.
- Removed a question related to the amount of active projects Axis Operation can handle. This was removed as the question was deemed too vague to answer specifically.

The feedback was considered, and the interview guide and case study protocol were adjusted.

Appendix D – List of interviewees

Table D.1 The PPM stakeholders chosen as interview participants.

Interviewee's work title	*Years of Axis experience*	*Relations to PPM structure*	*Date of interview*	*Length of interview [min]*
Director in Operations	8	Part of the senior management team	February 15th, 2024	55
Director in Operations	9	Part of the senior management team	February 15th, 2024	50
Vice President, Operations	1,5	Part of the senior management team	February 15th, 2024	50
Director in Operations	15	Part of the senior management team	February 20th, 2024	61
Director in Operations	11	Part of the senior management team	February 20th, 2024	53
Director in Operations	18	Part of the senior management team	February 22nd, 2024	48
Director in SC	3	Part of the middle management team	February 26th, 2024	60
Director in SC	3	Part of the middle management team	February 26th, 2024	48
Project Manager in Operations	18	Project Manager withing the PPM	February 27th, 2024	50
Project Manager in SC	7	Project Manager withing the PPM	February 28th, 2024	54
Project Manager in Operations	14	Project Manager withing the PPM	February 28th, 2024	55
Process Developer in Operations	1	Project Manager within the PPM	February 28th, 2024	50
Manager in Operation	25	Part of the middle management team	February 29th, 2024	83
Transformation Manager in Operations	1	Project Manager within the PPM	March 7th, 2024	55
Manager in Operations	10	Part of the middle management team	March 7th, 2024	50
Project Manager in SC	6	Project Manager within the PPM	March 8th, 2024	57

Appendix E – Summary Results

Table E. 1 The additional main challenges and issues of the current PPM structure.

Main challenges and issues [#interviewees]	*Senior Management [6]*	*Middle Management [4]*	*Project Managers [6]*
Absence of dedicated project resources	1	0	0
Unclear definitions and terminology	1	0	1
Unclear roles and responsibilities	1	1	0
Poor follow up process	2	1	1
Slow decision-making	1	0	0
Poor project prioritization	2	1	1
Unclear project process	1	1	0
Higher ambition than capacity	0	2	0
Poor project methodology	0	1	0
Low competence in projects	2	1	0
Scope creep	0	2	2
Absence of KPIs/measurement for projects	0	0	2
PM excluded in project preparation phase	0	0	2
Lack of project categorization	0	0	2
Difficulties in resource estimation	1	0	2
Unclear communication	0	0	1

Appendix F – Summary Results

Table F.1 The additional positive aspects of the current PPM structure.

Main positive aspects of current structure [#interviewees]	*Senior Management [6]*	*Middle Management [4]*	*Project Managers [6]*
Capable projects managers	1	1	0
Good internal relationships	1	0	0
Clear roles in projects	2	0	0
A centralized and supportive project organization	1	1	0
There is a clear priority list (OP-list)	0	0	2

Appendix G – Summary Results

Table G.1 The additional future wishes to ensure PPM success.

Future whishes [#interviewees]	*Senior Management [6]*	*Middle Management [4]*	*Project Managers [6]*
Better resource planning	3	1	0
Clearer areas of responsibility	1	0	0
KPI-driven projects connected to the BSC	1	0	1
Transparent portfolio processes	1	0	0
A set number of active projects	1	0	0
Better possibility to terminate project	1	0	0
A clearer connection to strategy	2	0	0
A better portfolio process	1	0	0
A strategic management of PPM	0	2	0
A clearer project methodology	0	2	0