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Project Portfolio Management: planning, selecting, and executing

Development of a framework for prioritizing between
innovation projects at a forest industry company

Master's thesis in Management and Economics of Innovation

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Abstract

Following a recent restructuring and new strategic directives, the Packaging Solutions Business Expansion team (PSBE) at Stora Enso has begun to question how it works with project portfolio management (PPM). This study explores the usefulness of a formal PPM process for designing PSBE's project portfolio and proposes a context-specific framework for handling this. The research is qualitative in nature, based on interviews with PSBE team members and representatives from external companies. The internal interviews explored the current needs and challenges of PSBE, while the external interviews provided insights into how other organizations work with PPM. While the externally interviewed companies offer insight and best practices, differences in context mean that their practices cannot be directly applied to PSBE. The findings indicate that PSBE currently selects and prioritizes innovative project ideas in an informal manner, and faces certain challenges related to it. A formal PPM framework could help address these challenges. This research has led to a set of recommendations for PSBE on how to work with PPM effectively. The proposed PPM framework encompasses three phases: planning (setting strategic focus and deciding on evaluation methods, including financial metrics, scoring models, and visualizations), selecting (building the actual project portfolio through activities such as evaluating individual projects and considering interdependencies and resource constraints), and executing (realizing projects through continuous monitoring and incorporation of lessons learned). Involvement of stakeholders throughout the process is crucial for success.

Keywords: Project portfolio management, PPM framework, Project selection, Project prioritization, Benchmarking.

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List of acronyms

LL	Lessons Learned
PA	Packaging Automation (Business area within PSBE)
PD	Packaging Design (Business area within PSBE)
PI	Packaging Innovation (Business area within PSBE)
PPM	Project Portfolio Management
PS	Packaging Solutions (Division at Stora Enso)
PSBE	Packaging Solutions Business Expansion (Part of PS)

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1 Introduction

The collection of projects sponsored or managed by an organization is known as its project portfolio, within which limited resources are shared and contested among the various projects (Meskendahl, 2010; Jonas, 2010). In a constantly evolving world where organizations are becoming increasingly project-oriented (Hansen & Svejvig, 2018) and resources remain scarce, the challenges of managing the project portfolio become increasingly evident. An effective way to address these challenges is through project portfolio management (PPM).

Oftentimes, companies are abundant with ideas; ideas that need to be evaluated, prioritized, and selected (Wheelwright & Clarke, 1992b). The challenge is to select the best ideas to build an optimal portfolio of projects, that is, one that is strategically aligned, balanced, offers maximum value, and includes an optimal number of projects (Cooper & Edgett, 2001). This is where PPM enters the equation. PPM is an iterative process that serves the purpose of 1) structuring the portfolio, by the process of assessing, selecting, and prioritizing new projects, 2) utilizing and allocating resources optimally among projects, 3) continuously coordinating and monitoring the portfolio (Cooper & Sommer, 2023; Kopmann et al., 2015), and 4) developing lessons learned to be used for successful future execution of PPM (Kopmann et al., 2015).

While the existing literature highlights the potential benefits of implementing a PPM process, it also emphasizes that PPM is inherently contingent and that there is no universal solution that fits all organizations (Kock & Gemünden, 2021). Instead, the PPM process must be tailored to factors such as organizational context and strategic direction (Kock & Gemünden, 2021). As a result, there are multiple aspects in which PPM can be fruitful, including maximizing return and R&D productivity (Cooper et al., 2001b); enhancing competitiveness (Archer & Ghasemzadeh, 1999; Cooper et al., 2001b; Killen et al., 2012); ensuring efficient use of resources (Cooper et al., 2001b; Jugend & Da Silva, 2014); aligning projects with business strategy (Cooper et al., 2001b; Kock & Gemünden, 2021; Jugend & Da Silva, 2014); achieving a balanced mix of projects (Archer & Ghasemzadeh, 1999; Cooper et al., 2001b) to mitigate the risks of a narrow portfolio; improving internal communication about priorities and strategic direction (Cooper et al., 2001b; Wheelwright & Clark, 1992b); and leveraging the benefits of potential project synergies (Kock & Gemünden, 2021). Conversely,

organizations that lack a structured PPM approach risk losing control over projects with regards to, for instance, cost, quality, scope, and time (Thomas, 2011). Moreover, projects misaligned with the strategy might get selected and steal resources from initiatives that would have been a better fit (Cooper & Edgett, 2001). Another issue relates to imbalance, where the future of the company can be endangered if not both short-term and long-term projects are included in the portfolio (Archer & Ghasemzadeh, 1999).

The forest industry company Stora Enso has in recent years undergone restructuring and a shift in strategic direction, stating that innovative projects must be more closely connected to its core business of corrugated products. As a result, the Packaging Solutions Business Expansion (PSBE) team at Stora Enso hypothesizes that their current project evaluation process may not be the most effective. PSBE seeks to ensure that its practices guide it in the right direction toward realizing its strategy and vision. The team also anticipates a large amount of new project ideas coming in, driven by an increased societal focus on sustainability and stricter regulations on plastics. Moreover, the limited resources within PSBE make effective project prioritization critical. Hence, Stora Enso has assigned the authors of this report the responsibility of developing a framework to meet PSBE's needs.

1.1 Aim and research questions

The aim of this thesis is to investigate how a project portfolio management framework for the Packaging Solutions Business Expansion team at Stora Enso should be designed, to allow for effective selection and prioritization of inherently different ideas in a homogenous and objective way. In order to effectively design such a framework, it is important to first understand the team's current approach to PPM and the challenges it faces.

Based on this aim, the following research questions have been developed:

RQ1: How does Packaging Solutions Business Expansion at Stora Enso currently work with selection and prioritization of projects?

RQ2: How should a project portfolio management framework for selecting and prioritizing between projects within Packaging Solutions Business Expansion at Stora Enso be designed?

1.2 Delimitations

This research focuses on portfolio management, that is, it takes a broad view of projects as interdependent elements within a larger system. Project management as a concept is not explored in depth, however, some methods are briefly referenced for substance and to support the development of the framework.

1.3 Case company Stora Enso - a provider of sustainable solutions in packaging, biomaterials, and wooden construction

Stora Enso has its origin in Sweden and Finland and operates within the forest industry with a focus on developing sustainable solutions within its three core areas Packaging, Biomaterials, and Wooden Construction (Stora Enso, n.d.-a). The firm has its roots in the 13th century, at the time a copper mining company, and has since pivoted to the forest industry (Stora Enso, n.d.-d). Stora Enso is continuously pivoting and finding new areas to expand into, and in 2023 the firm discontinued its paper division to be able to focus on its three new core areas that are divided into five divisions: Packaging Materials, Packaging Solutions, Biomaterials, Wood Products, and Forest (Stora Enso, n.d.-b). The five divisions operate to a large degree as independent organizations.

Stora Enso aims to leverage megatrends such as the increased focus on climate change and circularity to drive growth and profitability in its key segments (Stora Enso, n.d.-c). Subsequently, the firm aims to have a diversified portfolio of renewable projects that allows it to meet customers' needs both in the short term and long term. Stora Enso's goal is to offer products that are 100% regenerative by 2050 and to achieve net-zero carbon emissions by 2040 (Stora Enso, n.d.-b), a goal that is far more ambitious than the Paris Agreement, which dictates net-zero carbon emissions by 2050 (Paris Agreement, 2016).

1.3.1 The Packaging Solutions division

Stora Enso's Packaging Solutions (PS) division is a packaging converter that operates across Europe and Asia. The products and services are sold to customers located in markets such as retail, fresh produce, and industrial applications. The main products are corrugated packaging on the European market and fiber-based packaging on the East Asian market. Additionally, design and sustainability services are offered within these areas. Hence, the projects within

the department are diverse, spanning from inventing new cardboard solutions to developing automation solutions. PS is one of the divisions within Stora Enso that is the most exposed and affected by the macroeconomic situation. The division is customer-centric and aims to be the first-choice partner for its fiber-based packaging. By achieving this, PS will realize its strategic goal of selective profitable growth (Stora Enso, n.d.-c).

PS is the second largest division within Stora Enso in terms of share of personnel, constituting 22% of the total employees, which corresponds to more than 4,000 people located in different regions (Stora Enso, n.d.-c). The geographical dispersion enables local presence and thus closer contact with the customers. The division stands for 11% of external sales and 5% of CAPEX (Stora Enso, n.d.-c).

A representation of the current situation in the PS division is pictured in figure 1.

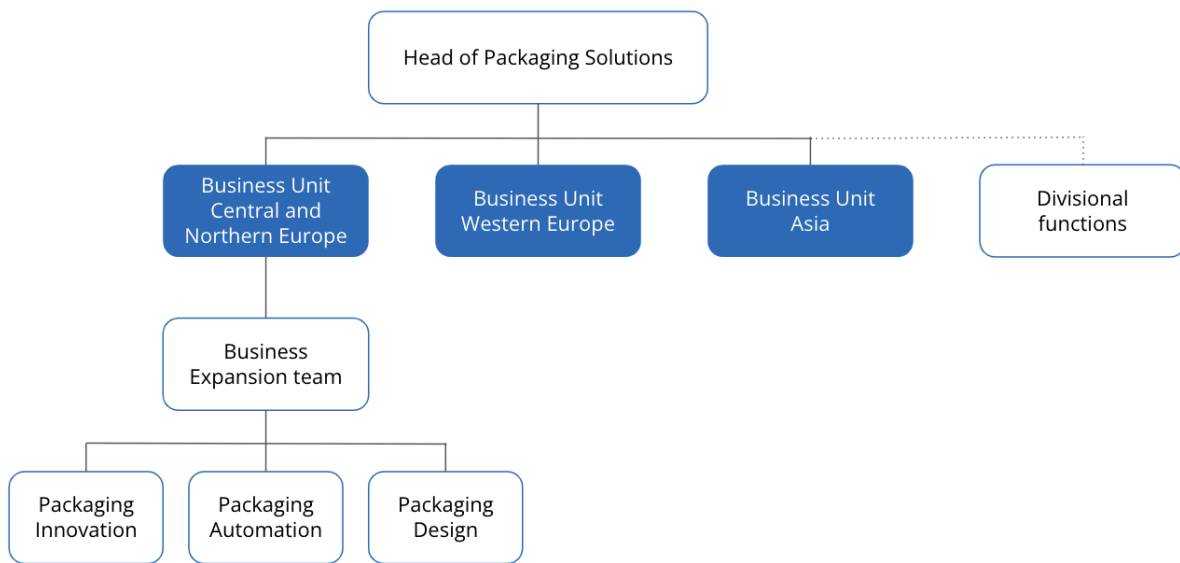


Figure 1. Scheme over the Packaging Solutions division at Stora Enso in 2025.

1.3.1.1 The Business Expansion team

Business Expansion is part of PS. As seen in figure 1, it is part of the Central and Northern Europe business unit. However, the scope of its activities is larger than the geographical boundaries of its business unit, because it also supports the other two business units. Business Expansion is made up of three pillars: Packaging Innovation (PI), Packaging Automation (PA), and Packaging Design (PD). Across these three business areas, projects are the main

way of working. The Business Expansion team consists of approximately 30 people, of whom the majority are working in the PA business area.

The purpose of the Packaging Solutions Business Expansion (PSBE) team is to work cross-country in order to seek growth potential outside of the core business, leading to the initiation of innovative projects. Innovation projects at PSBE are diverse and can be more or less innovative, but compared to the innovativeness pursued by the rest of PS it is significantly more innovative. As of today, the offerings identified by PSBE are found in Stora Enso's existing geographical markets. The offerings are translated into project proposals and then reviewed by a steering committee, which decides whether to invest in a specific project. The purpose is to select projects that are ahead of industry trends and strengthen the core business, demonstrate clear synergies with corrugated packaging (e.g., leveraging existing machinery or increasing sales to the same customer), and that the innovation is sizable. The steering committee is internal for the PS division and consists of people relevant to the specific project, including people with delegation authority and people directly involved in the project should it be realized. On the note of project teams, the number of team members varies across different project phases, and even formal leadership roles can shift throughout a project.

The selected innovative projects are initially incubated and operated by PSBE, but handed over to the local markets after being proven mature and commercially viable. This is important to ensure that the PSBE team maintains its agility and speed to sense and seize new opportunities.

PD and PI do not have a fixed project budget, instead, the amount of allocated resources depends on the number of projects and their scope. For example, some PD projects finish within weeks, whereas PI projects can have a duration spanning several years. Hence, the development budget varies annually. PA has its own budget, however, it can apply for additional funding. Due to recent restructurings of the organization in large, PSBE's active projects during a year can be widely varied and span from one to up to dozens.

2 Methodology

This study adopts a qualitative, case study approach to explore how PSBE currently works with selecting and prioritizing between projects and how a PPM framework should be designed to allow for effective selection and prioritization of inherently different ideas in a homogenous and objective way. Given the context-specific nature of the research questions, an abductive research strategy was chosen, characterized by an iterative movement between empirical data and theory (Alvesson & Sköldbberg, 2010). The study relied primarily on semi-structured interviews with PSBE and external companies, complemented by a narrative literature review to guide the analysis and the development of the generic and specific framework. Figure 2 depicts the overall research strategy.

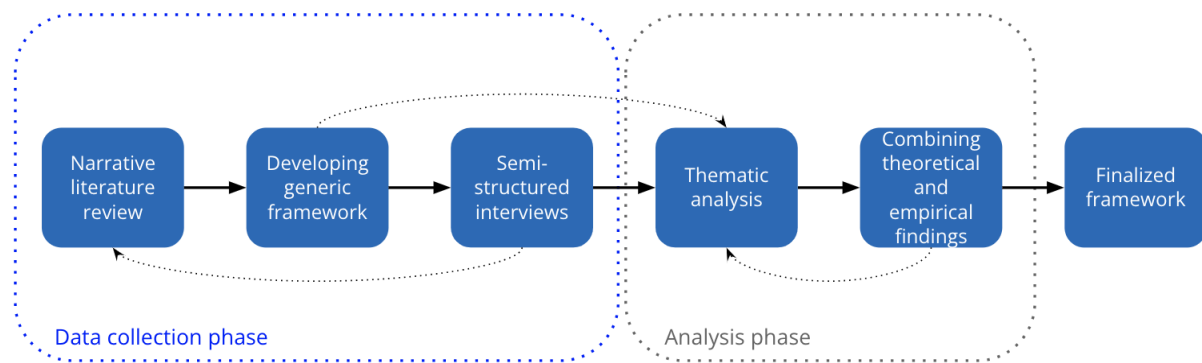


Figure 2. The research process of this thesis.

As this study focuses on a single department within defined boundaries, it can be characterized as a case study (Bell et al., 2019). A case study was chosen as it allows for in-depth analysis of the interaction between a phenomenon and its context (Dubois & Gadde, 2002). In this case, how PPM can be understood, adapted, and applied in the specific context of PSBE.

2.1 Literature review

As part of this research project, a narrative review of current literature was conducted. The literature review served as the springboard for analyzing the PSBE team at Stora Enso and exploring potential solutions. According to Bell et al. (2019), a narrative review is commonly used to gain an initial understanding of a topic and is less structured and focused than a systematic review. It is considered particularly suitable for qualitative research and in

instances where the boundaries of the research are not set at the beginning of the work (Bell et al., 2019). Given the limited initial knowledge about the current situation within the PSBE team, a narrative approach was deemed appropriate, as it allowed for flexibility in the scope and focus of the literature review as new insights emerged throughout the research process. This flexibility was important given the abductive nature of the study, in which theoretical and empirical insights were developed iteratively and could not be fully understood without one another.

The literature review was done by searching through online databases, such as Google Scholar and SCOPUS, by using keywords connected to the topic of the thesis. Words used in the search included “project portfolio management”, “project portfolio”, “innovation project portfolio management”, and “product portfolio management”. Since new product development starts off as a project, findings from literature having a more narrow focus on product portfolio management were still considered relevant. Figure 3 visualizes this argument. The scientific articles found were screened for relevance by reading the abstracts. Additional relevant articles were found through backtracking references made from the articles selected in the keyword search. Additionally, all overcome articles were critically reviewed to understand the reliability, authority, objectivity, date, and content in order to ensure that the articles were credible and of high quality, in line with recommendations from Uppsala University (n.d.).

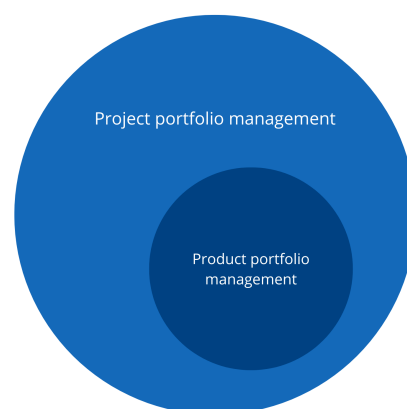


Figure 3. Product portfolio management was seen as part of the bigger concept project portfolio management.

2.2 Data collection

As a second step in the abductive research approach, data was gathered through semi-structured interviews with the Business Expansion team in the PS department at Stora Enso to understand how it currently works with project selection and to reveal its wants and needs of a PPM framework. Semi-structured interviews were chosen as a suitable method since they ensure that relevant topics are covered yet still give leeway for the interviewee to shape their answer and touch upon other related subjects, as opposed to structured interviews (Bell et al., 2019). This way, what Dubois and Gadde (2002) call “active” data is allowed to emerge, which can lead to unexpected discoveries relevant for developing the framework. Moreover, semi-structured interviews increases the validity as compared to, for example, surveys, as it becomes easier to detect whether the respondent has misinterpreted a question, or vice versa—that the interviewer has misinterpreted an answer (Bell et al., 2019)—and thus increases the credibility and confirmability of the study’s results.

The sample was chosen on the basis of a snowball sampling (Bell et al., 2019), where the thesis’ supervisors from Stora Enso made an initial recommendation of people at the company to interview, and through these interviews access to additional people relevant for answering the research questions was gained. By ensuring that the majority of the relevant stakeholders were interviewed, the risk of bias due to a sampling frame unrepresentative of the whole population, which Bell et al. (2019) identify as a limitation with snowball sampling, was minimized.

Second, semi-structured interviews were conducted with external manufacturing companies to investigate the processes and methods that they use for managing their project portfolios. These interviews complemented the literature review by exploring how theoretical models are applied in practice. Additionally, given that PPM is a contingent phenomenon, studying these companies helped identify context-specific best practices. The interviewed companies were all outside of Stora Enso’s industry boundaries. It is relevant to make this cross-industry analysis since a proven method in one environment can drive positive outcomes in another, as seen for example in the Lean principles, which took root in the Toyota Production System (Melton, 2005) and then bloomed into industries such as healthcare, travel, and banking (McKinsey, 2011). Another argument to find information outside Stora Enso’s industry boundaries is that individuals within the same industry often move between companies,

making it challenging to gain fresh perspectives when limiting the scope to organizations within the same sector. Interviewing companies within Stora Enso's industry would surely also have contributed with insights, but convincing direct competitors to participate was challenging.

To maximize the chances of obtaining responses, convenience sampling was used as a method to find companies and participants (Bell et al., 2019). This method was again complemented by the snowball sampling method due to the hypothesis that it would increase the chances of getting a two-way contact with the approached companies. The interviewees held titles such as CEO, portfolio manager, head of project management office, and head of project portfolio management. Swedish medium-sized and large-sized firms were contacted via email, where the study was explained transparently to uphold research ethics (Bell et al., 2019) and participation was requested. The reason behind the variation in firm size between the contacted firms was to cover both the elements of Stora Enso as a large company and the PSBE team as a relatively small unit. Despite a number of non-responses, eventual data collection errors (Bell et al., 2019) were considered minimal since the dataset was nevertheless qualitative in nature and no statistical analysis was made anyway.

All interviews held with Stora Enso and the other companies were conducted as synchronous online video interviews, mainly because of the geographical distance between the researchers and the participants. Moreover, the convenience offered by online interviewing was believed to increase the chances of having people agree to be interviewed, in line with Bell et al.'s (2019) argument. In order to counteract the issue that Bell et al. (2019) identify about non-face-to-face interviews making it more difficult to build rapport, the researchers proactively participated in informal coffee chats with the PS department at Stora Enso to facilitate the building of rapport.

To ensure reliability, both researchers attended every interview. This way, both got to hear the information shared first-hand. Afterwards, discussion meetings were held to confirm that both agreed about what was said and seen. If split views occurred, the interviewee was contacted for clarification. This way, inter-observer consistency (Bell et al., 2019) was achieved. Additionally, to achieve validity, any unclear answers during the interviews were validated by confirming with the interviewee that the answers were correctly interpreted.

2.3 Framework for analyzing data

Thematic analysis was used to analyze the data gathered from the interviews. Thematic analysis requires an organized way of working (Nowell et al., 2017) and often results in rich and detailed descriptions of the data (Braun & Clarke, 2006), subsequently increasing the validity of the research (Bell et al., 2019). The method was chosen for its flexibility, structured approach, and the ease to spotlight similarities and differences between the participants (Nowell et al., 2017).

Braun and Clarke's (2006) six-step approach for thematic analysis was used as a basis for the analysis. However, it was adapted to fit the abductive research approach, and subsequently, it was not a straight process but rather an iterative one. The first step included transcribing the recorded interviews and getting familiar with the data by reading it thoroughly. In the second step, the data were initially coded in a way relevant to the two research questions. The coding encompassed how the external firms and the internal business areas work with projects and PPM, and their challenges. The third step concerned identifying themes from the initial codes. This was done by comparing similarities between codes and grouping them together. Step four included reviewing the created themes while concurrently comparing them with the literature studied in the literature review. In the final two steps, the themes were named and used as a basis for developing the specific framework for PSBE. As previously mentioned, the thematic analysis was an iterative process; more specifically, it was iterative between the last four steps, where existing findings and literature were guiding and supporting the search for additional themes and deeper analysis. The process was inspired by Dubois and Gadde's (2002) systematic combining, which states that empirical findings and theory are dependent on each other and cannot be understood without each other.

In short, this study adopted an abductive, qualitative case study approach to explore PSBE's current way of working with project selection and prioritization, and for the development of a PPM framework for PSBE. The research combined insights from a narrative literature review and semi-structured interviews with both PSBE and external companies. The iterative movement between empirical data and theory, through the use of thematic analysis, enabled the development of a context-specific framework aimed at improving project selection and prioritization within PSBE.

3 Theoretical Framework

Common across all companies is the fact that they have a limited amount of resources. This implies that seldom every project in the pipeline can be undertaken simultaneously, and thus companies face the challenge of prioritizing between projects that may be of completely different character (Archer & Ghasemzadeh, 1999). The set of projects sponsored or managed by a particular organization is referred to as the project portfolio, where scarce resources are shared and competed for among the various projects (Meskendahl, 2010; Jonas, 2010). Project portfolio management (PPM) describes the process of assessing, selecting, and prioritizing new projects, while concurrently making decisions on whether existing projects should proceed or be deprioritized, and following these decisions, allocating resources to the active projects (Cooper & Sommer, 2023). Hence, PPM is an iterative process where the project mix is continuously evaluated as projects finish, as the availability of resources changes, as new markets emerge, and as business strategies are revised (Wheelwright & Clark, 1992a).

There are several benefits associated with project portfolio management. Some of the most frequently mentioned reasons behind the importance of PPM include:

- To maximize return and R&D productivity (Cooper et al., 2001b)
- For competitiveness (Archer & Ghasemzadeh, 1999; Cooper et al., 2001b; Killen et al., 2012), by taking market shares and increasing sales (Cooper et al., 2001b)
- To allocate scarce resources efficiently (Cooper et al., 2001b; Jugend & Da Silva, 2014)
- To ensure that the set of projects aligns with the business strategy (Cooper et al., 2001b; Kock & Gemünden, 2021) and consequently that the strategy gets de facto realized (Jugend & Da Silva, 2014)
- To ensure a balanced set of projects with regard to inter alia risk level, project size, and time horizon (Archer & Ghasemzadeh, 1999; Cooper et al., 2001b)
- For obtaining clearer communication about priorities and directions within the company (Cooper et al., 2001b; Wheelwright & Clark, 1992b) and a more objective project selection process (Cooper et al., 2001b)
- For exploiting synergies between projects (Kock & Gemünden, 2021)

There is no such approach as a one-size-fits-all when it comes to PPM; instead, a contingency perspective is needed (Kock & Gemünden, 2021). Contingent factors that influence project portfolio success include organizational context, portfolio characteristics, and the strategic orientation of the firm (Kock & Gemünden, 2021). Success in this regard refers to (Cooper & Edgett, 2001):

1. Maximizing the value of the project portfolio
2. Achieving a balance, for example, between long-term and short-term projects, risk levels, and project types
3. Having a project portfolio that reflects the business strategy
4. Choosing the optimal number of projects

Achieving these four criteria is challenging, indeed many companies frequently take on too many projects simultaneously and overextend their resources (Wheelwright & Clark, 1992a). Looking at the first criterion, value maximization, some confusion arises because value has traditionally been defined exclusively in financial terms, whereas nowadays, project value also depends on factors like accounting for sustainability issues such as carbon footprint (Cooper & Sommer, 2023). Factors further increasing the complexity of PPM includes (1) uncertainty, both within and outside of the organization's boundaries (Zapata et al., 2008), (2) projects of diversified character stand to be compared against each other (Jacobs & Swink, 2011), (3) disparity in overarching strategic goals versus operational goals (Zapata et al., 2008), (4) any interdependency among projects, which needs to be considered (Cooper et al., 1999; Jacobs & Swink, 2011; Zapata et al., 2008)—in fact, focusing on individual projects in isolation is a reason why strategic objectives do not get realized (Jugend & Da Silva, 2014), (5) scarce resources (Zapata et al., 2008), and (6) the difficulty of “killing your darlings”, i.e. closing a project after initiation (Zapata et al., 2008). Not unsurprising, therefore, companies that do not practice PPM stand to face problems related to cost, quality, resources, risk, communication, scope, and time with a project (Thomas, 2011). Looking at the second criterion, an unbalanced portfolio can, for example, become an issue if the proportion of high-risk projects is large and several of them fail, endangering the future of the company (Archer & Ghasemzadeh, 1999). Meskendahl (2010) also notes that some factors might be interrelated, for example, that a long-term project often comes with higher risk. Furthermore, a mismatch of the project initiatives with the business strategy explicitly leads to the failure of implementing it (Cooper & Edgett, 2001), thus making the third criterion highly important

to realize. For the fourth criterion, having too many active projects can imply a pipeline gridlock leading to an increase in time-to-market for the project (Cooper & Edgett, 2001; Jugend & Da Silva, 2014) and a poor execution quality (Cooper et al., 1999).

In the following sections, five of the most well-known methods used within project selection and prioritization will be presented. This is followed by a discussion of PPM as a process and the importance of incorporating stakeholders in it.

3.1. Project portfolio management methods

There are numerous PPM methods that can be used to more or less effectively allocate limited resources (Cooper et al., 2001b). The most commonly used methods can be categorized into five categories: (1) financial, (2) strategic, (3) visual, (4) scoring and ranking, and (5) checklist (Cooper et al., 2001b; Jugend & Da Silva, 2014; Killen et al., 2008). These five methods will be described further in this chapter, along with their strengths and weaknesses. There also exist numerous mathematical and optimization methods, but these are seldom used in practice due to their complexity (Jugend & Da Silva, 2014; Killen et al., 2007; Verbano & Nosella, 2010). There is not one best method, nor is it sufficient to consider only one of the aforementioned evaluation methods in isolation, since they individually fail to consider the manifold aspects that need to be considered in order to successfully manage the project portfolio (Cooper et al., 2001b). Instead, hybrid approaches that draw from multiple methods have been shown to yield better results (Cooper et al., 2001b).

3.1.1 Financial methods

Financial methods are the most commonly used (Killen et al., 2008) and the ones that companies put the most trust in if using multiple methods (Cooper et al., 2001b). The financial methods focus on maximizing the value of the portfolio in terms of return per unit of input (Jugend & Da Silva, 2014). Common financial methods are financial metrics such as net present value (NPV), return on investment (ROI), payback period, expected commercial value, and real options analysis (Archer & Ghasemzadeh, 1999; Cooper et al., 2001b; Jugend & Da Silva, 2014; Killen et al., 2008; Verbano & Nosella, 2010). The idea is that the projects with the highest NPV or ROI should be prioritized, which consequently is expected to result in a project portfolio of maximized value (Jugend & Da Silva, 2014). The biggest benefit of

financial methods is that they are user-friendly, easy to use, transparent, and provide clear results (Verbano & Nosella, 2010).

A limitation of financial methods comes from the characteristics of the evaluated projects. For example, for R&D projects or projects with similar characteristics, such as long time horizons or high degrees of uncertainty, comes the problem of accurately estimating future cash flows and costs (Verbano & Nosella, 2010). Similarly, financial methods are often prone to fail in estimating demand and impact of radical innovations, and subsequently might discourage more risky and innovative projects (Jugend & Da Silva, 2014). This is emphasized by Cooper et al. (1998), who found that the financial methods create a poorly balanced portfolio. Additionally, for traditional financial methods, such as NPV, it is difficult to quantify risk and uncertainties related to the technology, however, real options analysis overcomes this shortcoming with its flexibility (Verbano & Nosella, 2010). The financial methods are the worst methods when it comes to deciding the right number of projects when considering the available resources (Cooper et al., 1998). Lastly, financial methods fail to consider the company's strategy (Jugend & Da Silva, 2014; Verbano & Nosella, 2010).

3.1.2 Strategic approaches

The second most popular category of methods is the strategic approaches, where money is allocated between projects on the basis of the firm's strategy (Cooper et al., 2001b; Killen et al., 2008). First, strategic buckets are defined and thereafter resources are allocated to the different buckets (Cooper et al., 2001b). Projects are then put into the corresponding bucket based on the project characteristics, and ranked against the other projects within that bucket using other project portfolio methods (Cooper et al., 2001b). Which buckets that are used vary greatly between industries and firms, but some common ways to create the buckets are according to market, technology area, innovativeness, product line, and competitive need (Cooper et al., 1998). How to allocate resources between the buckets to achieve a balanced portfolio and maximize returns depends on multiple factors, such as what buckets are used and the organization's external environment (Chao & Kavadias, 2008). The strategic bucket method is a top-down approach that aims to align the portfolio with the strategy (Cooper et al., 2001a). A bottom-up approach, in comparison, to achieve alignment between portfolio and strategy is to use scoring methods (Cooper et al., 2001a).

The clearest strength of the strategic approaches is that they help align the portfolio with the business strategy of the firm (Cooper et al., 1998; Verbano & Nosella, 2010). Additional benefits of this method include that it is easy to use, considers multiple criteria, and promotes high-value projects (Cooper et al., 1998). However, the methods fall short when considering Go/Kill decisions for projects (Cooper et al., 1998).

3.1.3 Scoring models

The third most used method is the scoring model method, which enables the ranking of projects. The scoring model can be straightforward and include decision criteria such as cost and availability of workforce, which indicate on execution desirability (Archer & Ghasemzadeh, 1999). Other decision criteria can cover certain perspectives related to company objectives, such as profitability, innovation, competitive advantage (Jugend & Da Silva, 2014), business strategy fit, and probability of commercial success (Cooper et al., 2001b). Hence, the scoring model method is a way in which alignment between the project portfolio and business strategy can be ensured (Jugend & Da Silva, 2014). The decision criteria are each scored on a predetermined scale, where each endpoint of the scale is defined (Cooper et al., 2001b). After having scored each criterion, a total project score is calculated by adding the score for each criterion (Cooper et al., 2001b). Sometimes in this step, different weights are appointed to the individual criteria to account for relative importance. Thereafter, projects can be compared and rank ordered against each other (Cooper et al., 2001b; Archer & Ghasemzadeh, 1999). Strengths with the method include that it accounts for multiple criteria in a time-efficient manner, it identifies high-value projects, and it works as a basis for prioritization of projects (Cooper et al., 1998).

Depending on which decision criteria are used, scoring models are more or less prone to biases. For example, some qualitative criteria are subjective in nature, which can lead to biases when scoring projects (Jugend & Da Silva, 2014). Examples include that people might have limited knowledge of some of the items scored, or that people score their own project proposals higher (Jugend & Da Silva, 2014). Another weakness with scoring models is that they fail to consider the interrelatedness of different projects (Jugend & Da Silva, 2014). However, this drawback comes with the advantage that projects can be added or removed from the portfolio without having to re-score the other projects (Archer & Ghasemzadeh, 1999).

3.1.4 Visuals

Visuals are the fourth most used category of methods (Cooper et al., 2001b; Killen et al., 2008). Projects are mapped or plotted in relation to factors that need to be considered to visually help with prioritizing and allocating resources (Killen et al., 2008). The projects are usually plotted on an X-Y chart where the different quadrants or zones serve as categories (Cooper et al., 2001b). Common methods with these characterizations are bubble diagrams and the BCG matrix (Jugend & Da Silva, 2014). Roadmaps are another way to visually display projects and technology that could help align the portfolio with the strategy and achieve a balance between incremental and radical projects (Jugend & Da Silva, 2014).

A drawback of these methods is that they can be subjective and are reliant on competent management in order to yield satisfying results (Jugend & Da Silva, 2014). Another drawback is that they often yield too many projects in relation to the available resources (Cooper et al., 1998). However, it is argued that they are good to use for groups that collectively have to make decisions (Killen et al., 2008) and for aligning the portfolio with the business strategy (Cooper et al., 1998). Additionally, they are easy to use and can capture many facets of a situation (Cooper et al., 1998).

3.1.5 Checklist models

Checklist models involve projects being evaluated on a number of Yes/No questions (Cooper et al., 2001b; Dickinson et al., 2001; Verbano & Nosella, 2010). In order for the projects to move forward, they either have to achieve all Yes or a predetermined number of Yes (Cooper et al., 2001b). These models can either be used for Go/Kill decisions or to prioritize between projects using the number of Yes as the means of comparison (Cooper et al., 2001b). A drawback of checklists is that they can be subjective and neglect dependencies between projects (Jugend & Da Silva, 2014). Additionally, it is important that the person evaluating the project has enough knowledge about it in order for it to be successful (Jugend & Da Silva, 2014). Checklists are also unable to effectively balance the portfolio (Dickinson et al., 2001). A strength of these methods is that they consider the resources required for the project (Verbano & Nosella, 2010).

3.2 Project portfolio management as a process

PPM is not just a set of methods but rather a process of activities that firms need to actively perform in order to stay competitive (Archer & Ghasemzadeh, 1999; Cooper et al., 2001a). The use of a framework for the purpose of making portfolio choices will allow for higher degrees of objectivity and rationality (Jugend & Da Silva, 2014), however, a framework needs to fulfill certain criteria if it is to fulfill its intended purpose. Some of these include (Cooper et al., 1999; Archer & Ghasemzadeh, 1999):

- It should be easy to understand and use
- It should be time-efficient
- It should be effective
- It should be realistic, rational, and objective
- It should be logically organized, where each step either follows from the point of view of strategic considerations (top-down) or individual project considerations (bottom-up)
- It should not require data overload

In order to structure the chapter, it has been divided into three phases of the PPM process, namely planning, selecting, and executing. The planning phase involves the steps taken before building the portfolio, such as setting the strategy and selecting methods for project evaluation; the selecting phase concerns the actual portfolio selection and encompasses a holistic project assessment; and in the executing phase, the portfolio is monitored and revised. The three phases describe how projects move through the PPM process. The selecting and executing phases move iteratively between each other as both new and active projects are evaluated on an ongoing basis.

3.2.1 Planning

Before starting with the actual portfolio selection, there are certain activities that should take place in order to achieve a successful project portfolio (Archer & Ghasemzadeh, 1999; Cooper et al., 2001a; Levine, 2005). Archer and Ghasemzadeh (1999) call this the pre-process phase and Levine (2005) mentions it as the initial steps of prioritization and selection of candidate projects. This phase is intended to provide guidance for the portfolio selection process at a high level of abstraction (Archer & Ghasemzadeh, 1999). Key activities

prior to starting the selection process are developing the strategy (Archer & Ghasemzadeh, 1999; Cooper et al., 2001a; Jugend & Da Silva, 2014; Levine, 2005; Wheelwright & Clarke, 1992b) and selecting the methods that will be used for selecting the portfolio (Archer & Ghasemzadeh, 1999; Jugend & Da Silva, 2014; Levine, 2005).

The strategy development concerns setting the strategic focus of the portfolio and budget considerations while considering both external and internal factors (Archer & Ghasemzadeh, 1999). Setting the focus is an important task for aligning the portfolio with the firm's strategy and could be done by allocating resources to different project categories (Archer & Ghasemzadeh, 1999). Similar to this, Cooper et al. (2001a) argue for the importance of a clear strategy. There are particularly two dimensions that should be considered before the portfolio selection, namely, focus and spending. The strategic focus dictates which products, markets, technologies, or other areas the firm finds important and subsequently should focus on (Cooper et al., 2001a). The second dimension, strategic spending, concerns that the strategy should be used, as also argued by Archer and Ghasemzadeh (1999), to allocate resources between categories, which Cooper et al. (2001a) call strategic buckets, and that these buckets should reflect the firm's strategy. These strategic buckets were more extensively explained in chapter 3.1.2 as a method for portfolio selection. Levine (2005) argues that the prioritization and selection of projects should start with establishing a strategic plan and budget buckets, which corresponds with the arguments of Archer and Ghasemzadeh (1999) and Cooper et al. (2001a). Jugend and Da Silva (2014) argue that strategic planning is important for aligning the portfolio with long-term goals and Wheelwright and Clarke (1992b) argue that the first step of PPM should be to determine the types of projects that should be found in the portfolio, further cementing the importance of strategy before selecting the portfolio.

Another important factor to consider before the portfolio selection phase is which methods to use for evaluating and selecting projects (Archer & Ghasemzadeh, 1999; Levine, 2005). Some specific methods that can be used are explained in chapter 3.1. The methods should be chosen in such a way that they yield acceptance in the organization and comparability between projects (Archer & Ghasemzadeh, 1999). There is not a single best method (Archer & Ghasemzadeh, 1999; Cooper et al., 2001a), and using multiple methods has been shown to yield better results (Cooper et al., 2001a).

3.2.2 Selecting

As a first step in the portfolio selection process, it is highly relevant to define certain minimum requirement criteria and do an initial screening to sort out disqualified projects, such as those that lack strategic alignment or do not meet marginal requirements like minimum return on investment (Archer & Ghasemzadeh, 1999). The screening can be efficiently done by having the first questions in a checklist scheme measuring these criteria (Cooper et al., 2001a), for example, “does the project align with our strategy?” or “does the IRR of the project exceed $x\%$?”.

After the initial screening comes the actual portfolio review and selection. Evaluation of individual projects is done with regards to, for example, project value and risk (Jugend & Da Silva, 2014; Levine, 2005) as well as technological and market factors (Jugend & Da Silva, 2014), and by calculating the project’s economic return and risk factors (Archer & Ghasemzadeh, 1999; Jugend & Da Silva, 2014; Levine, 2005). These factors are assessed by applying the evaluation methods selected in the planning phase. A mix of evaluation methods will provide the organization with the most effective PPM approach (Cooper et al., 2001a), however, Archer and Ghasemzadeh (1999) note that not one set of methods works for all organizations. The authors mean that the context affects which measures are best suited for a specific organization. However, the set of methods should be consistent *within* the organization to allow for an equitable and objective comparison of projects when building the project portfolio (Archer & Ghasemzadeh, 1999). One caveat is that sometimes certain projects will freeride and get top priority just because they are strategic imperatives, that is, they are must-do projects in order to realize strategic priorities (Cooper et al., 2001a).

When constructing the optimal project portfolio, key objectives such as value maximization, portfolio balance, resource availability, and strategic alignment (Cooper et al., 2001a) must be achieved alongside ensuring project success in terms of budget, time, scope, and ancillary benefits (Levine, 2005). This requires not only evaluating individual project values but also considering project interactions, including interdependencies, scheduling constraints, and resource competition (Archer & Ghasemzadeh, 1999; Cooper et al., 1999; Jacobs & Swink, 2011; Zapata et al., 2008). This is because synergies can arise when combining certain projects, making the total benefit higher than if choosing projects in isolation based on individual benefit (Archer & Ghasemzadeh, 1999; Jonas, 2010).

Important considerations when selecting projects are what resources are available and what resources are required (Archer & Ghasemzadeh, 1999; Cooper et al., 2001a; Jugend & Da Silva, 2014; Levine, 2005; Wheelwright & Clarke, 1992b). As resources and time are limited, keeping a smaller project pipeline has the potential to result in a more attractive bottom line since it increases the chances of projects being launched earlier and on time (Levine, 2005). Resources can span a number of categories, for example financial and human (Cooper et al., 2001a; Jugend & Da Silva, 2014; Wheelwright & Clarke, 1992b). Estimating the execution time and the required man-hours are crucial for achieving a portfolio that is of optimal size and meets the deadlines (Cooper et al., 2001a; Wheelwright & Clarke, 1992b).

On the same note, as new projects are considered for selection, it is important to also re-evaluate active projects in order to confirm the available amount of resources at disposal (Archer & Ghasemzadeh, 1999), for example if the scope of project A has increased and thus needs a revision in resources, or if project B no longer fit the strategic direction of the organization, due to shift in focus, and hence needs to be abandoned. When prioritizing the projects, again interdependencies need to be considered in case the output of a project feeds the input of another (Archer & Ghasemzadeh, 1999) and thus limits the leeway of choosing project sequence.

3.2.3 Executing

The last phase in the PPM process concerns the execution and monitoring of projects. Whether (Cooper et al., 2001a; Levine, 2005) or not (Archer & Ghasemzadeh, 1999) the execution and monitoring of projects are part of PPM is debated. However, activities in this phase have an impact on the portfolio (Archer & Ghasemzadeh, 1999; Cooper et al., 2001a; Levine, 2005). Project evaluation should be done continuously to maintain the agility and innovativeness of an organization (Cooper et al., 2001a). Continuous monitoring of project performance and revision of the project portfolio has been argued to positively correlate with higher portfolio performance (Kock & Gemünden, 2021).

For continuous project evaluation and monitoring, several authors refer to a stage-gate method (Archer & Ghasemzadeh, 1999; Cooper et al., 2001a; Levine, 2005). The method can be used to minimize subjectivity by having more or less defined requirements that the project

needs to fulfill by the gates before being entered into the next stage (Cooper et al., 2001a). Hence, it is a way of assuring the desired performance and status of individual projects that results in resources being spent where they generate the best result (Levine, 2005) and ensuring that the project portfolio is balanced and compliant with the organization's strategy (Jugend & Da Silva, 2014).

The role served by the stage-gate model may vary; it can, on one hand, dominate the PPM process or, on the other, serve as simple checkpoints, or even somewhere in between (Cooper et al., 2001a). In the case where the stage-gate model dominates the process, the project is first evaluated against a set of absolute criteria and later against other projects. It is at these gates that resources are committed and distributed, i.e., the future of the project is decided (Cooper et al., 2001a). Portfolio reviews are still held but serve primarily as an extra stamp of approval and provide an opportunity to tweak the stage-gate model (Cooper et al., 2001a). Contrastingly, when the gates are simply used as checkpoints, they aim to answer whether the project is going as planned or not (Cooper et al., 2001a). The main difference from the case where the stage-gate dominates the PPM process is that there is no comparison against other projects, and subsequently, no new projects will be approved nor will any major changes in resource commitment be made (Cooper et al., 2001a). However, projects might still get killed (Cooper et al., 2001a). In the case where the gates are used as checkpoints, all major decisions are taken at the portfolio review meetings, where projects are evaluated and compared against each other. These reviews should be held more frequently, three to four times a year, compared to the case where the gates dominate, where one or two meetings are enough (Cooper et al., 2001a). Additionally, the context of the organization also affects how often portfolio reviews should be done. For example, companies operating in stable environments might do it once or twice a year, whereas companies that find themselves in dynamic environments characterized by innovation and turbulence will have to do it approximately every second month (Jugend & Da Silva, 2014).

Additionally, continuously evaluating projects during their execution allows for data to be collected, which can help guide future decisions concerning the project portfolio (Archer & Ghasemzadeh, 1999; Cooper et al., 2001a). Having a project database containing information about previous projects is one way of storing collected data. This data can later be used in a new iteration of the selecting phase of the PPM process (Archer & Ghasemzadeh, 1999). The logic of lessons learned is to help improve an organization's project management, which will

pave the way for future success of following projects and help in optimizing the PPM process (Kopmann et al., 2015).

Figure 4 shows a general framework that includes the three phases planning, selecting, and executing of the PPM process, and the respective activities of each phase.

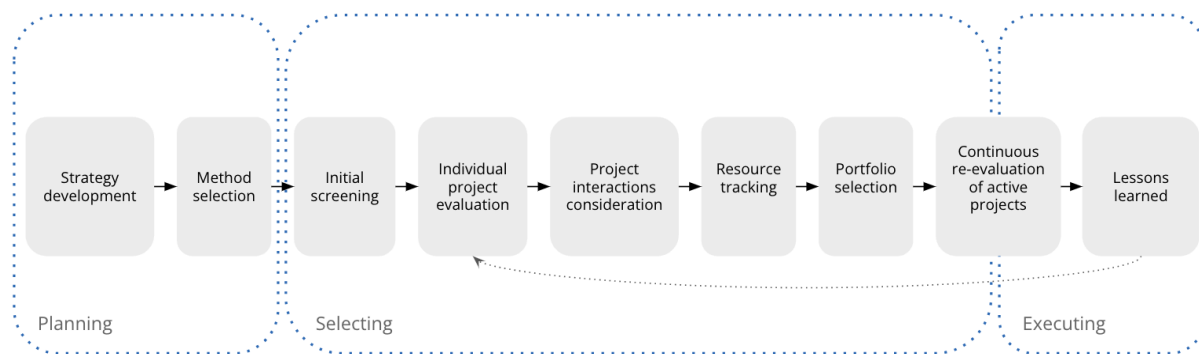


Figure 4. The three phases in PPM: planning, selecting, and executing, and their respective activities. *Note:* Based on previous PPM research, inter alia Archer and Ghasemzadeh (1999), Cooper et al. (2001a), Levine (2005), and Wheelwright and Clarke (1992b).

3.3 Stakeholders

Scarce resources are shared and competed for by all corporate functions in an organization. Thus, portfolio decisions affect, in large part, every organizational member (Kock & Gemünden, 2021). It is therefore necessary to integrate several internal stakeholders into the PPM process, which is often done through committees (Meskendahl, 2010). This also builds the ground for consensus and shared commitment (Jonas, 2010; Kock & Gemünden, 2021). Moreover, integrating different functions and utilizing cross-functional teams have been shown to give better results as information flows better and becomes more accessible (Jugend & Da Silva, 2014). Getting senior buy-in is often argued to be a major hurdle for the PPM work (Cooper et al., 2001b; Killen et al., 2008), however it has been proposed that project selection decisions should be taken jointly by top management and functional managers to gain buy-in (Jugend & Da Silva, 2014).

Furthermore, the users of the methods are also important to consider. If project evaluation is done by a team rather than a sole individual, the process becomes more objective as emotional and political factors can be mitigated to a larger degree (Levine, 2005). Additionally, when selecting methods in the planning phase, the users should be considered

first-hand, as it is important that they can understand and use the methods easily (Archer & Ghasemzadeh, 1999; Jugend & Da Silva, 2014).

In summary, figure 5 depicts the essential factors for the PPM process to be successful.

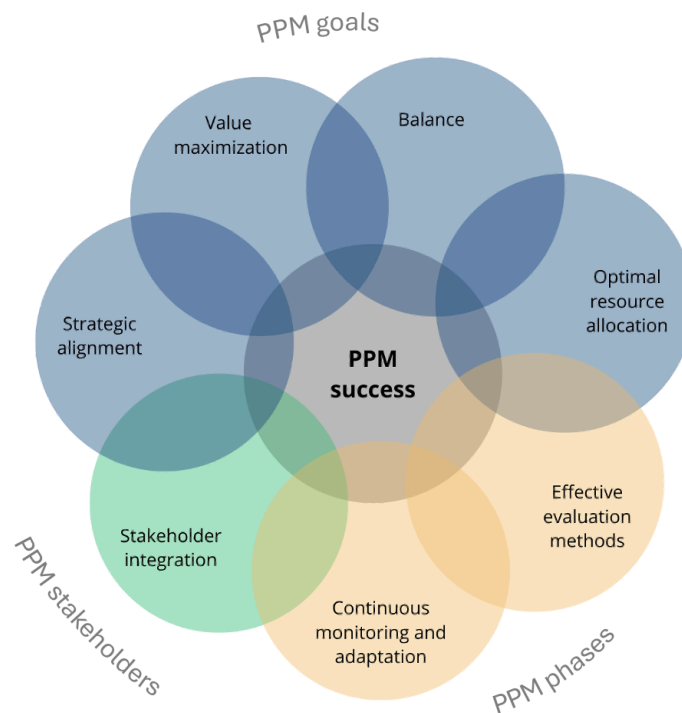


Figure 5. PPM success depends mainly on three factors. First, on the four goals: strategic alignment, value maximization, balance, and optimal resource allocation. Second, on the three phases planning, selecting, and executing, where the selection and application of evaluation methods, and the continuous monitoring of active projects occur. Third, on considering and integrating stakeholders into the process. *Note:* Adapted from literature, including Cooper and Edgett (2001), Kock and Gemünden (2021), Wheelwright and Clarke (1992b), and Archer and Ghasemzadeh (1999).

4 Empirical Findings

This chapter presents the empirical findings based on the interviews held with Stora Enso and the external companies. The first part of the chapter concerns how PSBE and its three business areas currently work with projects and project portfolio management. This is then followed by a review of how four Swedish manufacturing firms work with the same topics.

4.1 Packaging Solutions Business Expansion at Stora Enso

Seven internal interviews have been conducted. These have been held with people within PSBE's three business areas: Packaging Design, Packaging Innovation, and Packaging Automation. Questions discussed during the interviews encompassed the business areas' current work with project selection and the challenges they have encountered in that work.

4.1.1 Packaging Design

The PD business area has three tasks: to create buzz about PS and Stora Enso, to educate and improve the design processes within PS, and to be a valuable resource for the teams at the local manufacturing offices.

Creating buzz is PD's main responsibility and is done by collaborating with customers to create innovative designs and design solutions. These projects are usually of a more complex character as compared to the design projects that the local design teams at the manufacturing sites execute. Additionally, PD's projects are often associated with lower production volumes of packaging, which the local offices are hesitant to do due to limited economies of scale. The local offices would rather prioritize their resources, especially design resources, on projects that generate economies of scale.

One example of a recent design project done by PD is with a well-known lifestyle magazine, where the plastic wrapping of the magazine was replaced with fiber materials. Projects of this character are the main priority for PD as this is the way it generates direct revenue from paying customers. The revenue from these projects can be divided into two different parts: a design fee and the revenues from the manufacturing of the product. The design fee is usually a one-time fee, but may occur multiple times in case the customer wants a redesign, while the revenue from the manufacturing is continuous over multiple years. Even though the design

fee is a one-time payment, the short project cycle creates a stable revenue source over time, with little fluctuations, as new projects are initiated as soon as others finish. The design fee is rather small compared to the manufacturing, which can generate significantly more. The design fee is attributed to PD, whereas the local plant that does the manufacturing gets the revenue from the manufacturing part of the contract. Before moving forward with a project, discussions are held with the customer about their budget and the acceptable cost of the finished product, as well as with the manufacturing team to understand its cost estimates. As long as the customer is willing to pay more than it costs, PD moves forward with the project. This is the most important factor in reaching a decision since PD finds it hard to measure the indirect benefits of a project, such as PR and brand image.

The two other tasks, educating and improving the design process and being a valuable resource, are mainly done when there is time left from the ongoing design projects. As there are currently only two people working within PD, time is very limited, especially since one of the two only works part-time within the unit. The limited resources, particularly time, make it challenging to focus not only on these two tasks but also on the main task of generating buzz. It happens that PD has to delay projects because of the limited resources. While the limiting resource is the designer's time, resources from other departments are also needed, such as lab testing and manufacturing.

4.1.2 Packaging Innovation

PI is responsible for developing new innovations, including products, services, or business models, that are disruptive in the sense that they severely change the existing market. An example of an innovation is the EcoFishBox which replaces the traditional EPS boxes used for transporting fish and shellfish. What is special about the EcoFishBox is the composition of renewable materials and wood fiber, while simultaneously being water resistant. Except for the immediate benefit that renewable materials emit lower CO₂ levels, the EcoFishBox is also foldable and thus more easily transported. The development of innovations like the EcoFishBox requires both new technologies and takes a lot longer to finish compared to innovations pursued by the local units in PS. To avoid disrupting and hindering the operational and short-term work of the local units, these kinds of innovative projects fall under PI in PSBE. Additionally, there are some interdependencies between PI and the other

business areas, especially PA. For example, it is not uncommon for PI projects to either lead to the initiation of PA projects or to have automation elements in them.

As of today, there is only one person working full-time within PI. However, during projects, additional resources are brought in from other departments within PS and external partners. PSBE does not have its own budget (except PA), instead, PI has to apply for grants from the PS steering committee. In essence, it is the steering committee that decides on how many resources PI will have at its disposal and what projects it will pursue. As of now, PI has between one and two projects ongoing concurrently, though this number has historically been up in the tens. However, PSBE, and especially the PI business area, currently suffers from a smaller amount of resources allocated to its disposal.

Ideas for new projects are sourced from all functions in PS. New ideas are initially evaluated by PI based on technological feasibility and market potential before they are presented to the steering committee. In the project proposal for the steering committee, the business case has to be presented covering the market potential, costs, and risks. However, what exactly to include in the initial evaluation and business case is not explicitly specified, and varies on a case-by-case basis. It was mentioned that due to regulations, especially within the European Union, which aims to reduce, or even ban, plastics creates huge market opportunities for fiber-based substitutes. Subsequently, the difficulty does not lie in coming up with ideas but rather in determining which ones are the best and convincing the steering committee to fund those.

Once projects get approved by the steering committee, they are continuously monitored, and the steering committee is updated with the progress of the project. The project does not get allocated all resources immediately upon approval, instead, resources are distributed gradually over the project's life cycle. While the PI projects do not follow a formal stage-gate process, it was explained that the projects have to meet certain criteria before progressing and getting additional funding, similar to a stage-gate model.

It was noted that PS used to invest a lot more into new innovations, but the unavailability of resources and new strategic directions have limited the number of ongoing projects. An example of a project that partially took place in PI that did not prove successful was a project concerning the up-cycling of wood fiber to create furniture. The project was later

discontinued due to the absence of synergies with the rest of the business, low margins, and low demand. The project was allowed to progress for quite a long time and even commercialized before it was discontinued. This project was one of several that were started in another part of Stora Enso and later moved into PSBE. Some of these projects should not have been started and allowed to progress due to their misalignment with the strategy. There was a concern within PSBE about falling into the same pitfall and failing to prioritize projects with clear strategic alignment with the current strategy.

4.1.3 Packaging Automation

PA develops and sells automation solutions for packaging in corrugated cardboard. While PA has a broad portfolio of machines, it also collaborates with third-party companies to be able to deliver fully automated manufacturing lines. Additionally, PA offers maintenance and after-sales services. The sales are usually in a project-based form where PA helps customers automate their production and creates customized adaptations of PA's assortment of products. The machines sold cost between five and ten million SEK and a customer typically buys between one and eight machines. The lifetime of a machine depends on its usage but is expected to last around a decade.

Due to the fluctuation in revenue that comes from project-based sales and the long lifetime of the machines, PA has tried to pivot to also offering services such as leasing of products and analytics to gain a more stable revenue source. The existing revenue model is significantly different compared to the rest of PS, where Stora Enso enters into contracts with customers to deliver corrugated packaging material. These contracts are typically very long and create a stable revenue source.

Currently, the business area comprises approximately 20-30 employees who work with everything from sales, project management, and service, to the development of new offerings. Additionally, it owns 50% of Österbergs Förpackningsmaskiner AB, which is the main manufacturer of the machines that Stora Enso sells. Österbergs Förpackningsmaskiner performs most of the R&D concerning new machines, however, ideas come from PA and the co-owner VPK. Based on market trends, customer needs, and the strategic imperatives, PA comes up with ideas for Österbergs Förpackningsmaskiner. The ideas are then analyzed, especially the costs and potential revenue to see if they should be initiated as projects.

However, certain ideas are sometimes difficult to analyze. Such ideas include incremental improvements to existing products. In those instances, it is especially the impact on revenue that is challenging to analyze as it is difficult to estimate on the one hand whether the incremental improvements will lead to increased sales or if sales will remain on the same level, and on the other, if sales will drop if no action is taken. PA leverages its position as an owner to dictate what projects Österbergs Förpackningsmaskiner should proceed with.

PA is different from the other two business areas within PSBE in the sense that it has its own budget. However, it still has the possibility of seeking support for projects through PS' steering committee. It was mentioned that PA had tried to pursue a project through the steering committee, but found it cumbersome as it required heavy documentation and extra work compared to using its own budget to develop the project. However, when pursued with its own budget, the project had to be scaled down.

In summary, PSBE has not yet found an optimal solution for selecting projects and currently lacks a formal PPM process spanning all three business areas. Instead, PD, PI, and PA each rely on ad hoc approaches to project selection and prioritization, shaped by differences in project types, resources, and responsibilities. The empirical findings also show a number of challenges related to the current way of working with project prioritization and resource allocation within each business area. Table 1 synthesizes the key insights from the interviews with the three business areas within PSBE.

Table 1. Key takeaways from the internal interviews.

Business area	Description	Projects	Challenges
PD	Three types of projects: - creating buzz - educating and improving design process internally - being a resource for the local offices Does not have its own budget	Relative short project cycles Typically approves and initiates projects themselves Looks mainly at financial numbers when deciding on project initiation	Time is a limiting resource Difficult to measure indirect benefits of a project
PI	Responsible for developing new innovations (product, service, business model) Does not have its own budget	Longer project cycles Interdependencies with projects in the other business areas Project ideas need approval from the PS steering committee	Resources and funding Historical examples of projects proven unsuccessful
PA	Develops and sells automation solutions for corrugated cardboard packaging Offers after-sales services Have its own budget	Typically longer project cycles Typically approves and initiates projects themselves Looks at, inter alia, cost and revenue when deciding on project initiation or continuation	Difficult to assess the impact of incremental improvements to existing products

4.2 External companies

Four external manufacturing companies have been interviewed for this thesis. Out of these, three are categorized as large companies and one as a medium-sized company. Discussed topics during the interviews included the type and number of projects pursued by the company, the process of selecting (and re-selecting) projects for their portfolio, and overall challenges with their PPM process.

4.2.1 Firm A

Firm A pursues approximately 4000 projects simultaneously, which span everything from creating new factories to investing in R&D. The projects are divided into different sub-portfolios based on geographical area and function. These sub-portfolios contain strategic buckets concerning the projects' innovativeness. The firm views the structure of the portfolios and buckets as multi-dimensional strategic buckets. While the firm does not pursue a fixed, pre-determined distribution of projects between the different buckets, the buckets are instead used reactively rather than proactively. This means that if some buckets were to be left empty or severely under-allocated, it would serve as a warning signal to examine the current allocation of resources and potentially initiate a reallocation to get a more equal distribution.

The selection and comparison of the projects differ between the sub-portfolios. However, in general, mostly quantitative factors are used to assess projects. In the cases where projects from different sub-portfolios compete for the same resources, financial numbers such as NPV are one of the main factors considered:

[...] We can also compare projects from different portfolios. Why? The main question is why. Because sometimes they're competing for the same resources. Because if you're in a manufacturing project and you need an engineer from the R&D department because it's something completely new, you need to be able to compare them. So, of course, you'll need to define dimensions that are common—the financial ones are one of the keys—but also others, like risk, and so on.

However, the firm recognizes the challenge of estimating potential revenue for projects that are long-term, risky, or incremental. According to the firm, the difficulty in assessing

incremental projects lies in estimating the number of customers that might be lost if incremental improvements are not implemented.

The firm utilizes multiple software programs to collect and estimate data that is later visualized using Microsoft Power BI dashboards for comparing projects with each other. In the past, the firm has tried to adopt other methods for comparing projects, such as scoring methods. However, these approaches were eventually discontinued due to inconsistent usage and a lack of perceived value among parts of the organization.

Resource management was emphasized as an important factor in project selection. The firm continuously assesses what resources it has available internally, including human resources and lab resources. Before selecting and initiating a project, the required resources are mapped out and compared against what resources are currently available to ensure that the project is feasible and can be successfully completed. Additionally, the firm emphasized the value of applying similar and consistent structures across projects of different characteristics to ease the development process of several interdependent projects in parallel:

[...] Sometimes, when you develop a new offer, you need projects from different organizations (we call them sub-projects): projects that are development projects, manufacturing projects (because we need to manufacture the new product we created) then marketing projects (so we have the right tools to communicate with the market), then sales projects (because we need to train the salesperson), and so on. So all these projects need to work together. We need to synchronize all of it. That's why they should all have a structure that's not exactly the same, but similar—where we can have points of contact. E.g., you can't pass this gate in the sales project if you didn't pass gate number three in the product development project.

The greatest challenge the firm faces lies in gaining organization-wide acceptance of the PPM process, from top management down through all levels of employees. Another issue is that sometimes certain projects are excluded from the PPM process, which has a negative impact on the formal process since it creates discrepancies between estimated and actual resource availability. Moreover, projects that fall outside the process do not undergo the same scrutiny and evaluation, which has sometimes resulted in suboptimal projects getting selected.

4.2.2 Firm B

The large firm B has a highly structured PPM process that aims to drive and handle its different segments' project portfolios. The team working with PPM consists of +20 people. As of today, the number of active projects amounts to 45, whereas there are an additional 15 under pre-study. In the pre-study phase, the firm calculates the required and currently available amount of resources, cost, expected NPV, and time required for completion. If the project consequently scores high on strategic and financial targets, it will leave the pre-study phase and enter the pipeline as an active project. If the project, on the contrary, is not perceived as attractive, it will either be completely abandoned or put on ice.

Firm B has three project portfolios, which are divided into broad areas that cover the firm's main product groups. The allocation of resources between the project portfolios is not fixed but rather decided upon during meetings once or twice a year. The decision process is explained as:

We start by looking at, okay, the next five years, which opportunities do we have for a specific segment? Do we have the potential to increase our market shares? Then it will be given a higher strategic score, we want to continue expanding in that area. It could also be that we see that this segment is good but we do not see any opportunity to expand, then okay, we will maintain it and make updates but not invest in new products there. It could also be that we decide to back down from something, like, okay, we cannot be in this segment anymore, so should we exit or maintain? This decides how much resources each portfolio will get.

Within the project portfolios, the projects that firm B undertakes belong to either of two categories: NPD, which in turn consists of internal development or sourced finished product which involves other stakeholders, and "maintenance", that is, smaller updates of products already proven in production. The firm also pursues projects of a more radical character, but these are somewhat isolated from the daily operations and have a fixed share of the firm's budget allocated to their disposal. Decisions regarding the allocation of resources between the different project categories work similarly to those for the project portfolios but on one level lower. The essence is the integration with the strategic goals.

For selecting individual projects, in turn, financial goals and market potential guide the decision. The profitability is investigated by estimating costs, potential revenues and calculating financial key figures such as payback time. This lays the foundation for which projects to prioritize. The firm also finds it essential to evaluate what resources it has at its disposal, such as competencies.

Each active project is evaluated during monthly portfolio meetings and the decision whether or not to proceed, put on hold, or cancel a project depends on an aggregated view based on how the specific project performs, if the other projects in the portfolio have gotten delayed or are consuming more resources than planned, etc. Due to interrelatedness, a project that, for example, consumes more resources than expected might force the discontinuation of another, less prioritized project in the portfolio. For tracking individual projects, firm B uses a typical stage-gate method where different project types have different models adapted to the type of project. In addition to the stage-gate method, a steering committee looks over the projects three times a year and makes decisions regarding prioritizations, whether pre-studies should become active projects or not, and cancellation of projects. The steering committee also keeps track of operational questions and checks that the projects follow scope, time, and cost adherences. The objective of having both monthly portfolio meetings and the steering committee meetings in parallel is to handle the challenge of effectively allocating scarce resources.

Also integrated in the process of NPD projects, the project team gathers approximately four times over the project life cycle and discusses positive and negative findings that it has come across thus far. The learnings are saved in a database and are used as input for ongoing and future projects of the same character.

4.2.3 Firm C

The interviewee from firm C categorized their firm's innovative projects into three distinct groups: New Product Innovation (NPI), Engineer-to-Order (ETO), and Design-to-Order (DTO). The three categories are quite different. NPIs are innovative projects aiming to create new products. The NPI projects are referred to as "insurance for the future" and are intended to ensure the company's long-term competitiveness. ETO and DTO projects, on the other hand, are customer-driven and more short-term in nature. The difference between the two is that ETO projects are off-the-shelf products that just need a little bit of modification, whereas

DTOs include products that need heavier modifications and re-designs. Looking at the annual number of projects in each of these three categories, NPIs are in the single digits while both ETOs and DTOs cover over a hundred projects each. However, the firm aims to invest approximately 20% into NPI. The firm has taken an active approach to break out the NPI projects from the ETO and DTO projects and allocate a semi-set amount of money into these projects because, as the respondent expressed it, “a few years ago we got stuck in an ETO and DTO swamp where we had no time for NPI”.

On the note of project selection, the firm pursues all ETO projects that their customers ask for as long as there are available resources. ETOs are the firm’s bread and butter. The DTO project needs some deeper evaluation as compared to ETOs, due to the higher risks involved with making substantial re-designs. The evaluation usually includes an assessment of the technological risk, design and production costs, and if there exists a potential market for the re-designed product in addition to the client. Additionally, the DTO projects usually require a lot of resources and it is subsequently important to assess whether the firm has not only the available resources but also the capabilities to pursue them. Both ETO and DTO projects are selected and initiated continuously throughout the year. The NPI projects, on the other hand, is selected once yearly during the firm’s “strategy week”. During this week, the board revisits and sets the strategy for the coming year and aligns the NPI projects with the strategy:

During the strategy weeks, we look at internal proposals and consider our overall efforts for the coming year: will we grow, will we become more or fewer people, or what do we believe? We set those frameworks—whether we aim to increase profits or prioritize growth. That will give us an indicative decision, like yes, we will allocate this much to product development projects, and then when the budget is finalized, we confirm it.

Similar to the DTO projects, the NPI project proposals contain information about risk, cost, and potential revenue. However, the ideas do not come from the customers but rather the firm itself and are based on technology and market research. While there are no set requirements or KPIs that guide the selection, the firm emphasizes strategic alignment and positive NPV.

Selected projects have to go through a rigorous process of development and testing before market launch and customer delivery. For ETO projects, the process is rather straightforward in comparison to NPI projects, for which the process is more complex as NPIs require more

funding and involve higher technological uncertainty. NPI projects are continuously monitored and follow a process similar to a stage-gate model. Previously, the firm has experienced issues related to some projects being left unchecked for a long time, which led to huge investments into projects that theoretically should have been abandoned much sooner.

The reason why the board in firm C has project selection authority stems from past experiences where decisions were made lower down in the organization and based on consensus. This approach often resulted in no one taking responsibility, projects being initiated on weak grounds, and projects not being abandoned when they should have been. Another challenge the firm has overcome has been not listening to the loudest voice, but instead taking a more pragmatic and objective approach to evaluating project proposals, including considering the impact on the whole firm rather than on individual divisions.

4.2.4 Firm D

Firm D categorizes its products into three main categories depending on their degree of innovativeness. The three categories are: Current Product Engineering (CPE), New Product Development (NPD), and Research and Technology Development (RTD). The CPE projects are of incremental character and the least innovative. They usually concern small improvements and redesigns of existing products. The NPD projects are similar to CPEs, however, they are much more extensive because they concern the development of new products or large modifications and redesigns of existing products. The RTD projects cover research on new technology and the development of new competencies for the future. The ambition is for RTD projects to lead to NPD and CPE projects in the future. The time horizon and development time for the three different project categories correlate with their degree of innovativeness, where CPE projects typically are the shortest and RTDs the longest. To balance both short-term and long-term objectives, the firm tries to invest equally into the three categories. However, in practice, the firm has faced challenges concerning this resource allocation, where short-term projects have received more than their intended one-third share of resources. This is partly due to legal projects that are of must-do character.

Before selecting projects, the firm sets a five-year strategy dictating its key focus areas and goals for the coming years. The strategy includes which markets, both geographical and product, it should be active in and how it should be positioned within these markets.

Furthermore, all ideas are tested through a pre-study before they can be selected as projects. The pre-study investigates the technical feasibility, resource requirements, cost, potential customer benefits, and potential revenue. Project selection occurs twice a year during the firm's portfolio council meetings. The first step in these meetings involves ranking all potential projects based on their strategic alignment and their importance in realizing the strategy. This is the most important factor when considering and comparing projects within the same category. Financial aspects are also important, "it must not cost more than it tastes" (*in Swedish*: "det får inte kosta mer än det smakar", *meaning*: "it is not worth it if the cost outweighs the benefit"). Financial methods are especially important for prioritizing between projects that are equally aligned and important for the strategy. Additionally, the firm also evaluates its available resources and competencies, as these factors can have a major influence on the project's execution timeline and its associated risks. The assessment of resources and competencies not only considers the development project but also encompasses the whole lifecycle of the product. The firm employs a stage-gate model for evaluating its projects, where the first stage is the pre-study and the first gate is the portfolio council meeting. If projects do not meet expectations they can be cut at the gates or at the upcoming portfolio council meetings where the portfolio is reviewed.

The external companies' work with PPM with regards to the selecting and executing phases as well as the main challenges with the process, are summarized in table 2. As seen in the table, all companies apply strategic and financial methods for evaluating and selecting projects, and also calculate risks. In addition, firm B also uses scoring methods. In the project execution phase, stage-gate is applied to monitor each project. Besides that, firm A also manages its resources through mapping its available resources and comparing the resources required for a project against them. The challenges faced by the four companies varies and include difficulty in estimating revenue for certain project types and gaining organizational support for firm A; challenges in scheduling resources for firm B; challenge in achieving balance between short- and long term projects for both firms C and D, and previous experiences in taking decisions without considering their impact on the company as a whole for firm C.

Table 2. Key takeaways from the interviews with the four external companies.

Firm	Revenue	Selection methods	Project execution	Challenges
Firm A	~100 000 MSEK	Strategic buckets Financial methods Risk Available resources	Stage-gate Resource planning	Estimating the potential revenue for projects of long-term, high-risk, or incremental character Organizational support
Firm B	~ 50 000 MSEK	Strategic buckets Financial methods Scoring methods Risk Available resources	Stage-gate	Scheduling resources
Firm C	~ 1 000 MSEK	Strategic buckets Financial methods Risk Available resources	Stage-gate	Prioritizing long term projects Projects started without considering the impact on the whole company
Firm D	~ 125 000 MSEK	Strategic buckets Financial methods Risk Available resources	Stage-gate	Prioritizing long term projects

5 Development of PPM framework

The different business areas within PSBE currently work both differently and informally with selecting and prioritizing between projects. Additionally, the empirical data shows that PSBE has previously had experience of selecting and pursuing projects with low economic value and projects unaligned with the current strategy. Furthermore, PSBE finds it difficult to assess project values and has scarce resources. Referring to the goals of PPM: strategy alignment, balance, value maximization, and optimal number of projects (optimal use of resources) (Cooper & Edgett, 2001), introducing a formal PPM process into PSBE's business could directly help mitigate these challenges.

This chapter is divided into five parts. The first part discusses how a PPM framework should be designed on a high level of abstraction. The second to fourth parts concern the actual development of a tailor-made framework for PSBE. These three parts are divided according to the three general PPM phases: planning, selecting, and executing. Implementing a more formal planning phase will support the different business areas to work more uniformly and consistently, and ease the comparison of projects across business areas. With a more efficient selecting process, PSBE can help mitigate the challenge of selecting and pursuing projects that are not aligned with the strategy and projects that have low economic value. Additionally, the limited resources can be better utilized. Lastly, the execution phase is important for revising the PPM process and discontinuing projects that no longer meet the goals. The chapter ends with a discussion of the importance of incorporating different stakeholders in order to achieve an efficient and objective project portfolio in the case of PSBE.

5.1 Underlying features

In line with the needs of the PSBE team at Stora Enso, best practices from external companies, and existing literature (e.g., Cooper et al., 1999; Archer & Ghasemzadeh, 1999), the underlying features when developing the PPM framework were:

- It should be easy to understand and use
- It should be time-efficient
- It should be effective

- It should be realistic and rational
- It should be objective

Since PSBE has no mature, formal PPM process in place as of today, it is essential to deliver a framework that is easily understood, including its advantages and usefulness. Therefore, the PPM process should be logically organized, by consisting of certain stages built in a chronological sequence. This makes the process easy to follow and easy to update when needed. Furthermore, since PSBE at Stora Enso desires a PPM process that aims to facilitate decision-making primarily regarding innovative projects, it is important that the framework does not inhibit the team's creativity. Even though, for example, the equally large-sized firm B has a highly structured PPM process, its portfolio management team is relatively large, consisting of +20 people. In contrast, the PSBE team has significantly fewer people involved in the process, and it is thus believed that PSBE can still achieve objective results without applying equally rigid structures.

Keeping the framework simple is also a cornerstone for achieving the goal of time-efficiency, which is highly essential as human resources are the most scarce resource of the whole PSBE team. Moreover, as heavy documentation requirements have previously inhibited PA from pursuing some of its project proposals through the steering committee, a time-efficient process is instrumental for gaining buy-in from all the business areas.

To really utilize PSBE's resources in the best way, the decisions guided by the framework need to be the *right* decisions. Ineffective decisions would lead to rework and misallocated resources, which directly conflict with the goal of time-efficiency. To achieve effectiveness, therefore, it is essential that the framework consistently supports decisions that lead to long-term portfolio success. This includes prioritizing the right projects, allocating resources effectively, and enabling timely execution. For example, firms B and D apply specific minimum requirement criteria that projects must meet to even be considered for selection. This ensures that projects with undesirable attributes are filtered out early and are not included in the selection process.

To gain decision-makers' trust in the framework, it also needs to be realistic and rational. This means that it must incorporate data that reflects real-world conditions and the limitations of the PSBE division. This element will moreover keep the PPM process objective. However,

there is a balancing act where unneeded data should be avoided to not alienate users, in order to keep the framework simple and easy to use (Archer & Ghasemzadeh, 1999).

Closely tied to realism and rationalism is objectivity. Objectivity ensures that the evaluation and selection of projects are not biased by individual preferences, internal politics, or intuition alone. This is crucial for achieving the PPM goals of building a balanced and strategically aligned portfolio. By using consistent evaluation methods for comparisons, the framework helps remove subjectivity from decision-making. Primarily applying methods of quantitative character, which are the most used ones by firm A, will further minimize the subjectivity.

Hence, the following attributes have been prioritized during the development of the framework:

- Clear visual representations, to make it easy to understand and gain buy-in
- Not too detailed stages, to allow for speed and flexibility
- Specificity, to minimize subjectivity and the risk of making the wrong decisions
- Alignment with the context, that is, PSBE and its environment

The proposed framework developed for PSBE has its origin in the general framework that consists of the three phases planning, selecting, and executing, and their respective activities. The general framework has been adapted to fit PSBE's context to yield a framework that supports PSBE's PPM work in an optimal way.

5.2 Planning

Setting a clear strategic focus and operationalizing it is an important aspect of the planning phase. However, both PSBE and the external interviewed companies have faced, and still face, challenges in this area. Additionally, choosing the right set of methods for evaluating projects is essential and must be based on the current situation of PSBE.

5.2.1 The strategy

As explained by Cooper et al. (2001a), the strategic focus dictates what the firm should focus on and should be set before developing the PPM process. In the case of PSBE, this is

complex due to strategies at multiple levels within the company, all of which must be taken into account in order to build a strategically aligned portfolio. On a firm level, Stora Enso wants to leverage megatrends such as circularity and climate change to drive growth and profitability by offering sustainable fiber-based products. On a divisional level, PS wants to achieve selective profitable growth by being market leaders in fiber-based packaging. Additionally, PS wants to achieve this by being customer-centric and the first-choice partner for fiber-based packaging. Business Expansion's strategy, in turn, focuses on creating value by staying ahead of industry trends and developing offerings that have synergies with corrugated customers or corrugated technology. Additionally, at an even more granular level, some of the business areas in PSBE have their own strategies, such as PD and PA. PD's strategy is built around three pillars, creating buzz, establishing processes, and being a valuable resource. PA, on the other hand, aims to achieve significant growth by selling packaging machines and offering completely automated solutions in collaboration with key partners. Hence, while PSBE's overall strategy is well aligned with Stora Enso and the PS division, the business areas within PSBE are quite different from each other. While there currently is a clear strategic focus from PSBE, this has not always been the case. However, having a clear strategic focus is not enough, it has to also be operationalized and considered when selecting the project portfolio.

Strategic buckets are an important tool for operationalizing the strategic focus and creating a project portfolio that aligns with the strategy and supports long-term goals (Cooper et al., 2001a; Jugend & Da Silva, 2014). Due to the way in which decision-making is made for projects within PSBE, strategic buckets are a complex subject. As the PSBE team does not directly allocate project funding—those decisions are typically made by the steering committee—it could be argued that using strategic buckets would be useless, since it would fall outside PSBE's scope. However, since PSBE decides which projects to investigate and which to propose for the steering committee, it indirectly has a lot of influence on shaping the project portfolio. Allocating projects into strategic buckets could help ensure that PSBE does not overlook any of the buckets and that it pushes the right mix of projects to the steering committee. Subsequently, leveraging strategic buckets could still benefit PSBE in a way similar to how firm A uses it reactively rather than actively, to ensure that no bucket is disregarded.

All of the interviewed external companies applied strategic buckets in some capacity to distribute resources and funds between different specified areas. What types of buckets used differed greatly between the firms, from function to innovativeness to product group. It was emphasized by the interviewees that strategic buckets were important for aligning the portfolio with the strategy and ensuring that no part of the business was overlooked. The most prominent part that risked being overlooked was projects of highly innovative character, since these were often deprioritized in favor of less risky and more short-term projects, a challenge that all firms A, B, C, and D had experienced. A solution to this problem was to use strategic buckets based on innovativeness, to ensure that the most innovative projects would get their fair share of resources and not compete against other project types. However, applying this categorization directly within PSBE would likely not work, as PSBE's role within PS is to pursue offerings that are ahead of industry trends, often leveraging innovative technology or solutions. Its role is not to pursue incremental innovations such as a quality improvement of the corrugated cardboard. In short, categorizing and differentiating projects based on innovativeness would be difficult as the range between the most innovative and the least innovative would be narrow. Leveraging strategic buckets based on project innovativeness would be more effective at a higher organizational level, such as the divisional level, where the range between projects is broader. If applied at the divisional level, this would help the division to balance between incremental short-term projects and more long-term radical projects.

Using a combination of function and product groups for strategic buckets would, on the one hand, be more intuitive considering the three business areas, PD, PI, and PA. On the other hand, these business areas do not necessarily compete for the same resources. PA has its own budget and does not need to go through the same process as PI to seek funds and approval if it pursues the projects internally within PA. PD seldom needs to seek formal approval or extra resources due to the nature of its projects. Without changing the way PA and PD work and the way projects are initiated, using the business areas as categories in a strategic bucket approach would likely have little impact on the project portfolio other than to help visualize the balance and distribution of projects across the business areas.

If, however, PA and PD were required to seek project approval through the PSBE team, the use of business areas as portfolio categories could be enabled. However, implementing such a change is easier said than done. Firstly, PD projects are typically short in duration and

initiated far more frequently than other project types, which would demand more frequent portfolio meetings. Secondly, the ownership structure of Österbergs Förpackningsmaskiner, an important subsidiary of PA where many of the business area's innovative projects happen, makes it difficult for all the decisions to move through PSBE. Additionally, the resources used and required for projects between the different business areas are often very different and non-competing. For example, PD projects are highly dependent on human resources, specifically the designers' time, which often cannot be capitalized by projects from the other business areas. PI projects, on the other hand, often require capital investments into new machines. To some degree, the different business areas are independent of each other, and decisions concerning projects in one do not impact the others. However, this only applies on a project level. When considering the matter on a higher level of abstraction, the business areas depend on each other. For example, a more permanent reallocation of money in terms of the number of permanent employees between the different business areas could change the distribution of projects between the business areas. If PI were to get more permanent employees, it could perhaps source and screen more projects, while PD could execute more design projects. To summarize, the varying resource requirements across the business areas and the difficulty of transferring resources make using the business areas as buckets undesirable.

5.2.2 Selecting the methods

Considering PSBE's current situation, three methods have been identified to yield the best results in a tailormade PPM framework: financials, scoring, and visual charts. The use of this constellation of methods supports the fulfillment of the four key objectives of PPM: strategic alignment, balance, value maximization, and optimal number of projects (Cooper & Edgett, 2001), as summarized in table 3. The goal of finding the optimal number of projects for the portfolio is not directly fulfilled by one single method, but follows as a result of the efficient use of resources enabled by the methods combined. The combination of methods is both straightforward, since they are all transparent, and balances their complements' inherent weaknesses. Moreover, the application of the methods in conjunction is logically built, as seen in figure 6. The figure shows that the outcome produced by applying the financial method is used as an input in the scoring model, which in turn feeds the input of the visualization.

Table 3. The selected methods that build up the PPM framework and their respective main goal fulfilment.

Method	Goal achievement
Financials	Value maximization
Scoring	Strategic alignment Value maximization
Visuals	Balance Value maximization

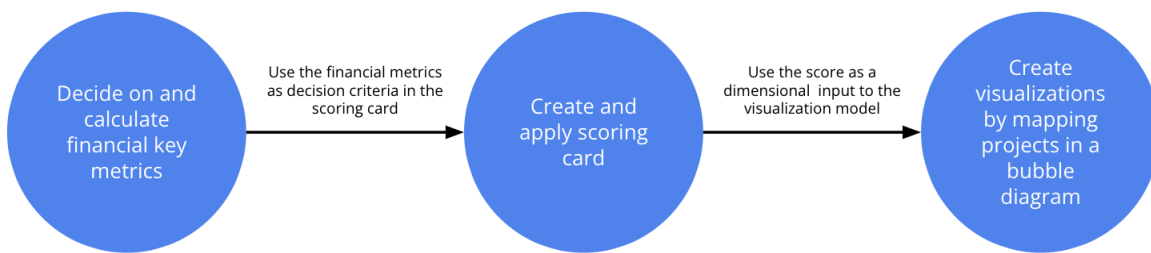


Figure 6. How the three methods are used in conjunction.

5.2.2.1 Financials

The use of financial methods is of utmost importance in this PPM framework. Mainly, two reasons speak for the importance of applying financial methods. First, interview data reveals that PSBE historically has had challenges in objectively comparing projects—which financial methods account for given its quantitative nature that provides transparency (Verbano & Nosella, 2010). The interview data make it evident that financial estimates facilitate the comparison of projects of different characteristics. For example, firm A uses NPV measures for selecting between projects that even belong to different sub-portfolios; firm B and firm D apply financial methods for prioritization between projects. Second, there are examples of projects pursued by PSBE that have turned out to be unprofitable, such as the initiatives in up-cycling wood fiber for use in furniture. While PSBE does currently use financial metrics when evaluating new project proposals, the informal way of working may have affected the selection process in a way that certain metrics may have been overlooked. By calculating financial numbers like NPV and ROI both before, during, and after the project life cycle, the risk of selecting unprofitable projects can be prevented. Both key figures are important: NPV indicates the absolute reward while ROI considers the relative reward. In the case of PSBE and its limited resources, ROI becomes increasingly important as it indicates where resources

are best spent. Calculating NPV to confirm that no unprofitable projects are pursued is exactly what all externally interviewed companies do. However, it was mentioned by the external companies that it is sometimes difficult to estimate the returns for certain projects, especially for risky long-term projects and incremental product improvements. The challenge of estimating returns on innovative and risky long-term projects is also mentioned in the literature (Jugend & Da Silva, 2014; Verbano & Nosella, 2010). The fact that most of the projects pursued by PSBE are of innovative character may also help explain why some of its previous projects have been unprofitable, even though financial metrics have been used as a method to evaluate them.

The application of financial methods will help fulfill the goal of maximizing the portfolio value. There are, however, pitfalls that need to be looked out for. Small margins are characteristic of the forest industry in general, which automatically makes high-margin, short-term projects appear particularly lucrative, while other types of projects are often overlooked, and thus an unbalanced portfolio risks becoming a fact. As exemplified by the external companies, this is an actual challenge that they are facing and is likely to impact Stora Enso even more, given its environmental context. In line with PS' strategy of achieving selective profitable growth (Stora Enso, n.d.-c), such an outcome is probable. The challenge of estimating financial metrics for innovative and risky projects speaks for using additional methods for achieving an optimal portfolio. As the literature pinpoints (Archer & Ghasemzadeh, 1999; Cooper & Edgett, 2001; Cooper et al., 2001b), it is essential for the project portfolio to be strategically aligned and balanced in order to also secure a future spot on the field. Hence, financial methods are insufficient to apply on their own.

5.2.2.2 Scoring

To hedge against the risk of solely choosing the projects with the highest NPV or ROI, a scoring model that covers other decision criteria important to PSBE is also included in this PPM framework. The decision criteria should be clearly defined and explained in the scoring card so that users' scoring is held as objectively as possible, which helps minimize the potential for bias, as identified by Jugend and Da Silva (2014) as a weakness of scoring methods. Incorporating the scoring method into the PPM process will help with prioritizing the projects that best align with the strategy, while simultaneously using PSBE's scarce resources in the most effective way.

The strategic aspect of the scoring method is especially important for PSBE, considering that strategic buckets as a method are challenging to implement in its case. Firm B uses a type of scoring method for both its sub-portfolios and projects. Each sub-portfolio is scored based on its contribution and importance to the firm's strategy. Similarly, projects are ranked based on their importance for achieving the strategic goals of each sub-portfolio. By scoring both sub-portfolios and projects, firm B ensures that its project portfolio is aligned with the overall strategy of the firm. Similarly, firm D ranks its projects based on how important they are to realizing the firm's strategy. The scoring method was stated to be one of the key factors to firm B's and firm D's success with PPM. Firm A, by contrast, had experimented with scoring methods but found them unsatisfactory in both outcomes and usability and subsequently discontinued them. A key factor that may explain the differing levels of satisfaction between firms B and D and firm A is the purpose and consistency of use. Firms B and D applied scoring extensively to ensure alignment between their project portfolios and strategic objectives. Firm A, however, lacked a clearly defined goal for using the method, which likely contributed to its ineffectiveness. Furthermore, Firm A manages a complex, multi-dimensional portfolio structure that already supports strategic alignment through other mechanisms. As previously discussed, PSBE will need to leverage scoring methods to align its portfolio with strategic goals. Firms B and D show that by using a tailored scoring model this alignment should be achievable.

Table 4 depicts a scoring card that meets the requirements and needs of PSBE. The first two decision criteria concern the strategic alignment and strategic impact of the projects. These two criteria ensure that the strategy is operationalized and follows the bottom-up approach proposed by Cooper et al. (2001a), which is an alternative to strategic buckets when operationalizing the business strategy. The decision criteria also consider the diverse strategies that the different business areas within PSBE have, while still allowing comparison between them. Additionally, the influx of new ideas, generated due to new political regulations concerning plastic usage, makes it instrumental to identify and choose the projects that best align with the strategy, to avoid falling into the same old pitfall of pursuing poorly aligned projects that subsequently fail. The third criterion aims to give an understanding of how well the protection of the project's outcome gives them a competitive advantage or if competitors can imitate easily. The scarce resources that PSBE has at its disposal limit it from pursuing projects that competitors can imitate for a fraction of the cost. The fourth criterion is also connected to the limited resources in the sense that projects that

allow for additional expansion and act as real options can help reduce development costs for PSBE. The fifth criterion relates to PSBE’s strategic goal of staying ahead of trends and investing in growing markets. It also helps ensure that limited resources are not allocated to projects targeting markets with declining demand and margins. The sixth and seventh criteria concern financial returns and aim to ensure that projects with high absolute and relative financial returns are prioritized. The last criterion concerns the risk of the projects.

The scoring card stresses strategic criteria as the strategic aspect is the most important factor for being successful with PPM (Cooper et al., 2001b). The initial scoring card puts equal weight on all criteria, however, as the PPM process matures it could be relevant to revise it and adjust the weights based on the relative importance of the decision criteria.

Table 4. A scoring card containing decision criteria important to PSBE.

	Key Factors	Rating Scale				Rating	Comments
		1	4	7	10		
Strategic fit	To what extent does the project align with the strategic direction of SE, PS, PSBE, and the relevant business area?	No clear alignment	Partial or strong alignment on some levels	Partial or strong strong alignment on all levels	Strong alignment on all levels		
Strategic impact	How significant is the project's impact on delivering strategic value or achieving key goals for SE, PS, PSBE, or the business area?	Minimal or no impact on strategic goals; low-value initiative	Some contribution; helpful but not critical to strategy	Strong impact on key goals at multiple levels; strategically valuable	Critical to success; transformative impact across strategic levels		
Competitive advantage	Does the project offer a competitive edge, IP, or technical uniqueness that strengthens the company's positioning?	Easily copied; no uniqueness	Some protection but not strong	Well protected; captive advantage	Highly defensible; strong proprietary edge		
Future growth and real option	Can the project act as a platform for future products, extensions, or markets?	One-off	Extension possible but limited	Clear potential for new product or market	Unlocks multiple new market or technology possibilities		
Market attractiveness	How attractive is the target market?	Market unclear or declining	Stable market	Solid market with growth	Rapid-growth market		
Financial return (Absolute)	What is the potential absolute financial reward?	Low return; NPV < X	Modest return; NPV < Y	Strong return; NPV < Z	Excellent return; NPV > Z		
Financial return (Relative)	What is the potential relative financial reward?	Low return; ROI < X	Modest return; ROI < Y	Strong return; ROI < Z	Excellent return; ROI > Z		
Risk and uncertainty	How high is the uncertainty in assumptions, both market and technical?	High risk; both market and technical risk is high	Moderate risk; Significant risks in either or both market and technology	Reasonable risk; Some risk in either market and technology	Low risk; both market and technical risk is low		

5.2.2.3 Visuals

A third method to use in combination with the financial and scoring methods in this PPM framework is visuals. A major drawback of the other two methods, financials and scoring, is that they fail to consider the goal of achieving a balance of projects. They instead focus on achieving high-value projects and projects aligned with the strategy, i.e. the individually most

attractive projects. The use of a visualization method is therefore essential in order to achieve a balanced portfolio. Though none of the interviewed firms mentioned that they formally use visual representations in their PPM processes, there are benefits of doing so in the case of the PSBE team, mainly due to three reasons: 1) it has had no mature PPM process historically 2) it consists of multiple users and decision-makers, and 3) it wants to work fast and efficiently. By supporting the more text-heavy information from the other two methods with a visual representation in the shape of a bubble diagram, people can quickly get an overview of the current portfolio's construction. When deciding upon which projects to pursue, a visual representation of the project portfolio will get everyone on the same page from the beginning and ease discussions and decisions that concern the portfolio, facilitating collective decisions (Killen et al., 2008) and making efficient use of time.

Figure 7 shows a bubble diagram that maps projects against the dimensions of technical feasibility vs. commercial feasibility, and aims to guide PSBE in achieving a balanced portfolio in terms of risk. Additionally, the dimensions are linked to PSBE's strategic intent. Technical feasibility relates to how easy it is for PSBE to pursue the project from a technical viewpoint. Projects that score high on this should therefore have synergies with existing technology in its core business, corrugated, which is one of PSBE's strategic intents. Similarly, projects that score high on commercial feasibility will likely have some synergies with customers in corrugated. The chart will help align the portfolio with PSBE's strategy. By color coding the bubbles by business area, each business area's contribution to the two targets can be visualized, and countermeasures can be more easily administered if needed to achieve a balanced portfolio. The size of the bubbles demonstrates the score of the projects, calculated from the scoring method. In sum, the bubble chart is three-dimensional, where projects can be compared both based on their technical feasibility, commercial feasibility, and score. Essentially, this is a helpful visualization for achieving balance between the strategic goals and choosing the best projects in each quadrant.

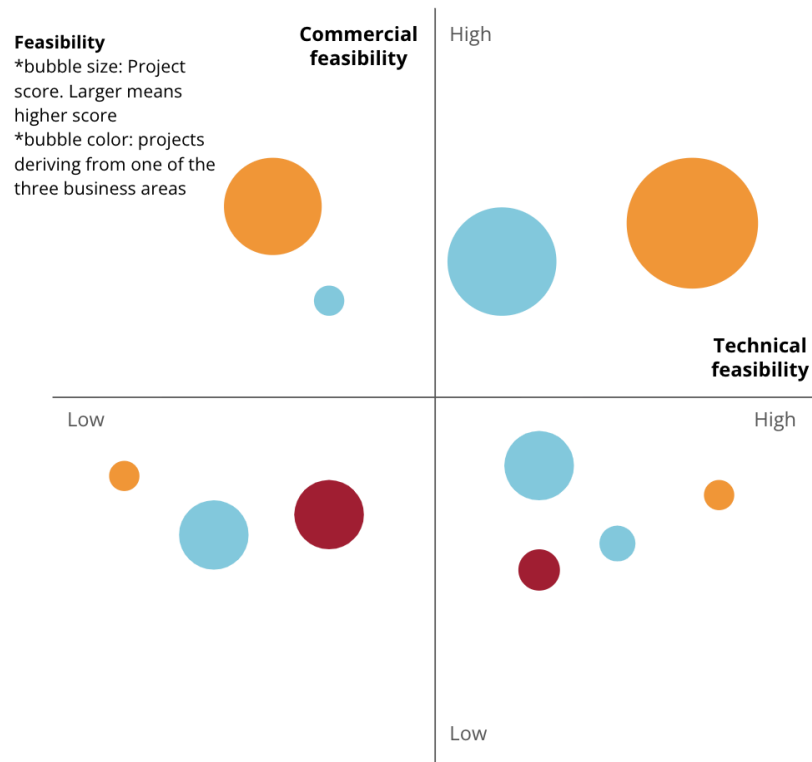


Figure 7. Example of a bubble diagram with projects mapped out based on the technical feasibility versus commercial feasibility. The size of the bubbles corresponds to the projects' score. The colors of the bubbles each represent one of PSBE's three business areas.

5.3 Selecting

The selecting phase consists of multiple activities: screening, evaluation, consideration of interdependencies and resources, and the actual portfolio selection. In the case of PSBE, certain activities will be harder to do than others, but they are all crucial for achieving the goals of PPM.

5.3.1 Initial screening

At the outset of the selection process, unattractive projects should be filtered out through an initial screening, in line with Archer and Ghasemzadeh's (1999) and Cooper et al.'s (2001a) arguments. Firms B and D both did this through a pre-study where certain aspects important to the respective firms were investigated. The pre-screening should be based on two minimum requirement criteria: strategic alignment and financials, as represented in table 5. During the screening, each criterion is assessed individually, and in case a project scores below a predetermined threshold on a specific criterion, it is considered unattractive and may be excluded from further evaluation. In essence, these minimum requirement criteria work as

a checklist to ensure that only feasible projects are able to move further in the process and eventually be initiated.

Table 5. Examples of minimum requirement criteria. The project needs to score over a specific threshold on each criterion to move forward.

	Key Factors	Rating Scale				Rating	Comments
		1	4	7	10		
Strategic fit	To what extent does the project align with the strategic direction of SE, PS, PSBE, and the relevant business area?	No clear alignment	Partial or strong alignment on some levels	Partial or strong alignment on all levels	Strong alignment on all levels		
Financial return	What is the potential financial reward?	Low return; < X NPV	Modest return; < Y NPV	Strong return; < Z NPV	Excellent return; > A NPV		

5.3.2 Individual project evaluation

Projects that pass the initial screening are then evaluated individually using the methods defined during the planning phase. These methods—financial calculations, scoring models, and visual representations—must be consistently applied to each project to enable fair and objective comparisons. Taking shortcuts in this phase could lead to unfavorable outcomes, such as the selection of an unprofitable project. Firm A precedes with a strong example that applying a homogeneous toolbox allows for comparison across even diverse projects from different portfolios. The firm also stated what might happen if some projects were excluded from the formal evaluation process: a discrepancy between estimated and actual resource availability, which obstructs an efficient PPM process.

5.3.3 Project interaction consideration

After individual evaluation, any interrelationships between projects need to be taken into account. While projects pursued by PSBE to a large degree are independent, there sometimes exist interdependencies between them. For example, it is not uncommon for PI projects to give rise to PA projects. If a PI project leads to the development of a new type of packaging, being able to offer an automated packaging solution for that novel packaging increases the overall value of the offering. Customers generally value that they can source both the packaging material and the machinery from Stora Enso. The value from the two projects is worth more combined than independently, i.e. the two projects give rise to synergies.

Subsequently, PSBE will have to keep in mind to evaluate not only projects independently but also jointly to consider potential synergies (Archer & Ghasemzadeh, 1999; Jonas, 2010).

5.3.4 Resource tracking

Another key interdependency between projects is the resources required for their completion. This is especially true for projects within the same business area. Various types of resources are involved, but the most prominent in PSBE are human resources and capital. Resource requirements vary between projects, especially between projects from different business areas. Mapping and distributing resources was mentioned as the greatest challenge for firm B, and has also been widely emphasized in the literature as an important factor to successful PPM (Archer & Ghasemzadeh, 1999; Cooper et al., 2001a; Jugend & Da Silva, 2014; Levine, 2005; Wheelwright & Clarke, 1992b). A crucial part of project selection is therefore the continuous process of mapping and monitoring available resources, as well as evaluating the resources required by each project. The human resources within PSBE are relatively easy to map and monitor. However, many projects also require additional resources from PS, which are more challenging to map and monitor due to PS' fragmented structure, where the different countries and local offices are quite independent.

A factor that complicates the mapping, monitoring, and allocation of resources is the current design of the decision-making process in each business area within PSBE. Both PA and PD have high degrees of autonomy and are able to approve and start projects themselves. Subsequently, this could lead to resources being spent in a suboptimal way, and those resources becoming more difficult to monitor. Similarities can be drawn to the challenge that firm A faces, where some projects go outside of the formal decision-making process and subsequently "steal" resources from formally approved projects. The solution for firm A was to try to strongly enforce that all projects go through the same process. This approach would likely not be successful in the case of PSBE, as it would require stripping PA and PD of their autonomy. The loss of autonomy could, particularly for PD, lead to project delays and, consequently, the loss of customers. However, the fact that the different business areas within PSBE require different types of resources, especially different kinds of human resources, mitigates the challenge of resource stealing to some degree. Nevertheless, the resources used across all projects should be tracked to support the monitoring of available resources, and projects that compete for the same resources or influence one another should be compared

against each other. Additionally, all compared projects should go through the same process as this allows for the most objective comparison. While considering the available resources is important for ensuring the right amount of projects (Cooper et al., 2001a; Wheelwright & Clarke, 1992b), the limited resources that PSBE has at its disposal and its ability to track PS' resources serve as a big barrier. Joint steps have to be taken in order to successfully monitor the available resources.

Figure 8 illustrates how visualizing both available and required resources can support the goal of achieving an optimal number of projects in the portfolio. It is not sufficient to only assess resource needs at the project's initiation. Resources must be tracked and measured continuously throughout the project lifecycle to prevent bottlenecks and slowdowns. Considering project interdependencies and resource requirements are especially important as the scoring method does not account for this (Jugend & Da Silva, 2014). Additionally, being able to present to the steering committee that resources are available for proposed projects can increase the likelihood of project approval, helping PSBE to overcome the challenge of securing sufficient funding for project execution.

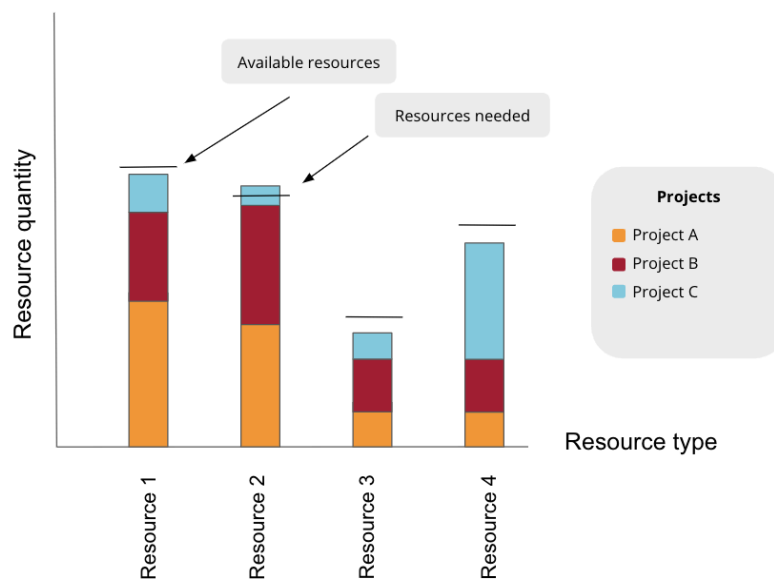


Figure 8. Resources of each type need to be investigated for making a decision whether it is possible to pursue a project or not. In the figure, there are available resources to pursue all three projects A, B, and C when looking at Resource 1, 3, and 4. However, when considering the availability of Resource 2, not all projects can be pursued.

5.3.5 Portfolio selection

After the initial screening, evaluation of projects, and resource considerations, comes the actual selection of projects for the portfolio, often called portfolio meetings. During this stage, both new and ongoing projects are considered. In order to achieve the best result, all three methods that were decided upon during the planning phase should be used in conjunction. While the suggested financial metrics, NPV and ROI, are objective, they have some overarching flaws. Primarily, they do not account for strategic priorities and tend to favour short-term projects over long-term ones (Jugend & Da Silva, 2014; Verbano & Nosella, 2010). In the case of PSBE, it is not always evident what to include in NPV calculations. For example, PD projects are currently only evaluated based on the design fee, which is relatively small compared to the total value these projects generate over their lifecycle. A fairer comparison would be to consider the full value of the project, not just the initial design fee. Moreover, quantifying the indirect value created by PD, such as PR and brand value, is difficult but important for a fair evaluation. Furthermore, the revenue structure of PA is rather different from the rest of PSBE, and even PS as a whole, with its revenues fluctuating. This could make PA projects appear less attractive and result in them being deprioritized if financial metrics are used as the sole approach for evaluation. The financial method serves as a support tool for the other two proposed methods, to help and increase the quality of their analysis. For example, financial metrics are integrated into the scoring card method. The scoring card aims to score and subsequently rank all the projects against each other to determine which projects are objectively best. However, projects deemed to be of critical strategic importance should be analyzed and eventually prioritized on a case-by-case basis, even if their overall scores are lower than those of alternative projects, due to the strategic imperative (Cooper et al., 2001a).

However, it is not necessarily the individually best project that should be chosen but rather the best combination of projects. This is where both the bubble charts and resource considerations come into play. The values of each project provided through the application of the scoring method should be used to create the bubble chart in figure 7. The bubble chart is meant to visually help compare what part of the strategy each project fulfills so that the best projects from each part of the strategy can be chosen, ensuring that the strategic goals are met. Additionally, projects between the different business areas should not be compared against each other if they do not compete for the same resources. This is the reason why the

business areas are color-coded in the bubble charts—to show the balance of projects from respective business areas. By mostly comparing projects within the same business area, problems such as how to value the projects from PD and the fluctuating revenue of PA can be mitigated to a larger degree. Similarly to the case of firm A, there are instances where the projects will have to compete for the same resources, and in those cases the same methods and processes must be used for each project in order to achieve objective comparisons.

While balancing strategic goals is essential, it is equally important to consider available resources, as they dictate how many projects can be initiated concurrently. This is especially important for PSBE as the three selected methods for the PPM framework do not directly consider the available resources. In situations where there might be a lack of specific resources for higher-ranked projects, it may be more practical to move forward with lower-ranked projects instead of waiting for resources to become available for the higher-ranked project. However, such decisions must be evaluated on a case-by-case basis, as in some instances waiting might be more beneficial.

The portfolio selection process is a cyclic process and not a one-off. On the one hand, Stora Enso's industry is relatively slow and stable, calling for few annual portfolio reviews according to Jugend and Da Silva (2014). On the other hand, PSBE in itself has a different dynamic. It aims to quickly sense and act on new and innovative business opportunities, which calls for more frequent portfolio evaluations over the year, in line with Jugend and Da Silva's (2014) argument. The interviewed companies reviewed their portfolios a few times a year, and given their context-specific contexts, this frequency proved effective for them. Moreover, PSBE manages projects with varying timelines, where a PD project may span just a few weeks, whereas PA and PI projects can extend over several years. Overall, therefore, it is recommended that the PSBE team conduct portfolio meetings every quarter. This number of reviews will help maintain PSBE's agility, which is an important trait of the PSBE team, and ensure that the team stays sensitive and flexible to new trends. This will create the right conditions for creativity to prosper. Yet, in order to avoid disrupting the work of PD and consequently losing important customers, PD projects should be allowed to be accepted outside of the portfolio meetings in case they meet the screening criteria and it is confirmed that they do not compete against other projects for the same resources.

5.4 Executing

In the execution phase, continuous monitoring of projects is an essential activity, as agreed upon by both the literature and the externally interviewed companies, in order to maintain an optimal project portfolio. Along the project life cycle, lessons learned should be documented and used as input for improving the PPM process.

5.4.1 Monitoring the projects

After project selection, each project's performance must be continuously tracked against key performance indicators (KPIs) and predefined metrics to ensure that they are on track. Any deviations from the plan need to be addressed without delay. Tracking individual project performances becomes even more important in case project interactions are present. For instance, if a PA project is preceded by a PI project, monitoring checkpoints such as time, budget, scope, and business case becomes important since otherwise PSBE could risk not having resources available as initially planned (Archer & Ghasemzadeh, 1999), or that it runs out of financial means so that the PA project cannot be pursued or the PI project cannot finish. In that case, the actual value of the projects will not be the same as the estimated value. Continuous monitoring is fundamental for taking timely decisions regarding the discontinuance of projects or the reallocation of resources between ongoing projects, in order to maximize the portfolio's total value.

The projects could be monitored through a stage-gate model. The method should be used in the way that Cooper et al. (2001a) describe as a checkpoint model, applied on an individual project level and not on the portfolio as a whole. Using it as a checkpoint model is deemed appropriate due to the large number of people involved, as coordinating all these people and their schedules would be too cumbersome in the case the stage-gate model were to dominate the PPM process. Moreover, the process should not be too condense, formal, or rigid, since that would work inhibitory against PSBE's creativity and agility. To not interrupt operational work, projects of less innovative character should go through a smaller stage-gate process with fewer gates and requirements.

It appears from the internal interviews with PSBE that an informal stage-gate model is used as of today, and that the steering committee also employs some kind of continuous evaluation of the projects. Creating a more formal stage-gate model based on the current ways of

working would lower the initial barrier to adopting the model, while also creating a more unified and unbiased approach to continuously monitoring and evaluating projects. This would allow PSBE to more effectively and objectively cut or pause projects that do not meet expectations. To integrate the stage-gate model with the rest of the PPM process, inspiration could be drawn from firm D, where the first stage is the pre-study and the first gate is the portfolio meeting. In PSBE's case, the first stage could be the initial information gathering leading up to the screening, which in turn would serve as the first gate. This would then be followed by project evaluation and selection, which would be stage two and gate two, respectively. The following stages and gates should be formalized based on the existing informal practices within PSBE. Gates should be placed at decision points where additional funding or resources are considered, to prevent underperformance of projects and waste of limited resources. Additionally, each gate must contain pre-defined deliverables that the project has to meet in order to pass through the gate and proceed to the next stage.

5.4.2 Learning from the projects

Lastly, throughout a project's life cycle, lessons learned (LL) should be noted along the way. LL are extremely important to nurture, especially for an immature PPM process. An approach could be to gather the project team and discuss both positive and negative outcomes during the project life cycle and the factors behind them, similar to what firm B does. This could help the PSBE team to identify the root causes of certain problem areas and find a solution to them, instead of repeatedly treating the symptoms. This would lead to more effective project execution in the future (Archer & Ghasemzadeh, 1999; Cooper et al., 2001a; Kopmann et al., 2015). LL could also be helpful in revising the scoring card to find the one best-suited scoring card for PSBE. Practically, this means that the PSBE team makes an analysis of the project outcome based on the scoring to identify the criteria most important for successful project completion, and based on this analysis, adjusts the weighting for the criteria in the scoring card. This is arguably important in the beginning of the novel and immature PPM process in order to reach efficiency and effectiveness in the process.

An overview of the proposed PPM framework for PSBE is presented in figure 9. In the figure, the key activities for each of the three phases are specified.

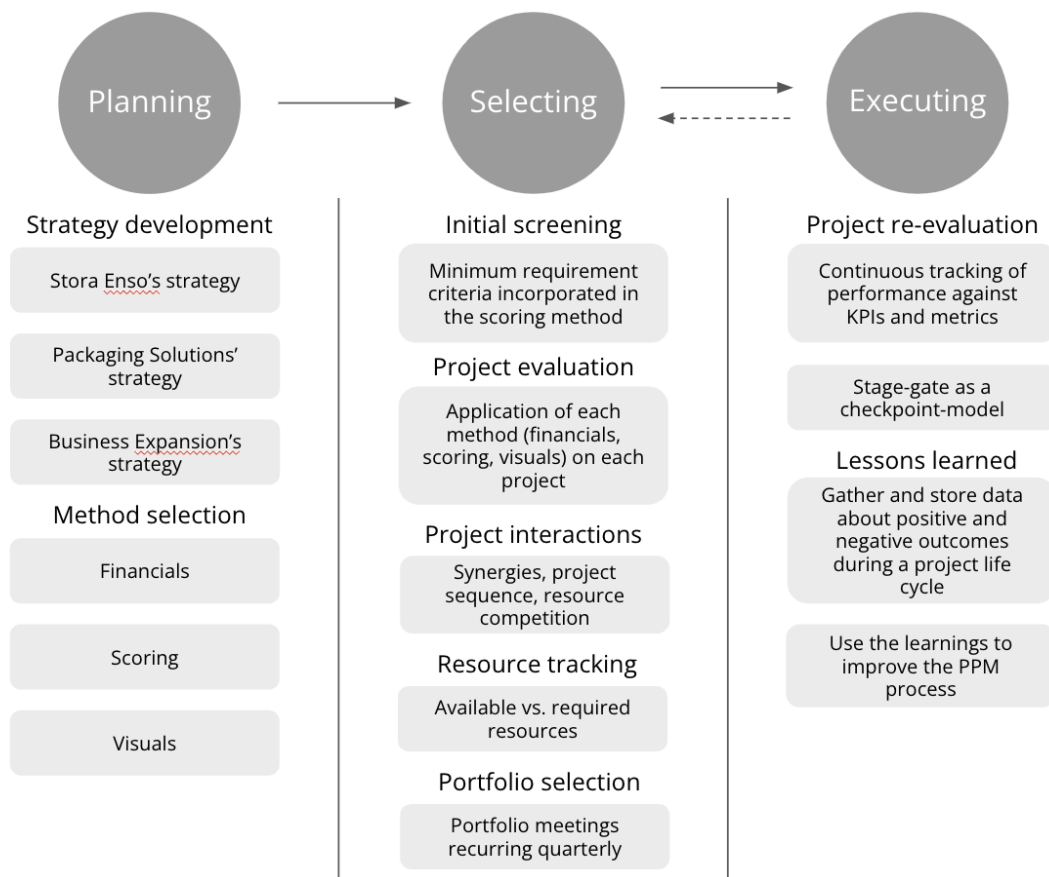


Figure 9. The finished PPM framework for PSBE. The key activities for each of the phases planning, selecting, and executing are described.

5.5 Stakeholders

Involving a broad range of stakeholders in the PPM process will lead to improved outcomes for PSBE (Jonas, 2010; Jugend & Da Silva, 2014; Levine, 2005). In the planning phase, the strategic focus is best set by the top management (Jonas, 2010). In the case of Stora Enso, where strategies exist at different levels, the strategic focus should be set by the senior leaders at the respective levels.

The evaluation and selection of projects, on the other hand, is best done by a group of different people (Jugend & Da Silva, 2014; Levine, 2005). However, due to the limited time and resources at PSBE's disposal, the initial screening should be done by the idea owner to save resources. The final evaluation and selection should instead be done by a group of people to yield the best results. As the decision-making regarding what projects should be proposed to the steering committee and investigated further is taken within PSBE, senior leadership from PSBE should be included. Senior buy-in is acknowledged as a challenge both

in the literature (Cooper et al., 2001b; Killen et al., 2008) and from the interviews with external companies. Incorporating senior leadership as much as possible will increase the chances of obtaining higher buy-in and a more successful PPM process. Moreover, an absence of senior leadership involvement in decision-making was detrimental to firm C's PPM work. PSBE should also aim to include representatives from the three different business areas to gain a broader understanding of the available resources and the feasibility of the projects. It is particularly important to include individuals lower down in the organization, since those are the ones who work closely with the projects, and a potential pitfall with scoring methods is that users do not have enough insight when performing the scoring (Jugend & Da Silva, 2014). However, in cases where the decision-making does not impact a particular business area, the presence of a representative from that business area is not necessary. Involving senior leaders from the broader PS division could also be advantageous, as their participation in the decision-making process would support future project funding. This would help align PSBE with the strategy and goals of PS even better. For the executing phase, the monitoring of projects and its related decisions on whether they should continue or not, is recommended to be performed by both the PS steering committee and the concerned project groups jointly.

6 Conclusion

This thesis aimed to explore PSBE's current way of working with project selection and prioritization, and to develop a PPM framework tailored to PSBE. The first research question was to determine how the Packaging Solutions Business Expansion team at Stora Enso currently works with selecting and prioritizing between projects. As of today, there is no formal, standardized process for selecting and prioritizing projects across PSBE. Instead, the three business areas within PSBE work rather differently and independently from each other. PD makes decisions regarding project selection relatively quickly, based on an initial investigation of project feasibility and customers' willingness to pay. Decision-making within PA and PI takes longer, and investigations are more in-depth. Additionally, in the case of PI, project selection decisions are taken by multiple stakeholders. The current way of working has led PSBE to experience several challenges, such as selecting and pursuing projects with low financial returns, low strategic alignment, and resources being used in a suboptimal way. These are challenges that a context-specific PPM framework could mitigate.

The second research question aimed to determine how a project portfolio management framework for comparing and prioritizing between projects within Packaging Solutions Business Expansion at Stora Enso should be designed. As previously explained, the challenges faced by PSBE within project selection and prioritization could be mitigated with a PPM framework. Based on insights from literature, best practices from external companies, and the current situation of PSBE, the general three-phase PPM framework has been adapted to PSBE's context. In the first phase, the planning phase, the strategic focus is set and the evaluation methods are chosen. PSBE has to consider both the firm-level strategy, the divisional strategy, its own strategy, and the strategies of the business areas within PSBE, when it selects and prioritizes between projects. However, simply having set the strategy is not enough; it also has to be operationalized in order to achieve a successful PPM outcome. The strategy is operationalized through the use of the evaluation methods for selecting projects. The methods recommended for PSBE are financial, scoring, and visuals. By using financial metrics formally, PSBE can help mitigate the challenge of selecting and pursuing low-value projects. However, the financial method has its limitations when used alone, as it has several drawbacks. The financial method is therefore proposed to be incorporated into the scoring card. The scoring card considers multiple different factors for evaluating projects. The most important factor considered by the scoring card is the alignment and impact on the

strategy. However, the method not only helps with selecting projects aligned with the strategy, but also with selecting high-value projects. The last method recommended for PSBE is visuals, which aims to help achieve a balanced portfolio in terms of PSBE's strategy of selecting projects that either have synergies with existing technology or customers.

The second phase in the framework, selecting, concerns the selection of the project portfolio. The phase involves several activities: pre-screening, individual project evaluation, consideration of project interdependencies, assessment of available resources, and actual portfolio selection. The pre-screening is important to save resources and ensure an efficient selection process. The pre-screening mainly considers the strategic alignment and financial returns of projects. In the individual project evaluation stage, the evaluation methods selected during the planning phase are used on individual projects in order to be able to objectively compare them with one another and ensure that the best mix of projects is selected. As projects are not always independent, especially PA and PI projects, consideration of project interdependencies is important to ensure that the right number of projects and the right mix of projects is selected. The activity of assessing available and required resources will probably be one of the hardest challenges for PSBE, due to its organizational structure and the nature of its projects. However, performing this activity is instrumental in achieving the right amount of projects and ensuring that the limited resources are used in an optimal way, a challenge that PSBE has previously faced. By combining the different evaluation methods, project interdependencies, and resource considerations, PSBE will be able to mitigate the challenges it currently faces and achieve a more efficient and objective PPM process. The portfolio selection is not a one-off but rather a cyclic process that, in the case of PSBE, should take place quarterly.

Executing, the third phase in the framework, aims to ensure that the PPM framework is continuously adapted based on changes within PSBE, its environment, and learnings from projects. Additionally, PSBE is recommended to adopt a more formal stage-gate model to monitor its projects and ensure that the projects that do not meet the requirements are discontinued, a problem PSBE has previously experienced. While the exact design of the stage-gate approach is outside the scope of this thesis, the two initial phases and stages are proposed to be integrated with the portfolio selection process. The first gate is proposed to correspond to the pre-screening activity, and the second gate the actual portfolio selection activity.

Lastly, spanning the three phases, is the importance of incorporating stakeholders. PSBE should include people from all three business areas in the portfolio selection to achieve a more objective project portfolio. Additionally, by including representatives from the business areas, a broader understanding of the available and required resources and the feasibility of the projects can be gained. It is also crucial to include senior leaders in the decision-making process.

While the framework provides a formal approach tailored to PSBE, this study has limitations, namely the limited number of interviewees. The framework has been developed on the basis of eleven interviews in total and a literature study, however, time has been limited and there is more to PPM than has been investigated in this report. As such, the framework's applicability beyond PSBE should be approached with caution. Nevertheless, the findings offer insights for organizations seeking to improve their work with project selection and prioritization. For example, the three phases planning, selecting, and executing and their respective activities could also be applied to other organizations in their general form. Although the framework is simple in its general and basic form, it has the potential to become powerful after adaptation to contingency factors.

7 Discussion

For successful application and execution of the framework, it is recommended to start small by beginning with the implementation in one business area within PSBE. This pilot phase will allow the framework to be tested, feedback to be gathered, and eventual adjustments to be made. For example, the number of portfolio meetings annually needs to be tried in practice to find the optimal solution that works best for PSBE, to maintain its agility and flexibility while still making the best use of the limited time and resources that the team has at its disposal. This is best done in a pilot phase to avoid disturbing as much of the operational work as possible. If successful, the framework can then start to roll out across the rest of PSBE. It could also be logical to apply the methods step by step. In that case, the financial method should be implemented first, given the proposed chronological sequence of the three methods.

As stated previously, PPM is contingent by nature and the developed framework is specifically tailored to PSBE's current organizational context. It is important to be aware that the framework might need revision in the future, for example, in case new markets emerge, regulatory changes occur, or the organization's strategic priorities change. Therefore, while the proposed framework is designed to be applicable not only over a week but for a meaningful period, it is not intended to be a one-size-fits-all solution. The contingency of PPM becomes apparent when considering the differences between the proposed framework tailored to PSBE, the way interviewed external companies work with PPM, and literature. For example, all the external companies used strategic buckets, but in the case of PSBE this is an unfeasible method due to the way PSBE is organized and the nature of the projects that it pursues. Additionally, in the literature, strategic buckets have been described as the go-to method for aligning the portfolio with the strategy (Archer & Ghasemzadeh, 1999; Killen et al., 2008; Verbano & Nosella, 2010). However, the challenges of choosing buckets and the fact that it is extremely difficult for some organizations to implement the method have not been acknowledged as a weakness of the method.

On the same note, while the challenges and importance of efficiently allocating resources are well documented in existing PPM research (Archer & Ghasemzadeh, 1999; Cooper et al., 2001a; Jugend & Da Silva, 2014; Levine, 2005; Wheelwright & Clarke, 1992b), certain steps are not equally well documented. For example, Cooper et al. (2001a) and Wheelwright and

Clarke (1992b) argue that identifying and monitoring the available resources are important activities, but they fail to consider the challenges related to these activities. In the case of PSBE, resource identification and monitoring could be a great challenge in implementing the proposed PPM framework, due to the organizational structure of PS. Additionally, financial methods have been described as easy, straightforward, and objective, especially for short-term projects, by the literature (Verbano & Nosella, 2010). However, both PSBE and firm A faced challenges when performing them on incremental short-term projects, a challenge not previously documented. To summarize, this study identified several differences and challenges not described in previous literature. These aspects are important for firms to consider in general when designing their PPM process in order for it to be successful. Further research into context-specific implementation of PPM could help unravel additional challenges and insights for firms.

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