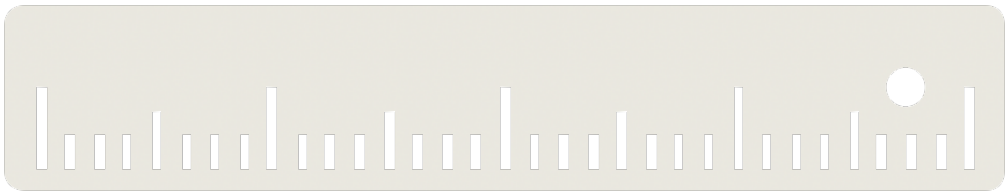
Measuring innovation project performance

- a holistic study of current practices and implications in Swedish large-sized companies



UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Emma Martinsson &
Madeleine Hammarstrand
Graduate School
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Innovation & Industrial Management
Supervisor: Daniel Ljungberg

Measuring innovation project performance - *a holistic study of current practices and implications in Swedish large-sized companies*

School of Business, Economics & Law at the University of Gothenburg
Vasagatan 1, P.O. Box 600,
SE 405 30, Gothenburg, Sweden

Contact: emmamartinsson@live.com and madde.hammarstrand@hotmail.com

Abstract

The field of innovation has gained increased attention in later years. As an enhancement for growth, innovation is of high importance for companies to pursue in order to stay competitive. Prior research has highlighted the need for measuring and evaluating the performance of innovation efforts, but it has proven to be a challenge for many companies to manage. In addition, little research has been conducted on a project level, although innovation projects have a significant impact on the overall innovation performance. In this matter, large-sized companies are of particular interest due to their structured innovation processes. Therefore, the purpose of this study is to explore how innovation project performance can be measured from the perspective of large-sized companies. This is done by identifying current practices as well as potential challenges to discover how measurement of innovation project performance can be managed.

The study is conducted qualitatively on a sample of twelve Swedish large-sized companies, with empirical findings collected through semi-structured interviews with innovation managers and experts within the field of innovation. In addition, a narrative literature review is conducted combining the fields of innovation management, performance measurement and project management, which provides the foundation for secondary data. The literature review and the empirical findings are analyzed using thematic analysis to answer the proposed research questions.

The findings of the study suggest various current practices of measurement, where five categories of metrics are identified, each with both benefits and drawbacks. Several challenges, as well as factors such as strategy and top management demand, are suggested to impact how measurement can be done on a project level. Finally, the study concludes that there is no best way to measure the performance of all innovation projects, as exemplified by a variety of practices identified. Instead, measurement can be carried out in numerous ways, and for practitioners the importance lies in finding purposeful metrics that are suitable for each project. Here, the findings of the study can help navigate throughout the journey of selecting the right metrics.

Keywords: Innovation project performance measurement, Innovation metrics, Innovation projects, Measuring innovation, Innovation measurement challenges

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Emma Martinsson

Madeleine Hammarstrand

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1. Introduction

This chapter presents the background on innovation and performance measurement which, together with the problem discussion, leads up to the proposed research questions of the study. Additionally, delimitations, clarifications of definitions and the structure of the report is also outlined.

1.1 Background

1.1.1 Innovation and innovation projects

Innovation is a widespread topic that has gained more and more attention recently. In today's rapidly changing environment, companies have to evolve in order to survive and innovation is often seen as an enhancement for growth (European Central Bank, 2017). According to the European Union (Gouardères, 2020), innovation is essential to stay competitive on the global market and to create a better society. In addition, several empirical studies indicate a positive relationship between implementation of innovation activities and future performance (Bowen et al., 2010; Rubera & Krica, 2012; O'Reilly & Tushman, 2004), further emphasizing its importance for companies in practice.

The term innovation has been used for the last 70 years (Baregheh, Rowley & Sambrook, 2009), but still, there is not any single definition of what it actually comprises. A large number of articles around innovation has been written, and the definitions presented are almost as many as the number of articles. An important distinction to make is that between an invention and an innovation, where innovation comes with a requirement on commercialization and implementation (OECD/Eurostat, 2018). A widely recognized definition is that in OECD's Oslo Manual which suggests that *"an innovation is a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought to into use by the unit (process)"* (OECD/Eurostat, 2018, p.20). For this study, in line with Adams et al. (2006), a broad definition of innovation is adopted to include the range of innovations that could possibly be encountered in any company. The broader perspective aligns with the definition brought forth by the International Organization for Standardization (ISO) (2020) of innovation being a *"new or changed entity, realizing or redistributing value"*. Consequently, innovation can be defined as something new, including but not exclusively consisting of products and services, that gets commercialized or implemented, resulting in an added value.

The innovation process is carried out through various innovation projects (Frishammar & Björk, 2019; Schentler et al., 2010), where a project can be defined as a temporary and unique set of activities, with defined scope and resources to make a contribution to the development of the business (Project Management Institute, n.d.). In order for a project to meet set requirements and thereby make such a contribution, it needs sufficient management. Managing

projects include considerations of time, people, money, and costs with the aim to achieve predefined goals and objectives (Cockrell, 2012). According to Frey (2003), there are a number of differences between regular projects and innovation projects that companies need to be aware of to properly manage them. Schentler et al. (2010 p.305) define an innovation project as *"a team-based approach to execute innovation processes"* where every project is considered an object for planning and controlling. As innovation projects are inherently more uncertain, the objectives of these projects are in the beginning often loosely defined and the way of working does not follow strict guidelines (Frey, 2003). These factors make traditional project management of projects in many cases impossible to pursue. Instead, practices must be adapted to better reflect the nature of innovation.

1.1.2 The need for performance measurement

As part of managing innovation, and to reach stated innovation goals, measurement and evaluation is among the most critical processes to put in place (Richtnér et al., 2017). Naturally, a primary concern of any company investing in a project is whether it is achieving anything in return for the provided investment (Project Management Docs, n.d.). Thus, a key aspect of project management is to recognize the impact, performance and value of the activities performed (Center for Business Practices, 2005). In addition, the creation of value should be a central goal of all innovation efforts, according to Frishammar and Björk (2019). To decide whether this goal is fulfilled or not, the performance of innovation projects needs to be measured. Hence, sufficient performance measurement must be in place for those projects.

The concept of performance measurement has previously been defined as a process for "*monitoring an organisation's effectiveness in fulfilling its own predetermined goals or stakeholder requirements*" by Cima (2008). Selected performance metrics are used to track, manage and communicate results (Mauboussin, 2012) and according to Fleisher (2003), having the right mix of such metrics is especially important for dynamic and complex environments, such as those where innovation usually takes place. Furthermore, it is a vital means to assess and improve the strategic direction of any company (Kaplan & Norton, 2004). In addition, through performance measurement, the effectiveness and efficiency of projects pursued can be estimated and somewhat compared to other projects (Ghalayini & Noble, 1996). However, as stated by Kromatic (Kromer, n.d.), it is difficult to establish consensus on how to measure something that per definition is novel and unknown. Thus, measuring innovation is an inherently complex activity.

The old saying of "*what gets measured gets done*" seems to hold true for numerous companies (Frishammar & Björk, 2019; RISE, n.d; Bourke, 2013), particularly when considering the right metrics and putting it to use accordingly (Henderson, 2015). At the same time, "*not everything that can be counted counts, and not everything that counts can be counted*" (Kylliäinen, 2018), which highlights the complexity in deciding what and how to measure and evaluate performance. Still, innovation requires sufficient follow-up, not least to support decision-making (Frishammar & Björk, 2019) and to ensure continued progress (Kylliäinen, 2018).

Measuring, and thereby acknowledging, innovation performance facilitates the persistence of innovation processes, which tend to be put aside in many companies when short-term actions are prioritized for resource allocation (Frishammar & Björk, 2019). Therefore, measuring may be vital for continued and future innovative performance, and consequently global competitiveness.

1.2 Problem discussion

While prior research has highlighted the need for measuring and assessing innovation performance as critical for continued improvements (Kristiansen & Ritala, 2018; Hauschildt & Salomo, 2007; Goffin & Mitchell, 2017), it has in practice proved to be a challenge for companies to manage (Kianto, 2008) and many organizations lack sufficient tools for measurement (Mankin, 2007). Sawang (2011) points out a clear gap between recognized importance of certain performance indicators and the actual usage among managers. In fact, companies rarely possess any systematic way of collecting the sufficient information to assess innovation, and the varying courses of actions complicate comparison and benchmarking to other actors' innovation performance (Tidd, 2001). In addition, employing incorrect metrics may do more harm than good (Brattström et al., 2018) and systems for innovation performance measurement are often perceived ineffective with significant need for improvement (Dewangan & Godse, 2014). Put together, there is a discrepancy between the identified need for measurement of innovation performance and current use among companies which needs to be explored and exploited further.

Adams et al. (2006) highlight another gap between theory and practice where the metrics suggested by academic research oftentimes have had few practical implications. Much of the previously conducted research has focused on institutional or industry level relating to measurement of innovation capability (Chiesa et al., 2009; Aas & Breunig, 2017), which rather refers to underlying processes enabling innovation (Goffin & Mitchell, 2017). However, less seems to cover the performance measurement for innovation on a project level. Nonetheless, project management is an important element influencing a company's overall innovation performance and should therefore be assessed in order to ensure the optimal management (Cordero, 1990; Adams et al., 2006; Ringel et al., 2020). Additionally, a project-level unit of analysis allows for the diversity among innovation activities within companies to be taken into account to a greater degree than company-level (Molina-Castillo & Munuera-Alemán, 2009; Palmberg, 2006).

Having numerous active projects ongoing, that each requires appropriate follow-up, the segment of large-sized companies is of extra relevance in studying innovation performance measurement. On one hand, they have been argued to struggle with innovation due to static organizational structures (Viki, 2018), bureaucracy (Baumgartner, 2007) and incentives to maintain status quo (Altringer, 2013). On the other hand, their built-up structures and resources allow for appointed innovation processes (Kirsner, 2019), thereby allowing for structured

exploration from a research perspective. Moreover, according to Govindarjan et al. (2019), larger companies have come to be increasingly more successful in their innovation processes which ultimately improves overall performance and preserves their positions on the market. Additional research on large-sized companies and innovation management processes such as project performance measurement will provide further guidance on how to advance innovation at companies of such size. Hence, there are motives to strive towards an improved apprehension of measurement practices for large-sized companies. In addition, holistic approaches of measurement have previously been presented by Banu (2018) and by Richtnér et al. (2017), demonstrating the possibilities of further conceptualization and generalization within the field in the intersection between theory and practice.

1.3 Purpose

The purpose of this study is to explore how innovation project performance can be measured from the perspective of large-sized companies, by identifying current practices and potential challenges from a sample of Swedish companies. In the prior section, the stress for further empirically based research within the field of innovation project performance measurement has been demonstrated. Further, the practical use of measurement has been found inadequate with entailed challenges for many companies. Thus, in order to benefit from measuring project performance, a greater understanding among practitioners is necessary. Moreover, the identified gaps between theory and practice as well as the suggested differences in courses of action emphasize the need for a holistic research perspective and a broader overview.

To fulfill the purpose of the study, the experiences from twelve innovation managers and five experts together provide the reflection of current practices and related challenges. They are all either part of, or have experiences from, large-sized Swedish companies and their innovation management practices. As previously stated, large-sized companies provide a particularly significant ground for exploration of innovation-related fields, due to their appointed innovation processes and multitude of ongoing innovation projects. In addition to the experiences from practice, the findings are to be compared to and analyzed in relation to previous research within the fields of innovation management, performance measurement and project management. By combining the findings from Swedish large-sized companies and related theory, the study will therefore provide a holistic perspective on innovation project performance measurement.

1.4 Research questions

Based on the purpose of the study, the following research question has been formulated:

How can large-sized companies measure the performance of their innovation projects?

The research question is specified by the following sub-questions:

- *What measurement practices are currently being applied?*
- *What are the main challenges with measuring innovation projects?*

1.5 Delimitations

The study takes a holistic approach to measurement, implying that examples of specific metrics are suggested however not examined in detail due to its body of variety. Instead, bundles of metrics are presented in categories together with their general implications. The main reason for this is the ability to be inclusive towards measurement, rather than limiting, to allow for a variety among the findings. Another delimitation is the sample of Swedish companies only, which implies that the findings may be limited to a Swedish context. Finally, no distinction is made between different types of innovation, such as product, service or process innovation, nor between innovation projects in different industries. The reasoning behind the delimitations is elaborated more thoroughly in the methodology section of this report.

1.6 Clarifications of definitions

Throughout the report, it should be clarified that some definitions applied are considered synonymous. First, no distinction is made between *measuring* and *evaluating* throughout this report. Measuring is defined by the Cambridge Dictionary (Cambridge University Press, 2021a) as "*to judge the quality, effect, importance, or value of something*". Evaluating is defined as "*to judge or calculate the quality, importance, amount, or value of something"* (Cambridge University Press, 2021b). Due to its similarities in definitions, these are applied synonymous in this report. Second, a *measure* is defined as the "*size, amount or degree*" of something (Cambridge University Press, 2021a) while in comparison, a *metric* is a representation of what is measured (Bladt & Filbin, 2013) and is to a greater degree linked to measuring performance (Sage Advice, n.d.). Hence, the term *metric* is used throughout the report, meaning measures specifically related to performance. Third, *metrics* and *key performance indicators (KPIs)* are used equivalently throughout the report. According to Boyle (2020), the main difference between the two concepts is whether tracking business processes or objectives, whereas in this report both should be considered. Thus, they are used synonymously when describing the tracking of performance. Finally, the term *company* is used

to portray for-profit organizations offering products or services. In some situations, the word *organization* is used, however only when it refers to conditions within the previously mentioned company.

1.7 Structure of report

The report has the following disposition, presented in Figure 1. Next, a literature review is presented where relevant theoretical contributions are examined within innovation management, performance measurement and innovation project management. Thereafter, the applied research methods are outlined, motivating methodology selections and the research process more in depth. Then, the section of empirical findings is presented followed by an analysis section of those findings in relation to the theoretical findings from the literature review. Finally, the conclusion is presented including answering the research questions together with theoretical and practical implications and recommendations for future research.

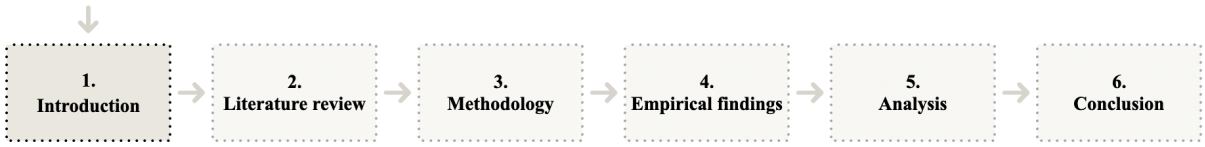

Figure 1 - Structure of the report

2. Literature review

In this chapter, previous literature within the fields of innovation management, performance measurement and project performance measurement are presented. The purpose of the chapter is to increase the understanding of the subject at hand and identify proposed ways of measuring innovation projects as well as associated challenges. In the end, a synthesis of theory is presented, summarizing the findings.

2.1. Introduction to Innovation Management

Innovative companies are increasingly under pressure to maximize the complexity of products and services while simultaneously acting faster and being responsive to transforming market needs (Richtnér et al., 2012). While companies agree that innovation is vital for competitiveness and growth (Badrinas & Vilà, 2015), innovation management is still a relatively novel field with no single solution on how to best perform (Goffin & Mitchell, 2017). In setting the initial context for this study, it is critical to outline where innovation takes place, and thus where it needs to be managed and measured. Goffin and Mitchell (2017) present five main elements of innovation management through their Pentathlon Framework, consisting of idea generation, idea selection, implementation, innovation strategy and lastly cultural aspects of innovation. Throughout this entire process, or funnel, innovation needs to be managed. Pisano (2015) takes a systematic approach, describing it as an innovation system, which is "*a coherent set of interdependent processes and structures that dictates how the company searches for novel problems and solutions, synthesizes ideas into business concepts and product designs, and selects which projects get funded*". The systematic approach is also emphasized by Badrinas and Vilà (2015) who suggest that implementing an innovation management system for structured and systematic management processes around innovation may enhance both profitability and growth.

According to International Organization for Standardization (2019) an innovation management system is *"a set of interrelated and interacting elements, aiming for the realization of value"* and in 2019, the ISO56002 international standard for managing innovation systems was released to build towards a best practice within the field (Tidd, 2020). While it has been concluded that adapted use of standardized innovation management systems is positively related to both innovation capability and performance (Mir et al., 2016), Tidd (2020) argues that the systematic approach may be too holistic for many companies to grasp, and thus more tools are needed to improve their innovation management. Put together, innovation management stretches across several processes in companies, throughout which innovation needs to be systematically managed in order to reach innovative performance. According to Goffin and Mitchell (2017) the ultimate goal of innovation management is to improve the performance and the capability to innovate. As part of innovation management practices, performance evaluation is central (Tidd, 2020). The main means to assess or evaluate performance is through measurement (Goffin & Mitchell, 2017), further explored throughout this report.

2.1.1 Degrees of innovation

Innovations can be categorized into different degrees, having incremental innovations on one side of the spectrum and radical innovations on the other (Goffin & Mitchell, 2017; Dewar & Dutton, 1986), as visualized in Figure 2. Incremental innovations consist of improvements of what a company is already providing, for example a product or service, and is targeting existing customers (Nagji & Tuff, 2012). Therefore, the degree of uncertainty within these innovations is relatively low, and the outcome of the project can often be somewhat predicted (Kristiansen & Ritala, 2018). Radical innovations on the other hand are seen as game-changers that can completely change the business environment within an industry. Hence, radical innovations are much more powerful, but also much rarer according to Goffin and Mitchell (2017). O'Reilly and Tushman (2004) relates incremental innovation to exploiting the traditional core business and radical innovation to exploring new business opportunities.

Figure 2 - Degrees of innovation
(adapted from Nagji & Tuff, 2012; O'Reilly & Tushman, 2004; Kristiansen & Ritala, 2018)

The distinction between incremental versus radical, or exploiting versus exploring, is important because financial resources for innovation projects are not infinite and hence have to be divided between the different types of innovation (Nagji & Tuff, 2012). In addition, the two put different requirements on what measurements are useful due to the difference in degree of ambiguity and uncertainty (Kristiansen & Ritala, 2018; Nagji & Tuff, 2012). Thus, from a holistic perspective, the entire range with both extremes need to be incorporated however distinguished from each other when measuring the performance of its respective innovations.

2.2 Performance measurement

As part of the management literature discipline, a lot of research has been carried out within performance measurement in general, but the field is broad and the conceptualizations diverge (Bititci et al., 2012). Some have studied the link between objectives, dimensions and context within R&D and discovered that selected metrics are strongly guided by the aims and motives of a company (Chiesa & Frattini, 2007; Chiesa et al, 2009). Others have studied its link to organizational culture (Bititci et al., 2006). Ferreira and Otley (2009) suggest performance measurement systems are formal and informal processes or mechanisms, essential to manage strategic objectives as well as allowing for improvement and organizational learning. Traditionally, such systems have been used for operational controlling and financial reporting purposes (Kuwaiti, 2004) however it has developed significantly throughout history.

Bititci et al. (2012) review the historical evolution of the performance measurement field from productivity management and budget control, to integrated performance measurement and management. Traditionally, performance measurement systems have encompassed financial- or productivity-oriented metrics solely (Goshu & Kitaw, 2017). Yet, Bititci et al. (2012) conclude an ongoing shift within the field moving from rational control towards an increasingly cultural control and learning process. Thereby also acknowledging previous criticism that performance measurement systems enforce controlling and limiting structures upon the organizational culture, potentially leading to weakened overall performance (Bititci et al., 2006; Bititci et al., 2012). The perceived success of any performance measurement system is ultimately determined by the question of how to measure, which in turn requires the creation of metrics that "*accurately reflect the performance of the processes and its people; are easily (and transparently) translated into business processes for implementation; and are dynamically maintained and revised in response to today's ever-changing business environments*" (Paranjape et al., 2006. p.9). Thus, taking this perspective, performance measurement systems are to be considered dynamic, evolving alongside with the business. Moreover, combining above definitions, the performance to measure can be of both internal and external character for the company.

Performance is often reflected through metrics. A metric is based on data, and represents what is measured to then be managed (Bladt & Filbin, 2013). Increasingly, in contemporary settings, financial metrics are combined with non-financial, in models such as the Balanced Scorecard or by multi-criteria key performance indicators (Franco-Santos et al., 2012; Cheng et al., 2007). The Balanced Scorecard was first introduced by Kaplan and Norton (1992) as a means of combining multiple financial and non-financial metrics, as well as including both lagging and leading metrics, thus a combination of forward-looking metrics and metrics of actual output. For innovation, a combination of several metrics is of particular interest since a single metric could not possibly capture all the dimensions nor complexity of the innovation process (Gama et al., 2007). Franco-Santos et al. (2012) argue that contemporary performance measurement systems are vehicles to translate strategic aims into operational actions, and that the key requirement for a performance measurement system to be included in the definition is the combination of financial and non-financial metrics. Burgess et al. (2007) have found contemporary performance measurement systems to be more likely implemented in larger companies than in small and medium sized companies, due to their resource strength and innovativeness. According to Franco-Santos et al. (2012, p.99), contemporary performance measurement systems "*affect communication processes by requiring and providing relevant information that influence how people think, act, and interact*" which in turn affects performance. Thus, it also incorporates an extent of circularity in the process of measuring.

The field of contemporary performance measurement encompasses a balanced approach of performance measurement tightly integrated with the strategy (Goshu & Kitaw, 2017). Therefore, a scorecard may not only be applicable for measuring the performance of innovation projects, but also to ensure that these projects are aligned with the company's overall goals and

direction (Gama et al., 2007). In all, the approach of balance among several dimensions of metrics is recommended by literature for innovation performance measurement, to reach a weighted combination of various metrics for optimal evaluation. While contemporary performance measurement has gained attention over the last years, Bourne et al. (2003) include the multidimensionality of combining financial and non-financial metrics in their definition of performance measurement, indicating that contemporary performance measurement should not be separated from the field of performance measurement but rather be seen as a synonym or a sub-category within it. This is also the approach taken in this study, however from the dimensions of innovation and more specifically, innovation projects.

2.2.1 Innovation performance measurement

Within the research field of innovation, performance measurement has been studied at various levels, such as organizational, portfolio and project levels (Schentler et al., 2010; Adams et al., 2006). Dewangan and Godse (2014) place it in the intersection of the performance measurement literature and the literature of innovation management. In fact, innovation management can be considered as dependent on metrics due to multiple reasons. According to Gama et al. (2007) metrics are required to guide investment decisions, emphasize value created, recognize employees, implement strategies and report progress. Explicitly, the right metrics can provide a data-driven ground for investments, optimized evaluation and steer behaviour across the company through the communication of it (Gama et al., 2007). Frishammar and Björk (2019) state that innovation performance measurement is necessary to be able to plan and prioritize, follow-up and evaluate, and to learn and discover potential opportunities. In line with this, Nagji and Tuff (2012) suggest that measurement is critical to inform management about ongoing activities. The establishment of a systematic process for innovation measurement is a vital success factor to allow for innovation to occur, and in turn for value to be created (Frishammar & Björk, 2019). It also needs to be driven by the overall innovation strategy of the company, which can be simplified into the questions of how innovations should create value and what type of innovations that would be needed to enable that (ibid). In total, there is a significant need for performance measurement in order to spur innovation processes in a company.

Within innovation performance measurement, Adams et al. (2006) present project management as one of the most important areas, together with knowledge management, strategy, structure and organization (Alfaro-García et al., 2017). Simultaneously, Schentler et al. (2010) highlight the interlinkage between innovation performance measurement on a company level, multi-project level and single-project level, and state that all three levels must be managed to fully understand innovation actions and related results. Thus, projects should not be managed nor measured completely separate. From a bottom-up perspective, aggregated performance measurements from projects are feeded into the portfolio, which in turn is feeded up to the company level of innovation management (Schentler et al., 2010). Consequently, although the project level is the level of analysis of this report, its interlinkage needs to be acknowledged as it is not, nor should be, managed in isolation.

From the holistic perspective of this study, measuring performance is tightly related to evaluation of both past and future potential performance. Hence, as previously clarified in section 1.6, measuring and evaluating is used synonymously. The evaluation of projects is described by Goffin and Mitchell (2017) to be especially important when deciding whether to proceed with a project or not, which in practice happens continuously as projects develop. Here, the authors distinguish between financial and non-financial evaluation methods where financial methods are most commonly used. These refer to metrics such as estimated value or profit through financial models as for example net present value (NPV), including parameters such as payback time or breakeven. However, due to the uncertain nature of innovation projects, especially in early phases, these are sometimes not reliable and need to be complemented with a multi-criteria approach, such as the previously mentioned Balanced Scorecard or a checklist scoring tool. The latter refers to scoring the project towards a set of factors that are considered critical for the progress of the specific project, dependent on company-specific or other contextual factors (ibid). In a similar manner, Frishammar and Björk (2019) suggests a sufficient overall metric to be that of estimated goal accomplishment at any certain point in time. The process of targeting multiple assumptions to determine whether a project has succeeded or not is also mentioned by Christensen et al. (2008) as a discovery-driven approach, originally presented by McGrath and MacMillan (1995). Investment decisions are based on tested assumptions, validating the specified success factors. However, one crucial part of such a process to hold true is that it is continuously tested and evaluated to accumulate learnings and establish new assumptions ongoingly (Christensen et al., 2008). Hence, to be able to adapt the measuring to contextual factors, a dynamic process needs to be established, supporting the uncertainty in those projects and iterating metrics as the process unfolds.

2.2.2 Different characteristics of metrics

For contemporary, balancing, methods for measurement, different characteristics of metrics are often combined. Birchall et al. (2004) suggest that metrics should be designed according to six criteria. It should capture vital aspects of the project or process, be straightforward and clear to involved stakeholders, be based on accessible and easily-understood data, be fully comprehended as to strengths and weaknesses, easily evaluated and provide ground for action (ibid). Consequently, metrics need to be manageable in order to be of any value for the user. Here, Bladt and Filbin (2013) distinguish between vanity metrics, which present great numbers but do not necessarily contribute to business value, and meaningful metrics, where you easily can prove the enhanced value from business activities.

The literature also distinguishes between quantitative and qualitative metrics where both have their advantages and disadvantages (Henttonen et al., 2016). Quantitative metrics often center around numerical captures of output, in terms of for example financial standards or technical procedures. According to Henttonen et al. (2016), quantitative metrics are relatively facile to use, time-efficient and fairly cheap, however may be hard to interpret or understand, sometimes leading to misinterpretation or misuse. Qualitative metrics, contrastingly, usually center around

effectiveness in terms of human performance and rely on opinions of selected individuals. However, qualitative metrics may be biased by those individual opinions sometimes resulting in incorrect estimations (ibid.).

In addition to that of qualitative versus quantitative, another distinction of metrics made by both Henttonen et al. (2016) and Frishammar and Björk (2019) is related to time. In early stages of a project, indicative metrics are most commonly used while in later stages actual output can be measured more sufficiently (Henttonen et al., 2016). In a similar manner, Frishammar and Björk (2019) group metrics into input metrics, throughput metrics and output metrics, presented in Figure 3.

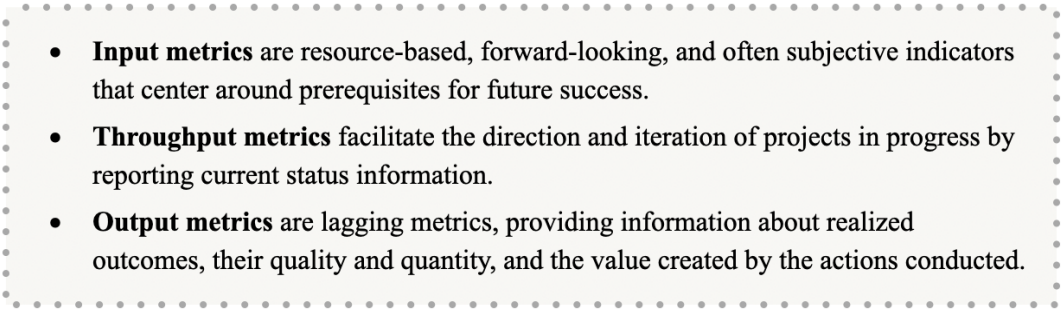

Figure 3 - Time-related distinction of metrics (Frishammar & Björk, 2019)

Although input metrics are specifically necessary for the early stages, in deciding what project to pursue or not, the inclusion of leading indicators is essential throughout the entire project cycle (Frishammar & Björk, 2019). According to Henttonen et al. (2016), input metrics, indicative by nature, are mostly qualitative due to its need for estimations to be conducted. In contrast, output metrics are often quantitative, in that it more easily can be captured numerically (ibid). Cordero (1990) further separates between leading, estimating indicators, and lagging, recording metrics, and emphasizes the importance of including both in the later phases of innovative projects. However, one metric can not necessarily be both estimated and recorded at once which is why a complementary approach for performance evaluation must be formally and systematically conducted (ibid).

2.3 Metrics applied for innovation project management

The concept of performance has been found to be multidimensional (Molina-Castillo & Munuera-Alemán, 2009), implying that the measuring of it is too. Previous studies suggest that there are numerous metrics across different categories of performance that companies apply to project management (Adams et al., 2006; Molina-Castillo & Munuera-Alemán, 2009). In section 2.2.2, different characteristics of metrics were presented, however metrics can also be categorized according to the type of performance they are supposed to reflect. This will be presented throughout the upcoming sections.

In terms of applied metrics for innovation management and measurement, one of the most cited and comprehensive theoretical contributions is by Adams et al. (2006). The framework presented by the authors divides measurement into seven different perspectives: inputs, knowledge management, innovation strategy, organization and culture, portfolio management, project management, and commercialization. For the sake of this study, the focus is on the area of project management, however as stated by Adams et al. (2006) it should ultimately be integrated to the other perspectives. For example, it is suggested that the perspectives presented in the framework can be combined into a Balanced Scorecard for innovation as the multi-dimensional approach has been found to better capture the whole innovation process compared to one-dimensional approaches. However, still, each perspective needs to be carefully considered. From the project management perspective, as the perspective of this study, Adams et al. (2006) define four main dimensions as the most important components of innovation project management. These areas provide the foundation for the following sections on metrics used for innovation project management. The project management areas are presented in Figure 4 together with their related identified metrics throughout the upcoming sections 2.3.1 to 2.3.5.

Project Management area	Definition	Categories of metrics
Project efficiency	Doing the project ”right” (Schentler et al., 2010)	Financial, time and quality metrics
Collaboration	Active involvement of internal and external stakeholders (Dewangan & Godse, 2014)	Customer metrics, supplier metrics, internal stakeholder metrics
Communication	Exchange of information and knowledge (Cormican & O’sullivan, 2004)	Internal and external communication metrics, learning metrics
Tools & Techniques	Formal processes and instruments to manage projects (Adams et al., 2006)	Process metrics, tool-specific metrics
Other areas	Not defined by in the categorization of Adams et al. (2006) but discussed in other literature contributions	Risk, Patents

Figure 4 - Project Management areas suggested by Adams et al. (2006) and identified categories of metrics

2.3.1 Project efficiency metrics

The first category of metrics is project efficiency metrics. Lerch and Spieth (2012) emphasize the significance of the linkages between innovation, efficiency and business performance, from a project management perspective. Accordingly, managing efficiency increases the business performance of a company. It is argued by Schentler et al. (2010) that most metrics used in practice are efficiency-oriented, determining whether the projects are carried out in the right way or not. Historically, efficiency has been captured by the components of cost, time and quality (Elmquist & Pascal Le Masson, 2009), but increasingly the concept of quality has evolved from solely technical to becoming more customer-centric (Icmeli et al., 2001). Hence, efficiency metrics ensure that projects are managed optimally and efficiently from several perspectives.

On the quantitative side, efficiency metrics include for example actual-to-budget analyses, such as capturing costs, duration or estimated revenue of a project (Adams et al., 2006; Schentler et al., 2010). In addition, profit from new products and sales of new products has been found to be top priority when looking at efficiency metrics (Markham & Lee, 2013), indicating a quantitative focus among practitioners. Several authors argue that in addition to these quantitative metrics, qualitative metrics are also needed. An example of such metric is innovation speed, influencing both quality and customer satisfaction (Adams et al., 2006), as well as improvement of knowledge, organizational learning and alignment with overall strategy (Schentler et al., 2010). Another qualitative dimension is technical quality which can be captured by metrics that assess conformance to specifications or received quality awards (Icmeli et al., 2001).

2.3.1.1 Time-related metrics

For time-related metrics, Henttonen et al. (2016) conclude development time or time to market as the most commonly used for product innovation, whereas hours of training and breakeven time are among the most commonly used for process innovation. Time to market, or R&D efficiency, can be linked to the internal process perspective in the Balanced Scorecard together with profitability and development cost of the project (Bremser & Barsky, 2004). It can also relate to time to first prototype or concept, or full time from idea to finish, from a lagging perspective (Frishammar & Björk, 2019). The number of prototypes may also be of interest in some projects. Other metrics that can be evaluated as throughput are time spent in relation to the estimated length of the project or time standing still in relation to total estimated time (ibid).

Another efficiency metric presented by Richtnér et al. (2017) and Frishammar and Björk (2019) is that of slack. Slack is defined as the available resources for a predetermined output, where a high level of slack often results in lower costs and less risk for bottlenecks (Richtnér et al., 2017). It can also refer to time available (Agrawal et al., 2019). Slack is categorized both as an input metric and throughput metric that acts as a buffer toward unpredicted events (Frishammar & Björk, 2019), protecting the efficiency of the project from a resource perspective. In order to measure slack-based efficiency, Tone (2001) suggests metrics that directly evaluate excess of input resources and shortcomings of output.

2.3.1.2. Financial metrics

Financial-based performance metrics evaluate performance on the basis of financial success and include for example profit and return on investment, ROI (Molina-Castillo & Munuera-Alemàn, 2009). Moreover, Frishammar & Björk (2019) define estimated profitability as an input metric which continuously evolves to estimated time to profitability and finally the monetary value created as the result from the project. While there are several efficiency-related metrics to choose among, the findings of Markham and Lee (2013) suggest that financial metrics are the most frequently used in the best performing companies within innovation. Additionally, the determination of project success relies predominantly on subjective assumptions until financial information is accessible (Henttonen et al., 2016), further

strengthening its implications. The subjectiveness does however put a great responsibility on the person evaluating the metrics and it may sometimes vary between the perceptions of project managers and team leaders. On the other hand, a sole efficiency focus could restrict the innovation potential of more radical projects due to its uncertainty in estimates and frequent change of course (Nagji & Tuff, 2012). Moreover, for longer term projects and in large companies specifically with a larger portfolio of projects and often fewer cost restraints, financial metrics are less highlighted in the study conducted by Henttonen et al. (2016). This indicates that financial metrics are more often deployed for short-term aimed projects and where resources are somewhat restrained. Still, occured costs versus budget or simply occured costs may be an important metric for following up on the value created (Frishammar & Björk, 2019), and thereby evaluate for future improvements in project management.

2.3.1.3 Identified project efficiency metrics from literature

As a synthesis of the previous section about measuring project efficiency performance, examples of metrics suggested are presented below in Figure 5.

Project efficiency metrics	Input	Throughput	Output
Quantitative	N/A	• Project costs • Project duration • Estimated revenue • Time to market • Number of prototypes • Time spent • Idle time	• Project costs (& vs budget) • Project duration • Profit from new products • Time to market • Profit/ROI
Qualitative	• Estimated costs • Estimated duration • Estimated revenue • Slack/resources available • Estimated profitability • Conformance to quality specifications	• Innovation speed • Estimated costs • Estimated duration • Estimated revenue • Slack/resources available • Estimated profitability • Conformance to quality specifications	• Innovation speed • Conformance to quality specifications • Received quality awards

Sub categories
- Financial metrics
- Time metrics
- Quality metrics

Figure 5 - Identified project efficiency metrics from literature

2.3.2 Collaboration metrics

Increasingly, companies are collaborating within and across company borders to gain competitive advantages (Chesbrough, 2003) and collaboration has been found to have the ability to significantly impact the innovation process (Adams et al., 2006; Alfaro-García et al., 2017; Schentler et al., 2010). Thus, it is a noteworthy concern of the innovation project management process, requiring adequate metrics for management. It is argued by Dewangan and Godse (2014) that in an innovation performance measurement scheme, organizational stakeholder goals and perceptions must be addressed. This includes both internal stakeholders such as employees, as well as external stakeholders such as suppliers and customers. Studies have found that customers and internal management are the most influential to project success (Henttonen et al., 2016), motivating indicators to track the cooperation with these stakeholders.

For example, among the preferred metrics of the study from Henttonen et al. (2016), were those of customer satisfaction, time to market, or multifunctional cooperation, validating the above statement. However, customer metrics can also be complex to directly link to profitability in terms of how and to what degree it impacts bottom line performance (Peterson et al., 2018). Hence, investments based on these metrics solely can be hard to justify in certain situations. On the other hand, several authors argue that the customer nevertheless plays a central role for innovation (Henttonen et al., 2016; Adams et al., 2006; Richtnér et al., 2017). Additionally, Dewangan and Godse (2014) argue that collaboration is especially important for innovation projects compared to regular projects as the outcomes are much more uncertain. From an input perspective, the key is to find the degree to which there is an ability for interaction between fundamental actors involved in the project (Frishammar & Björk, 2019). For example, the number of customers involved or the degree to which the project is connected with required external suppliers or partners (ibid).

In many companies, customer-based metrics have shown to be among the most popular out of all potential metrics (Henttonen et al., 2016). Although efficiency can be achieved in terms of costs or time, that is no guarantee for market success due to the significant role of the customer (Shenhar et al., 1997). Moreover, the quality of any new product can be defined as the "*degree to which it satisfies customer requirements*" (Adams et al., 2006. p.36) including continuous adjustments to emerging demands and involving the customer throughout the process (Icmeli et al., 2001). Therefore, the relationship with the customer or end user is critical to continuously evaluate and improve within projects. Companies should undertake metrics that improve the customer-centricity of their projects (Richtnér et al., 2017).

It is also noted by several authors that customer feedback should be incorporated as a metric for evaluating innovation performance (Richtnér et al., 2017; Molina-Castillo & Munuera-Alemàn, 2009), thus highlighting the importance of having a good collaboration with them. Examples given of metrics are time and frequency of customer interaction (Richtnér et al., 2017) or customer tests prior to launch (Frishammar & Björk, 2019), as well as performance in terms of impact on customer behavior (Molina-Castillo & Munuera-Alemàn, 2009). Furthermore, the embeddedness of the recipient, most often the customer, may play a vital role for the continued success of a project (Frishammar & Björk, 2019). Finally, the degree to which customer expectations were met, through metrics that capture customer satisfaction is a way to measure ex post performance from a customer perspective (ibid).

2.3.2.1 Identified collaboration metrics from literature

As a synthesis of the previous section about measuring collaboration, examples of metrics suggested are presented below in Figure 6.

Collaboration metrics	Input	Throughput	Output
Quantitative	N/A	• Number of customers involved • Time of customer interaction • Frequency of customer interaction • Customer tests	• Number of customers involved • Time of customer interaction • Frequency of customer interaction
Qualitative	• Ability to interact with internal and external stakeholders • Estimated number of customers involved • Estimated test results	• Customer satisfaction • Degree connected to external partners • Customer feedback	• Customer satisfaction • Multifunctional cooperation • Customer feedback • Impact on customer behaviour • Recipient embeddedness

Sub categories
- Customer metrics
- Internal metrics
- Supplier metrics

Figure 6 - Identified collaboration metrics from literature

2.3.3 Communication metrics

Communication is critical for alignment and mutual understanding between the stakeholders involved in a project (Cormican & O'Sullivan, 2004). Although the literature is scarce on the measurement of such processes, some contributors can be found. According to Damanpour (1991), internal communication enhances innovation project performance and can be measured through elements of integrations, such as number of meetings and internal contacts, which are quantitative in nature, or the degree of employee involvement and participation in the project, which are of more qualitative nature. Likewise corresponding indicators of external communication may be applied (Adams et al., 2006), for example communicative interactions with suppliers or the external environment (Cormican & O'Sullivan, 2004). Frishammar and Björk (2019) suggest measuring time between questions and answers regarding the project as an indicator of the continuous communication, which may be applicable both internally and externally. Cormican & O'Sullivan (2004) suggest other potential measurement areas within the field of communication to be the degree to which analyses of user needs, generated ideas, occurred problems and ongoing status of the project are both within reach and/or strategically communicated. Here, they recommend the usage of subjective assessments through a scorecard based on best practices to determine the perceived maturity of for example the communication related to the innovation.

Cormican and O'Sullivan (2004) link communication to knowledge and learning. Many companies struggle with knowledge and information transfer due to weak communication (ibid). Here, one perspective for measurement brought up by Frishammar and Björk (2019) is that of how much knowledge that has been created through the project, meaning the value of assimilated learnings. As previously mentioned, knowledge and feedback of learnings is a vital part of project management and at the very core of measuring. Thus, the learning metrics explain the overall learnings from the project and its measurement so far. This relates both to the competencies gained during the project as well as identified gaps of knowledge regarding what is yet to be learned (Elmquist & Le Masson, 2009). Nonetheless, measuring knowledge

is complicated due to its inherent attributes such as being tacit, subjective and embedded in organizations (Mitchell & Boyle, 2010). Therefore, such metrics are typically based on internal or external assessments with subjective categorizations and reflections of for example the outputs and its implications for knowledge creation (ibid).

2.3.3.1 Identified communication metrics from literature

As a synthesis of the previous section about measuring communication, examples of metrics suggested are presented below in Figure 7.

Communication metrics	Input	Throughput	Output
Quantitative	N/A	• Number of meetings • Number of internal contacts • Communicative interactions with external environment • Time between questions and answers	• Number of meetings • Number of internal contacts • Communicative interactions with external environment • Time between questions and answers • Communicated ideas
Qualitative	• Estimated degree of employee involvement • Estimated project participation • Estimated user needs • Planned communicative interactions • Previous learnings	• Degree of employee involvement • Project participation • Analysis of user needs • Ongoing learnings	• Degree of employee involvement • Project participation • Communicated/available analysis of user needs • Communicated/available information of occurred problems • Assimilated learnings • Identified gaps of knowledge • Assessment of knowledge output & implications

Sub categories
- Internal comm. metrics
- External comm. metrics
- Learning metrics

Figure 7 - Identified communication metrics from literature

2.3.4 Tools and techniques for project management

2.3.4.1 Project process models

Adams et al. (2006) emphasize vitality of implementation of formal processes for innovation projects to be efficient. Such processes include tools and techniques for managing innovation projects, and the evaluation of these tools can be seen as a metric of innovation performance. Historically, the stage-gate model has been the most established and used project management technique (Adams et al., 2006). This approach includes a sequence of steps carried out where one step has to be completed before the next one is started (Crockell, 2012). After each stage, there is a gate where a set of deliverables has to be fulfilled for the project to continue to the next stage (Cooper, 1990). Cooper and Sommer (2016) define stage-gate as a top-down model focusing on both doing the right projects, and doing the projects right.

One of the big criticisms brought forth against the stage-gate model is that it is inflexible and does not allow for adaptations, which is seen as necessary in today's business environment (Crockell, 2012; Cooper, 2014). As an answer, models focusing on agility have emerged and

having an agile process has become more and more popular. The approach stems from the software industry and focuses on iterative development where the customers have an important part of the development, and where prototypes are frequently tested (Barlow et al., 2011). The focus is on business needs of the project and tries to remove non-value-adding activities (Crockell, 2012). In contrast to the stage-gate model, agile project management brings adaptability, agility and speed to development projects (Cooper & Sommer, 2016) however it needs to be adapted to each case (Cooper, 2014). The need for adaptation of the agile process has led to the development of an agile-stage-gate hybrid model, combining the traditional stage-gate model with agile development methods (Cooper & Sommer, 2016; Salvato & Laplume, 2020). Combining the two enables incorporating the most valuable parts from both of them. While the agile approach gives faster results and is more efficient, the stage-gate model provides structure and coordination with other parts of the company (Cooper & Sommer, 2016). At the same time, empirical findings also show that the need for dedicated resources and frequent product demonstrations negatively impacts the efficiency of project resource usage (Salvato & Laplume, 2020).

2.3.4.2 Measuring the process

According to Adams et al. (2006), project process evaluations can be used to measure the use of tools and techniques like those presented above. In addition, more specific metrics can be incorporated to measure usage of certain tools and systems appropriate for the company (Adams et al., 2006; Chiesa et al., 1996). For technological companies, metrics regarding usage and access to software programs is among the mentioned examples of metrics (Chiesa et al., 1996; Adams et al., 2006). Other tools may relate to analyses of trends and milestones, project status reporting or target costing (Schentler et al., 2010). The metrics used for evaluating tools and techniques, both for the project management and for more specific areas, should relate both to measuring whether the techniques and tools are appropriate for the activities taking place, as well as the degree to which they are actually being used (Chiesa et al., 1996).

2.3.4.3 Identified tools and technique metrics from literature

As a synthesis of the previous section about tools and techniques metrics, examples of metrics suggested are presented below in Figure 8.

Tools & Techniques metrics	Input	Throughput	Output
Quantitative	N/A	No examples suggested	No examples suggested
Qualitative	No examples suggested	• Project process evaluation • Project status • Usage/access to tools • Milestone analysis	• Project process evaluation • Usage/access to tools

Sub categories
- Process metrics
- Tool-specific metrics

Figure 8 - Identified tools and technique metrics from literature

2.3.5 Other metrics: Risk management & Patents

Besides the categories defined by Adams et al. (2006), other metrics have also been brought up by the literature. Two of these will be briefly presented below to increase the comprehension of the topic.

2.3.5.1 Measuring risk

Several authors bring up risk and uncertainty as an area necessary to assess in order to improve chances of project success (Al-Shaaby & Ahmed, 2018; Goffin & Mitchell, 2017; Frishammar & Björk, 2019). To enable sufficient project analyses, there must be a mutual understanding of the risk impacting the project among the involved participants (Goffin & Mitchell, 2017). Metrics related to risk mainly relate to the throughput, being evaluated ongoingly, and can be such as the current level of risk, the degree to which the level of risk has lowered, and how much risk that still is present (Frishammar & Björk, 2019). Additionally, according to Goffin and Mitchell (2017), as a variety of possible outcomes is inherent within the uncertainty of innovation projects, the possible range of outcomes must be acknowledged when assessing the potential value. If not included when designing measurement practices, radical projects with higher uncertainty may be abandoned despite great potential value (ibid).

2.5.5.2. Patents

Patenting is an output metric that can be measured through the number of patents applied for or the number of patents approved within the project (Frishammar & Björk, 2019; Goffin & Mitchell, 2017). Patenting indicates technological capabilities built or acquired, however solely looking at counts may overlook the significance of some patents over others (Dunning & Lundan, 2008). Furthermore, the use of patenting varies across industries and companies (ibid), implying that such a metric may not be suitable for all projects. It should also be noted that patents indicate inventions rather than innovations, implying that no concern is taken to the commercialization or reduction to market (Goffin & Mitchell, 2017).

2.5.5.3 Identified other metrics from literature

As a synthesis of the previous section about other identified metrics, examples of metrics suggested are presented below in Figure 9.

Other metrics	Input	Throughput	Output
Quantitative	N/A	• Patents applied so far • Patens approved so far	• Patents applied • Patens approved
Qualitative	• Future risk level • Potential range of outcomes	• Current risk level • Future risk level • Degree to which risk has lowered • Potential range of outcomes	• Degree to which risk has lowered

Sub categories
- Risk
- Patents

Figure 9 - Identified other metrics from literature

2.4 Challenges with innovation project performance measurement

2.4.1 Novelty and lack of consensus

One of the fundamental difficulties with measuring innovation projects lies in the fact that there is no single established definition of what innovation includes (Schentler et al., 2010; Adams et al., 2006). Without a clear definition, disagreements on what can and should be measured can easily appear, as well as how it should be done (Birchall et al., 2011). At the same time, measurement requires some level of quantitative comparability between entities, but as novelty is the core of innovation, this can make measuring difficult, and sometimes even impossible (Smith, 2005). Thus, for innovation, value creation could occur where one does not expect it (Elmquist & Le Masson, 2009). The lack of sufficient knowledge in practice may steer companies towards wasteful methods with little value to their innovation management processes (Adams et al., 2006). For example, the implementation of metrics with opposite nature may create conflicts of goals that suboptimize the projects, and if the data generated is of low quality, so will the actions based on it be (Frishammar & Björk, 2019). Thus, one must have a clear understanding of the purpose of each metric, be aware of the data dependency and make sure that the metric is fully understood among the people involved.

Other practical issues of measuring refer to inadequate insights in how to combine resources of both tangible and intangible nature (Nilsson et al., 2012), as well as challenges related to transformation of internal processes to better capture the intangible aspects of innovation (Smith, 2005). While measurement is found important, it is also important to not measure too much or try to quantify items that are not quantifiable, since that would affect the possibilities for decision-making based on the findings negatively (Birchall et al., 2011). To measure too much or the wrong things require both time and resources from the company (Frishammar & Björk, 2019). Furthermore, Lauras et al., (2010) argue that the abundance of indicators connected to managing complex projects, such as innovation projects, may confuse the managerial focus and thereby weaken the control. Instead, a general rule of thumb presented by Frishammar and Björk (2019) is to keep the number of metrics low, with a total maximum of 15-20 indicators.

In line with above, Richtnér et al. (2017) present three common managerial pitfalls in measuring innovation efforts. First, the over- or underestimation of what significance the measurement can have. Either managers measure too much in their belief that everything that is measurable is manageable, or they do not do it at all in the belief of it restricting creativity. Both are extremes that lead to poor management. The second pitfall is to focus too narrowly when measuring, focusing on parts rather than holistically, which complicates resource allocation and disrupts the innovation process through creation of bottlenecks. Third, sometimes managers do not take any consideration to the internal politics related to measuring innovation. For example, the way innovation measurement is designed in a company may be influenced by current reward structures or organizational resistance of change. Therefore, it is

easy to become trapped in reinforcing patterns resulting in a static measurement system. In contrast, companies need to continuously revise and update the measurement system to stay accurate and relevant. First after being aware of these pitfalls, a manager can assess and improve the way of measuring the innovation projects. (Richtnér et al., 2017)

2.4.2. Limitations of the predominant financial metrics

Another key challenge for innovation project performance measurement is the historical domination of financial metrics, influencing current systems. According to Christensen et al. (2008), current project management practices are strongly influenced by traditional financial models and tools for estimation, such as net present value (NPV), discounted cash flow (DCF) or return on investment (ROI). However, such metrics may restrict or even shut down more radical initiatives, since a great degree of assumptions are needed for critical variables where input is yet not possible to obtain due to its novelty (Nagji & Tuff, 2012). For projects closer to core, such information is easier to access. Hence, traditional financial metrics do not favor innovation projects with high uncertainty (Christensen et al., 2008). However, innovation is necessary for a company to stay competitive, and hence one cannot compare against continuing as before. Instead, not making investments is more likely to, in the long run, decrease the company's competitiveness (Christensen et al., 2008). Furthermore, market outcome metrics, such as profit or margin, often favor short-term results over long-term, which may lead to myopia in projects (Hauser & Zettelmeyer, 1997). Consequently, managing solely by outcomes comes with an inherent risk of creating incentives for managers to manipulate numbers to ensure that their project is continued or gets attention (Likierman, 2009).

Richtnér et al. (2017) argue that in some cases, companies may be reluctant to implement qualitative metrics alongside their quantitative ones, leading to measurement efforts failing to deliver desired outcomes. Financial constraints also increase the likelihood of abandoning projects and failure (García-Quevedo et al., 2018). Moreover, the lag in time between action and outcome for innovation projects make lagging financial metrics less suitable for corrective action, due to the information being available too late. In addition, there may be issues in determining how much of the outcome that can or should be linked to the project per se (Kerssens-van Drongelen et al., 2000). While several downsides have been presented above, financial indicators are mission critical to ensure short-term satisfactory results (Gama et al., 2007) and can also include a safety aspect in being well-recognized and understood throughout the organization (Rae, 2006). Furthermore, the way financial metrics are used, perceived and comprehended in the organization affect its impact on innovation, as they could be used for both diagnostic and interactive purposes, either to eliminate deviations or to encourage dialogue (Brattström et al., 2018; Simons, 1994). Both these have separate implications for management and innovation.

2.4.3. Diversity of innovation projects

The diversity of innovation projects is, as mentioned, a challenge if trying to create a single set of metrics to evaluate them. Nilsson et al. (2012) discusses that one setting when this becomes evident is when trying to pursue both incremental and radical innovation projects at once. According to Nagji and Tuff (2012) the two ends of the spectrum require opposite metrics. For example, while traditional financial metrics are suggested to be highly sufficient for incremental activities, exploring activities require non-financial and internal metrics to improve the potential for discovering and learning (ibid). The latter could therefore not be put under the same pressure for future earnings as the former, especially not in early phases where information is even more limited. Moreover, increasingly many companies strive towards organizational ambidexterity, implying a simultaneous focus on exploitation through incremental innovation and exploration through radical innovation (O'Reilly & Tushman, 2004; Nagji & Tuff, 2012). Thus, it is critical to be aware of the differences in management and measurement for the both innovation types. According to Schentler et al. (2010), planning, controlling and measurement of innovation projects become harder the more radical the innovations are. Hence, there is a need to develop not one set of metrics, but several different for different projects and, in addition, a need to understand which metrics are suitable for each project.

A final aspect brought up by Likierman (2009) is that even if companies do measure, they most likely compare the results to a predefined plan or budget, hence only comparing with their own company. To capture the performance of an innovation or innovation project, the metrics have to be benchmarked against other companies but that is very difficult to do in real-time (Likierman, 2009). In addition, benchmarking requires that projects are comparable and that the same metrics are used, both pointed out as challenging within the field (Smith, 2005; Adams et al., 2006).

2.5 Synthesis of theory

Throughout the literature section, a number of metrics have been presented together with the implications and challenges of measuring innovation project performance. A synthesis of the suggested metrics are summarized in Figure 10, where it is placed on the project level as the level of analysis in this report, however interlinked to the context of the portfolio and strategic level. The synthesis is based on the combined findings from section 2.3, with implications from the brought up opportunities and challenges of measurement in an innovation project management context. It should however be noted that the suggested metrics provided in the figure are examples discovered in researched literature and thus it should not be viewed as comprehensive nor exclusive in terms of empirics or practice. Further, since quantitative metrics have been described to include a degree of output, input metrics are kept empty for that category.

Innovation strategy (company level)

Innovation portfolio (multi-project level)

Innovation project (single-project level)	**Input**		**Throughput**		**Output**	
Category of metrics	*Quantitative*	*Qualitative*	*Quantitative*	*Qualitative*	*Quantitative*	*Qualitative*
Project efficiency	N/A	• Estimated costs • Estimated duration • Estimated revenue • Slack/resources available • Estimated profitability • Conformance to quality specifications	• Project costs • Project duration • Estimated revenue • Time to market • Number of prototypes • Time spent • Idle time	• Innovation speed • Estimated costs • Estimated duration • Estimated revenue • Slack/resources available • Estimated profitability • Conformance to quality specifications	• Project costs (& vs budget) • Project duration • Profit from new products • Time to market • Profit/ROI	• Innovation speed • Conformance to quality specifications • Received quality awards
Collaboration	N/A	• Ability to interact with internal and external stakeholders • Estimated number of customers involved • Estimated test results	• Number of customers involved • Time of customer interaction • Frequency of customer interaction • Customer tests	• Customer satisfaction • Degree connected to external partners • Customer feedback	• Number of customers involved • Time of customer interaction • Frequency of customer interaction	• Customer satisfaction • Multifunctional cooperation • Customer feedback • Impact on customer behaviour • Recipient embeddedness
Communication	N/A	• Estimated degree of employee involvement • Estimated project participation • Estimated user needs • Planned communicative interactions • Previous learnings	• Number of meetings • Number of internal contacts • Communicative interactions with external environment • Time between questions and answers	• Degree of employee involvement • Project participation • Analysis of user needs • Ongoing learnings	• Number of meetings • Number of internal contacts • Communicative interactions with external environment • Time between questions and answers • Communicated ideas	• Degree of employee involvement • Project participation • Communicated/available analysis of user needs • Communicated/available information of occurred problems • Assimilated learnings • Identified gap of knowledge • Assessment of knowledge output and implications
Tools & Techniques	N/A	No examples suggested	No examples suggested	• Project process evaluation • Project status • Usage/access to tools • Milestone analysis	No examples suggested	• Project process evaluation • Usage/access to tools
Other metrics	N/A	• Future risk level • Potential range of outcomes	• Patents applied so far • Patens approved so far	• Current risk level • Future risk level • Degree to which risk has lowered	• Patents applied • Patens approved	• Degree to which risk has lowered

Figure 10 - Synthesis of theory

While several metrics have been suggested throughout this literature section, it should be noted that selecting the right metrics has proven to be highly subjective to factors such as strategy and ability (Goffin & Mitchell, 2017), as well as size, industry and business (Frishammar & Björk, 2019). Additionally, metrics of innovation projects are in general highly context-dependent (Aase et al., 2018; Bain et al., 2001) and its novelty implies that performance may surpass any predefined metrics (Shapiro, 2006). Consequently, there is no such thing as the perfect metric for all projects. The challenge lies in designing a framework of combined metrics guided by the needs of the organization (Schentler et al., 2010). In turn, such needs must be defined by strategic objectives, purpose and priorities rather than looking solely at best practices or easily available metrics (Frishammar & Björk, 2019). Additionally, identical metrics cannot be used for all projects throughout the organization, as that would both weaken alignment to strategy and restrict the potential of optimizing the value obtained from the project (Gama et al., 2007). This, since different projects have various purposes (Frishammar & Björk, 2019).

To manage the variety of metrics for innovation projects, Mankin (2007) recommends dashboards or scorecards containing multiple metrics as managerial tools to provide real-time information of ongoing projects from several perspectives. In line with the main idea of the Balanced Scorecard, several authors state that measurement needs to take place at a multi-dimensional level (Dewangan & Godse, 2014; Schentler et al., 2010; Richtnér et al., 2017). This implies that both financial and non-financial metrics need to be included (Dewangan &

Godse, 2014), as well as that all stages of the innovation process needs to be covered and integrated (Schentler et al., 2010). Finally, it is recommended to establish a continuous process for revising the current metrics and comparing results to metrics in order to identify cause-and-effect relationships (Richtnér et al., 2017). In that way, metrics can be optimally selected in close relation to its context and the project-specific requirements, and furthermore selectively adjusted when change is demanded.

3. Methodology

The methodology chapter is to increase the transparency of the study by thoroughly presenting and motivating the chosen research strategy and design. Thereafter, the method for collecting and analyzing the data used is presented. Finally, the quality of the research is discussed.

3.1 Research strategy

As aforementioned in the introduction, there is no universally established definition of innovation. In addition, its link to performance measurement on a project level remains relatively unexplored with significant gaps between literature and practice. Therefore, an explorative approach to the research allowed for an open-minded and flexible perspective towards the topic of study. With the purpose in mind, to explore how innovation project performance can be measured from the perspective of large-sized companies, a qualitative research strategy was considered most suitable to reflect that perspective. Qualitative research strives to produce in-depth insights from words rather than numbers, focusing on how various factors interact in a given context (Bryman & Bell, 2015). Thus, by allowing the participants of the study to express themselves freely and in a subjective manner, a variety of perspectives was combined. This was particularly valuable in the context of this study, since previous studies of innovation performance measurement have found diversity and lack of consensus to be highly present (Smith, 2005; Goffin & Mitchell, 2017, Adams et al., 2006). Furthermore, in order to capture the different perceptions of measuring innovation, the qualitative strategy allowed for a holistic research perspective of the subject (Eriksson & Kovalainen, 2015).

In line with the exploratory approach of the study, the orientation towards theory was primarily inductive, taking its initial starting point in the empirical findings and striving towards generalizing for contributing to present theory (Bryman & Bell, 2015). As the aim of this study was to explore practical views and experiences of different companies in relation to innovation performance measurement, the inductive approach was particularly important to discover not foreseen paths.

Although the qualitative strategy was argued to be most suitable for this research project, there are multiple drawbacks to be aware of. Due to its subjectivity and relative lack of structure compared to quantitative studies, it entails a great degree of reliance on the researcher, which complicates the replicability of the study (Bryman & Bell, 2015). The subjectivity issue of qualitative studies was partially mitigated by increasing the amount of data sources, giving less weight to each source. Another issue is lack of transparency in the process, as it was iterative rather than straightforward and structured (ibid.). This issue was partially mitigated by making the methodology section extensive and detailed, and transcribing all interviews held. However, the mentioned issues are a consequence of the selected strategy and cannot be fully removed.

3.2 Research design

Given (2008) defines research design as *"the way in which a research idea is transformed into a research project or plan that can then be carried out*". It constitutes the underlying logic for the methodology choices for data collection and analysis (Bryman & Bell, 2015). In designing the research process, some research-specific factors needed to be taken into consideration. First, the choice was impacted by the qualitative strategy, in *how* the design was applied (ibid.). In order to explore the topic from several perspectives, where each perspective was considered to add value to the findings, it was desirable to reach individuals from different organizational settings. In this case, the different settings referred to different companies.

The research design of this study can arguably be seen as twofold. It was designed to include the experiences from multiple perspectives during a short period of time, from a holistic perspective rather than narrowing down in each individual context. Due to the above factors, as well as collecting data from several companies at once and reflecting the practical reality, it can be argued to be of cross-sectional design (Mills et al., 2010; Bryman & Bell, 2015). On the contrary, quantification of data and relationships among variables are usually characteristics of such design (Bryman & Bell, 2015) however these are limited due to the qualitative research strategy. Furthermore, it has a relative lack of systematicness compared to quantitative studies where cross-sectional design often takes place (ibid.). Instead, another argued design was a multiple-case study investigating multiple organizational contexts. Such design is beneficial when comparing different cases to find commonalities or deviations from each other (ibid). However, for this study, the total depth of each context was limited by a relatively large number of data sources, in the form of the number of respondents included. Moreover, the respondents representing companies were kept anonymous, explained further in section 3.3.3.1, which limited the ability to thoroughly contextualize each setting. One general guideline put forth by Bryman and Bell (2015, p.72) is that "*with a multiple-case study design, the emphasis is on the individual case; with a cross-sectional design, it is on the sample of cases*". Following this logic, the research design of this study leans more towards cross-sectional design. However, altogether it was rather an iterative process between the two designs throughout the study. Initially, a multiple-case study was considered but as sample size increased the emphasis on each context decreased, resulting in a somewhat mix between multiple-case and cross-sectional design. The mix allowed for greater flexibility throughout the process, however it might have reduced the ability to replicate it.

3.3 Data collection

Throughout the study, both primary and secondary data was collected in two separate procedures depending on type of data. Primary data was collected through semi-structured interviews, further motivated in section 3.3.2, and was included in the empirical findings. Secondary data was collected through a narrative literature review and used to build the theoretical framework of this study. This is further motivated in section 3.3.1. Due to the inductive approach of the research strategy, the secondary data collection was foremost guided

by the primary data. However, as often for inductive approaches (Patel & Davidson, 2018; Eriksson & Kovalainen, 2015), the process iterated somewhat between both throughout the process. Initially, a broad overview of the secondary data was gathered, followed by the collection of primary data, which thereafter navigated the structure of the full literature review. Thus, while the entire data collection process was mainly inductive, the secondary data collection will be outlined here prior to the primary data collection to comply with the actual initiation of the data collection.

3.3.1 Secondary data collection

To establish an initial understanding of the existing literature in the field of innovation performance measurement, a narrative literature review was conducted. In general, narrative reviews are often broader in scope with less restrictions than systematic reviews, particularly beneficial for qualitative studies and inductive reasonings (Bryman & Bell, 2015). This was considered appropriate when studying innovation and measurement due to the relative lack of consensus in research detected already in the formulation of the research questions. The narrative review also allowed for flexibility during the process, matching the iterative process carried out between theory and empirical data. As previously mentioned, the gathering of theory was initiated early in the process to create an understanding of the field before going into the interviews. However, the aim was not to create a framework of theory to test throughout the interviews, but rather to make sure that the researchers had sufficient knowledge within the area to be able to maximize the value captured in the interviews which was supported by the narrative approach (Bell et al., 2018).

In the formulation of the research questions, the main pillars of the relevant existing literature were suggested to revolve around the fields of innovation, project management and performance measurement. Put together, innovation project performance measurement could be considered to appear in the intersection between the three, implying that theory from all the fields would be relevant for the study.

As the approach of this study was inductive it was important to not be too narrow when initiating a literature review (Bell et al., 2018). For example, it was neither possible nor desirable to fully set out inclusion and exclusion criteria beforehand. However, to increase structure and replicability, and thereby the quality of the study (Eriksson & Kovalainen, 2015), some inclusion and exclusion criteria were set out. These criteria are listed in Figure 11 below:

Inclusion criteria	Exclusion criteria
Published books	Literature written in other languages than Swedish or English
Peer reviewed journal articles or published in acknowledged academic journals	Sources that are not about innovation *or* performance measurement *or* project management
Literature concerning R&D measurement	Literature focusing explicitly on SME[1]

Figure 11 - Inclusion and exclusion criteria

In regard to the exclusion of SME[1] literature, the following should be clarified. This study takes the perspective of large companies, which is also where most innovation studies can be assumed to take place due to their structured innovation in comparison to smaller companies. Therefore, literature specifically focused on SMEs were strategically excluded to ensure that the full study would be applicable to large-sized companies. Literature not explicitly focusing on SMEs were assumed to be applicable for the study at hand and hence included.

The process of collecting secondary data was dynamic and performed in two main iterations. An initial theory section was developed prior to the interviews. However, based on the empirical findings the theory was then revisited and adjusted to align with the empirics. The literature was collected through searches in Google Scholar, EBSCO Business Source Premier, as well as University of Gothenburg's "Supersök". Keywords used were *innovation measurement, performance measurement, innovation, R&D performance measurement, project management, metrics* and combinations of these. In addition, the snowball method was frequently used, identifying new relevant articles based on references in other articles.

For each source that was processed, notes were taken in a shared Excel sheet around central themes, origin, conclusions and the implication it potentially could have in answering the research questions. In the second iteration, its link to empirical findings was also accounted for. The gathering of initial notes contributed to an overview of relevant sources and facilitated the further processing of data (Patel & Davidson, 2011). It also provided the possibility to link the different sources to each other prior to the actual creation of the theoretical section. Additionally, it supported the inductive approach, facilitating continuous iteration between theory and empirical results throughout the research process.

3.3.2 Primary data collection: Semi-structured interviews

The primary, empirical, data was collected through qualitative, semi-structured interviews with people in companies working actively with innovation, as well as from people considered experts within the field. Qualitative interviews provide a conversational landscape that allows for the researcher to get insights into other people's perspectives, opinions and experiences

[1] The study takes the perspective of large-sized companies which according to the European Commission Recommendation 2003/361/EC (2003) is a company with more than 250 employees, with a turnover above 50 MEUR and/or with a balance sheet value of more than 43 MEUR. Oppositely, SMEs have less than 250 employees and a turnover below 50 MEUR/or balance sheet value below 43 MEUR.

(Brinkmann & Kvale, 2018). Moreover, through interviewing, data, or knowledge, is created through the interactive conversation between the interviewee and the respondent (Kvale, 2007). In order to understand current practices of measurement and potential challenges, interviewing allowed for such interaction with the people participating in the study, thus providing the primary foundation for analysis.

For the study, interviews were held in a semi-structured manner with a question-based interview guide as a starting point. The reasons for choosing semi-structured interviews were several. First and foremost, the research was based on elaborated research questions rather than just a field of interest which, according to Bell et al. (2018), supports semi-structured interviews. In addition, due to the many perspectives in the sample, comparability between interviews was of high importance for the analysis, further emphasizing semi-structured interviews due to their somewhat degree of structure (ibid.). The exploratory design of the study also made it important to be able to ask follow-up questions if needed during interviews which a semi-structured setup allowed for. Furthermore, the semi-structured interview methodology is suitable in settings with relatively high understanding of concepts and linkages of the research questions (Given, 2008). As the interviews were conducted with professionals within the field of innovation, it was thus considered a suitable approach to move between high-level and detailed examples when necessary.

Before initiating the process of interviewing, two interview guides were formed, which will be further described in the next upcoming sections. Having semi-structured interview guides allowed for the main fields of interest to be covered, however simultaneously leaving room for individual elaborations of each participant (Given, 2008). The questions were developed mainly from the problem discussion, research questions, and only somewhat from the part of literature that had been developed at that point. In line with the inductive approach and since the problem discussion provided an indication that perceptions and practices may vary across practitioners, this was considered the optimal approach to get as much value from the interviews as possible. The questions were foremost open-ended to allow for elaboration and interpretation of each respondent.

3.3.2.1 Company interviews

The main foundation of primary data was provided through interviews with representatives from Swedish companies. These interviews were crucial to enable insights into current practices on the market, as well as their limitations and implications. As previously stated, a separate interview guide was formed for the company interviews. The company-specific interview guide included five main areas of questions which would allow an insight into thoughts and experiences from current practices. The areas included were *background*, *definition and innovation strategy, innovation projects, measuring innovation projects* and *challenges and future opportunities* (for full interview guide, see Appendix 1). As one could not assume from the start whether measuring takes place or not, the interviews started broadly to set the scene, thereafter moving into a project focus and finally narrowing down to the key

issue of measuring. Within these areas, several questions and follow-up questions were formulated. The degree to which these follow-up questions were used varied between the interviews depending on the respondent and how he/she developed the answers given.

Throughout the period of conducting the interviews, the interview guide was refined and iterated to be as suitable as possible for the respondents, in line with the semi-structured approach that allowed for such flexibility. The interview guide found in Appendix 1 is the final version. In addition, it should be noted that the interview guide acted as a basis for all interviews but that each interview was adjusted to the respondent at hand. This was because innovation is a very widespread area and that the knowledge of the respondents varied together with the level of detail provided in the answers. On one hand, the flexibility of the interviews could have lowered the ability to generalize the results, but on the other hand, it made the answers more relevant for the research questions and increased the engagement of the respondents. The initial questions were discussed with all respondents, but from there the interviews were adjusted to the respondents' area of knowledge and how the specific company worked. As a final question, all respondents were also asked if there was anything they wanted to add, to ensure that no aspects considered important by the respondent were left out.

3.3.2.2 Expert interviews

In addition to interviews with company representatives, five expert interviews were conducted to allow for added perspectives in the empirical findings. According to Eriksson and Kovalainen (2015) such a combination of different sources, also referred to as triangulation, can establish a greater degree of validity in the research by clarifying the result. In a similar way, the purpose of these interviews was to provide a more general perspective complementary to the company interviews. To gain insights from professionals with experience of innovation management from various backgrounds, a researcher perspective as well as consultant perspective was included in the expert category. The combination of two expert roles was considered particularly favorable due to the previously mentioned gap between theory and practice.

Similar to the company interviews, the expert interviews were also conducted in a semi-structured way with a predefined interview guide as a basis (for full interview guide, see Appendix 2). However, the expert interview guide was to a greater extent adapted to each respondent and the aim was not to gather comparable answers, but rather to get multiple views of the topic from experts within the field. Here it was considered more valuable to focus the interviews on the person's specific knowledge and experiences that could provide additional insights and understanding about the subject. Thus, these interviews were preceded by research of each expert's previous publications or achievements. Still, the expert interview guide touched upon some main categories. The guide presented in Appendix 2 is the generic guide providing the foundation for each adaption.

3.3.3 Selection of respondents

3.3.3.1 Company representatives

The study takes the perspective of large-sized companies, which according to the European Commission Recommendation 2003/361/EC (2003) is a company with more than 250 employees, with a turnover above 50 MEUR and/or with a balance sheet value of more than 43 MEUR. The study was conducted on a sample of Swedish companies, where companies were selected through generic purposive sampling in combination with predefined criteria based on the research questions. Such sampling is favorable in terms of relevance to the study as the researcher may strategically allow for variety with the research goal in mind. However, it may restrict generalizability towards a larger population since it is intentionally sampled rather than probability (Bell et al., 2018). Providing clear arguments for sampling might somewhat strengthen the generalizability by allowing a greater insight into the reasoning behind it and the possibilities for extending it into other contexts (Eriksson & Kovalainen, 2015). Therefore, this process is described in detail below (for illustration of process, see Figure 12).

In order to reach the largest actors in the Swedish business environment, a list of Swedish companies, sorted by turnover, was retrieved from the database Retriever Business. A list of 150 companies were exported, where all had a balance sheet value of above 43 MEUR. The list was processed from largest to smallest to only retain the companies that employ more than 250 employees, as that was the other criterion for inclusion. In order to only include companies that actively operate both strategically and operationally, holding companies were replaced by their linked subsidiaries or excluded if such did in turn not fulfill the criterions of a large-sized company. No considerations were taken to any particular industries, as the variety of contexts within the Swedish business climate would allow for a broader analysis of the performance measurement. Furthermore, since innovation projects are often both unique and novel (Kromer, n.d.), the variety of settings should be embraced rather than filtered out, in order to keep the holistic view of the study.

The next criterion was the existence of an innovation-related managerial role at the remaining companies. Through a systematic search on Linkedin on “innovation” and “company name”, such roles were identified. The desired role was “innovation manager”, as that would both imply that the company actively works with innovation, thus being relatively mature in their innovation processes, and provide a managerial function perspective rather than sole operational. The latter was decided based on findings from Zizlavsky (2016) that managers and top managers are generally the most frequently involved in evaluation of innovation projects. According to Bell et al. (2018) there is no single optimal sample size as it is dependent on the context and scope of each study. Balancing the time, comprehensiveness and general standard of a masters’ thesis, an optimal number of interviews from a business perspective was between 10-15. This would provide a rich and broad view combining various professional perspectives and at the same time not be too large to allow for a detailed analysis.

The methodology conducted for reaching out to potential company respondents was threefold. First, an initial contact was made through Linkedin. After acceptance of the contact request, a longer message was sent, explaining the scope of the study, the reason for the contact and a request of an email address for a meeting proposal and further information (see Appendix 3). Thereafter, a meeting was scheduled via email. Requests were sent out between 29th of January and 28th of February to a total of 30 people at separate companies. Based on the replies, and the availability to participate in an interview during March 2021, a total sample of 12 respondents from the business perspective was created.

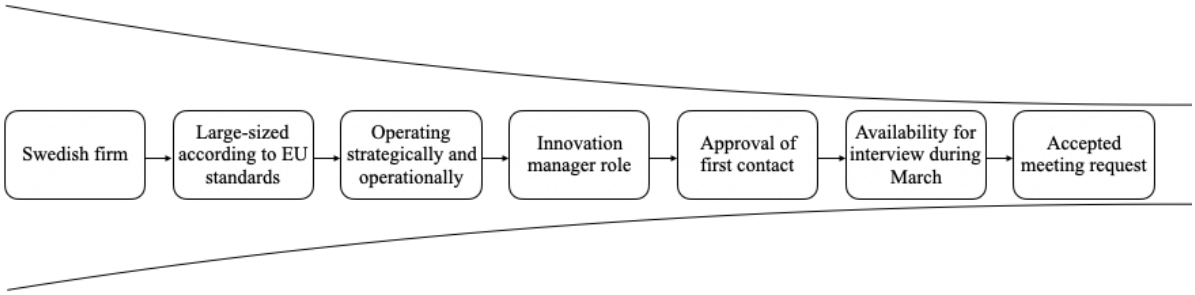

Figure 12 - Sampling process for company respondents

In two cases, and on the initiation of the company representatives, the snowball sampling approach was used to reach key people with the sufficient knowledge of the area, where roles such as “Head of Strategy” or “VP Design” was considered by the innovation manager to be of more experience within the field in those companies. In those situations, these people were contacted and included in the sample. The implications might be that they contribute with another perspective than the roles of innovation managers, however being appointed as key people with the research questions presented, the value of attaining the most knowable in the field was considered superior to the potential downsides. Moreover, as each interview still represented each participant’s perspective, the diversity of perspectives was considered rather enhancing than limiting. In one case, two respondents from the same company were included in the sample. On one hand, that could result in a distortion towards that company, however the choice was motivated by the need to include both people to comprehend the full situation of that company, suggested by the first respondent prior to the interview. Additionally, they were from separate units and thus could be considered to represent two different contexts.

It should be noted that some reflections gathered from the interviews may picture the views of the innovation manager rather than the whole company. The sample includes some of the largest companies in Sweden, thus companies with many employees and sometimes several innovation departments and efforts. Hence, the result is a “snapshot” of a perspective of how the questions studied could be perceived, somewhat limited due to the time and scope of the study. At the same time, to contribute to an increased understanding across the sample, the

broad perspective of this study was considered favorable due to the lack of maturity stated in the problem discussion.

In order to incentivize participation and reduce the risk of filtering the answers, the innovation managers were kept anonymous for the study. Moreover, since one initial expert interview described innovation as a somewhat sensitive topic, anonymization was considered to enable deeper and more honest description from the interviewees, without risking the information to be negatively affecting neither the interviewee nor the company. The anonymity was also motivated by the strive to put emphasis on the results rather than the individual companies it applied to.

3.3.3.2 Expert respondents

Due to the aforementioned gap between theory and practice within the field of innovation performance measurement, combining the practical perspective of companies with other types of expertise was considered valuable to capture additional aspects. In the early stage of research, and with the aim to gather supplementary knowledge of the issue studied, a Google search for researchers based in Sweden combined with the keywords "innovation measurement" and related words was conducted. A total of three researchers were contacted by email, where two replied and had the ability to participate in the study. Another perspective in the sample of expert respondents was that of innovation experts from a consulting background, with cross-industrial experience. Key people were identified through recommendations made by Martin Högenberg, Head of Innovation at CGI Scandinavia, and contacted via Linkedin in a similar manner as the innovation managers were approached. The final acceptance of the meeting request, preceded by information regarding time and scope, acted as an informed consent by the participant to take part in the study. In contrast to the company respondents, the expert respondents were not anonymous to increase credibility or their answers.

3.3.4 Interview set-up

Due to the Covid-19 pandemic still unfolding during the spring of 2021, the decision was made to hold all interviews at distance, preferably online through Zoom or Teams, but if needed also over phone. Online interviews were preferred over phone interviews as they give a better ability to connect with the respondent due to the face-to-face interaction (Bell et al., 2018). However, in one case, the respondent was not able to connect to Zoom and therefore that interview was instead conducted over the phone.

Approximately one week before each interview, an email was sent out to the respondent with a reminder of the date and time for the interview, and information about the subjects that were to be covered. Specific questions were not included. It was deemed important to prepare the respondents on what to expect from the interview to ensure that the subject was well understood and to allow for smaller preparations, if considered necessary. However, as the aim was to have

semi-structured interviews with space for additional questions it was not desirable to send out specific questions as that might have led to respondents preparing specific answers.

With the permission of the respondents, all interviews were recorded. This gave the researchers the possibility to fully focus on the interview and respondent at hand, not having to take notes at the same time. Other benefits mentioned by Bell et al. (2018) is that it enables a more thorough examination and thereby also analysis of the answers given.

All interviews but one was held in Swedish. As both respondents and researchers were native Swedish it was argued that holding the interviews in Swedish created the most natural setting. However, this implies that the empirical results had to be translated for the empirical section and analysis. As discussed by Xian (2008), there are several problems occurring when translating data, for example linguistic differences between languages, and socio-cultural aspects such as idioms used. To minimize biases affecting the results, all analysis was performed in Swedish, and no data was translated until it was written in the report. Also at this stage, there is a risk that interpretations from the researchers were included which may have affected the outcomes. On the other hand, holding interviews in a language that is neither the interviewer's nor the respondent's native language could have led to difficulties in understanding one another and less precise answers. In this case, it was therefore deemed to be more valuable for the study to hold the interviews in Swedish. The consequences of this have been considered throughout the process to limit the negative impact, and indistinct translations have been discussed between the researchers to avoid biases affecting.

In Figure 13 and Figure 14 below, all interviews are presented together with respondent, date, time and setting. In the sections of empirical findings and analysis later throughout this report, company respondents will be named RX and expert respondents will be named EX. The distinction is important because they are likely to have different perspectives, where the experiences of innovation managers can be assumed to be somewhat influenced by the company he or she represents.

Company interviews				
Company Respondent	**Role**	**Date**	**Duration**	**Setting**
R1	Product Development Manager, Strategy & Technology Innovation	2021-03-03	59m	Zoom
R2	Senior innovation manager	2021-03-09	50m	Zoom
R3	Innovation manager	2021-03-09	49m	Zoom
R4	Global Technical Innovation Manager	2021-03-10	51m	Teams
R5	Director of Service Innovation	2021-03-10	50m	Zoom
R6	Global Innovation Manager	2021-03-10	1h	Zoom
R7	Director research and innovation	2021-03-10	37m	Zoom
R8	Innovation management officer	2021-03-15	49m	Teams
R9	Head of Strategy	2021-03-15	49m	Zoom
R10	Vice President of Global Design	2021-03-17	38m	Zoom
R11	Product Owner Innovation Management	2021-03-17	36m	Zoom
R12	Manager Product Development & Innovation Center	2021-03-25	54m	Zoom

Figure 13 - Company interviews

Expert interviews					
Expert Respondent	**Name**	**Occupation**	**Date**	**Duration**	**Setting**
E1	Ilse Svensson de Jong	Ph.D. Student, Innovation Engineering Department of Design Sciences Faculty of Engineering, Lund University	2021-02-14	1h 2m	Phone
E2	Peter E Johansson	Associate Prof. in Innovation Science, at the School of Innovation, Design and Engineering, Mälardalen University	2021-03-03	58m	Zoom
E3	Håkan Ozan	Strategic innovation management & digital strategy expert, researcher, speaker, author, teacher & consultant	2021-03-03	1h	Zoom
E4	Sten Jacobson	Innovation expert at Innovation360	2021-03-15	1h 9m	Zoom
E5	Erik Brandrup-Wognsen	Head of Strategy & Business Design at CGI	2021-03-18	51m	Zoom

Figure 14 - Expert interviews

3.3.5 Transcription of interviews

The recordings of the interviews were fully transcribed afterwards to enable analysis of words, in accordance with the qualitative research strategy. Transcription is a very time-consuming process which creates large amounts of text to analyze (Bell et al., 2018). The value it creates hence had to be weighed against the time it took. For the sake of this study, it was argued that the empirical data is of high importance for the outcome, and that transcriptions also enable the thematic analysis taking place later. In addition, recording and transcribing the interviews also enabled the interviewers to fully focus on the respondent during the interviews which was seen as valuable for the conversation. Therefore, the value created by transcribing the interviews was found to be greater than the time it took performing it. It should however be noted that transcription from a recording may entail transcription quality errors such as issues with the

sentence structure or mistaken words (Poland, 2001). Such flaws were partly mitigated by recording in a quiet environment, full reproduction of the record, and being aware of the risk of interpretation errors. For example, where it was unclear what the respondent said at some points, it was marked [not captured] in the transcription. Another weakness detected in the transcription process was the lack of capturing gestures or mimics, which at some points put text out of the proper context. Here, parts of it were captured with for example *laugh*. Also, as recommended by Poland (2001), some "tidying up" of quotations for enhanced readability were conducted first after the analysis had been completed to reduce the risk for misinterpretations.

3.4 Data analysis

After transcribing the interviews, the text was analyzed using tag coding and thematic analysis. Thematic analysis enables a structured way of approaching the data and gives the ability to group it into smaller, more manageable pieces (Bell et al., 2018). Here, themes, patterns and relationships in the data were outlined which provided not only flexibility throughout the analysis but also a means to cover different aspects of the research questions by categorizing the data. A complete table of the codes and their grouping into themes are presented in detail in Appendix 4.

With regards to the large amount of text collected in the transcriptions, coding was conducted prior to the creation of the empirical section. Thus, the results were formed as the description of findings of the themes emerged from the data collected. The coding was performed through code tags in the software program Atlas, developed to assist when analyzing qualitative data. The software enables, among other things, the creation of various codes that later also can be grouped into themes. One of the main advantages of using Atlas, or similar softwares, is that codes are grouped in a structured way, thus giving the researchers an overview of information from all interviews conducted (Bell et al., 2018). For the sake of this study, where a total of 17 interviews were held, this was beneficial as it would otherwise have been challenging to gather all the results in a structured way. Through Atlas Cloud it was also possible for both researchers to go through the transcriptions on their own but still have all the findings gathered.

A number of codes were defined by the researchers as relevant for the study. Due to the inductive research approach, these were mainly based on the researchers' perception of key topics from the interviews and the proposed research questions, rather than building on the theoretical framework. However, in the iterative process of moving back and forth between empirics and analysis, additional codes were also added to ensure all relevant pieces were included. In some cases, the same section or sentences from an interview was given several codes to provide the full picture. Many of the topics and codes from the interviews were not mutually exclusive as the subjects were tightly connected. Furthermore, it should be noted that the selection of codes may be subjective to the researcher in what was believed to be relevant. This implies a risk of losing valuable data in this process and the subjectivity also limits the

replicability of the study. To ensure that all significant topics were captured, and that coding was done similarly across all data, the coding was conducted directly after the transcriptions were finished. Moreover, it was iterated over several times with agreed upon examples as guide. It should also be noted that due to the variation of knowledge and details provided by the respondents, some respondents occurred somewhat more frequently than others throughout the empirical section of this report. However, it was considered more valuable to provide a coherent overview of the key findings, relevant for answering the research questions, than focusing it on specific respondents to weigh their appearances completely equal.

One of the criticisms brought forth against softwares for qualitative analysis like Atlas is that you risk losing the context of the text you code (Bell et al., 2018). However, for the sake of this study, both researchers attended all interviews and were involved with all parts of the process. Hence, there was a natural understanding of the context for all interviews which decreased this risk. When several researchers are performing the coding within the same study, there is also a risk of having different interpretations and therefore code the data in different ways (ibid.). In this case, this was handled by deciding the most important codes together beforehand and having a continuous discussion around how to code certain things.

When coding was finished, the codes were grouped into larger themes connecting to the purpose and the research questions at hand. In total, four themes emerged based on the 18 codes identified throughout the transcriptions (see Appendix 4). The analysis was then based on the results of themes and codes in relation to each other and the literature. Prior to connecting the empirical findings with the literature, the literature section was revisited to ensure that all relevant parts found in the empirics were brought up in the literature as well. This was due to the inductive approach of the study where empirical findings were to guide the outcomes (Bell et al., 2018). The codes and themes were then connected to both literature and other codes which acted as the starting point from where the analysis section was built. Thus, the thematic analysis enabled a thorough analysis of the findings and the ability to answer the proposed research questions.

3.5 Research quality

3.5.1 Validity

Validity is an established criterion for evaluating the quality of research and refers to the degree of correctness of study, meaning how accurately it explains the studied issue (Eriksson & Kovalainen, 2015). For this study, it implies whether the purpose of exploring the measuring of innovation projects in large-sized companies is fulfilled and accurately studied. Two forms of validity presented by Bryman and Bell (2015) are internal and external validity.

Internal validity refers to the fit between the empirical findings and the theoretical contributions. A key criterion for internal validity is credibility, which refers to the

trustworthiness of the study (Bryman & Bell, 2015). Due to the inductive approach of this study, where the research process foremost was guided by empirics, the theoretical contributions are built upon the empirical findings, which implies a relatively strong relationship. Moreover, to ensure credibility the research was conducted according to good practices and with qualified respondents within the researched field.

External validity is the generalizability across other settings than the one studied (Bryman & Bell, 2015). The conclusions of this study apply for the sample, but not necessarily to the entire Swedish market of large-sized companies. On one hand, it could be argued that a holistic perspective increases the possibility to generalize, however at the same time, the qualitative strategy and the limited sample reduced generalizability. Thus, generalizations were possible to make for the selected setting but should not be accounted for circumstances beyond the scope of this study. At the same time, due to the predominant lack of established definitions and practices within the field of innovation and its link to performance measurement, a holistic and inclusive approach was preferred rather than limiting the study from an early stage. Thereafter, due to high variety in findings, the holistic approach was kept throughout the entire research process. While the findings cannot fully be generalized across all contexts for large-sized companies, the generalizations across the sample provide some indications to a larger population. Moreover, the external validity was strengthened by including multiple perspectives, from both company respondents and expert respondents, to validate and relate findings.

3.5.2 Reliability

Reliability refers to the degree of repeatability of the study where consistency in the process allows for another researcher to replicate findings (Eriksson & Kovalainen, 2015). Thus, having a strongly motivated methodology section increases its reliability. The main issue for qualitative studies is that the social context being studied evolves with time and surrounding conditions can change (Bryman & Bell, 2015), reducing the reliability of the study. In line with this, empirical practices might have changed from the way it was described during the time of the interviews. Moreover, due to the ongoing global Covid-19 pandemic during the time of research, the ability to repeat results might be limited. Especially, since many companies have adapted their practices and shifted focus during the pandemic (PwC, 2021).

Due to the study being carried out by two different researchers, it also entails a question about internal reliability, which concerns if the researchers agree upon what is found (Bryman & Bell, 2015). To enhance internal reliability, a transparent process between the two researchers has been key, with discussions, preliminary conclusions and continuous communication. Moreover, the transcriptions have been double-checked by both researchers alongside with the coding and thematic analysis to ensure agreement on findings and interpretations.

4. Empirical findings

In this chapter, the findings from the semi-structured interviews with company representatives and experts within the field are presented. The chapter is structured by topics where the opinions and experiences of different respondents are discussed together. The main topics covered are innovation management, methodologies for innovation project management and evaluation, current use of innovation project performance metrics and challenges with measuring innovation projects.

4.1 Innovation management practices

4.1.1 Definitions of innovation

According to E3, every company needs to define innovation for themselves since it is often a subjective matter. Looking at all the definitions used by the company respondents, there are both similarities and differences between them. All company respondents agree that innovation is not only about products, but also for example services, processes and business models. Another common standpoint is that innovation is about creating and realizing value. It is also pointed out by R3, among others, that:

> *"If it is just an invention, a fun gadget but that does not solve any problem or real need and does not create value for the user, then it is still not an innovation" – R3*

The distinction between invention and innovation is frequently highlighted throughout the interviews as crucial to understand. According to R12, receiving a patent in itself is only an invention, for it to become an innovation you have to produce it and make it usable for the end user. This can be contrasted to R1 who sees patents as a big part of the definition of innovation as it makes it possible to quantify and compare to what has been presented before. It is also argued by E2 that an innovation per definition is successful, there are no failed innovations, only failed innovation projects. This is because something becomes an innovation when it brings value to the user, according to E2.

Another distinction made by some company respondents is between different types of innovation, predominantly incremental and radical innovation. According to R4, some of the activities they call innovation within the organization might rather be seen as continuous improvement by other companies. R1 mentions this in terms of the importance of distinguishing between improvements to current products, and innovations where you create something completely new. On the other hand, E2 states that it is difficult to know beforehand if something will be an incremental or radical innovation, and hence there is not much value in trying to separate them when discussing how to define innovation.

All company respondents mention that an innovation has to be something new. Most company respondents discuss that it has to be new to the company or to the industry, but it does not have

to be new to the world. Contrastingly, R12 states that their definition of innovation is that it is new to the world. All parts do not have to be new to the world, but the outcome should be. However, the subjectivity in what is to be considered new is also pointed out by E3 as one of the reasons why innovation is hard to define. Consequently, there are multiple perspectives of innovation among the respondents, but it revolves around creating value, being something novel and involving more than just products.

4.1.2 Innovation strategy

An innovation strategy is, according to E5, vital for companies to be able to determine if their innovation efforts are taking them in the right direction or not. When discussing innovation strategy with the company respondents, only six out of twelve respondents can summarize a clearly stated innovation strategy for their organization. For example, R2 says that there is no overarching innovation strategy at the company, instead innovation happens within smaller groups in different divisions. This can be contrasted to for example R3 and R6 who have a predefined innovation strategy which is broken down from, and based on, the business strategy of the company. Another recurring theme when discussing innovation strategy is that it is customer-driven or customer-centric, according to six of the respondents. This implies that innovation is carried out together with customers and that the focus is to solve actual problems for the customers. However, R1 points out an issue with pursuing such a strategy:

> *"Because when the customer tells you that we would need this, then the train has already left basically" – R1*

Another important part of the innovation strategy, according to E3, is to define what is important for the company and what kind of innovation to pursue. There has to be a separation between incremental, semi-radical and radical innovations. This is also discussed by R3 who suggests that perhaps the company should not work with radical innovation at all but rather be an early adopter and have that as part of their strategy. Another example is given by R9 stating that the strategy incorporates two different tracks where one is developed closer to the larger organization and the other is further away from the core of the company, to a greater degree separated from the larger organization. At the same time, R7's organization has a clear strategy when it comes to incremental innovation, but not for more radical projects to ensure it stays outside the box of what the company normally does. Hence, there are different innovation strategies identified across the sample, where some relates to innovation occurring ad hoc and bottom up, whereas others are predominantly determined top-down and integrated into the overall business strategy.

4.1.3 Innovation leadership and culture

To have the right leadership is considered a crucial presumption for successful innovation by a majority of both the company respondents and the expert respondents. R4 highlights that for innovation projects, it is important with top management who understands innovation and that

innovation projects cannot be carried out in the same way as regular projects, due to their different characteristics. In many cases, according to E5, the leaders want to maintain control and mitigate uncertainties, which is a way of working that does not promote innovation. At the same time, the need for top management's buy-in is exemplified by R6 who states:

> *"...you have to have the top management onboard as well, if you do not have top management onboard it is over." – R6*

In addition, nine out of twelve company respondents talk about the innovation culture and its impact on innovation activities. In companies with a strong innovation culture, innovation is encouraged and there is a greater understanding of innovation, also in terms of measuring it. However, in three of the companies, the company respondents suggest there is a need to change the culture to become more innovative. For example, R12 says that they are trying to build more processes and structure within the company but that it is difficult to change due to the inherent culture within the organization.

4.2 Methodologies for innovation project management and evaluation

4.2.1 Innovation project management processes and methodologies

The process of creating innovation is, according to both E3 and R3, very well tested and possible to look at from a best practice perspective. However, looking at the innovation project processes among the company respondents' organizations, it is clear that there is no common way the companies carry out their innovation projects. At the same time, there are similarities and recurring themes among the described processes for innovation projects. For example, five out of twelve company respondents describe that they work with agile methodologies where sprints are conducted, and after each sprint the project is evaluated to decide where to continue next. One concern raised by R7 against agile project methods for innovation projects is that it has to be adapted into sprints of 2-3 years rather than a couple of weeks to give value to innovation projects. The stage-gate approach, where certain requirements need to be fulfilled before a project can move on to the next phase, is also mentioned by four company respondents. However, R1 highlights that even though there is a written process for innovation within the company, that is not how it works in reality because the process is not based on what the reality within the organization looks like. Similarly, R12 describes that written processes are mainly used for education and not fully followed through in the actual projects.

Additional methodologies for project management are reportedly applied by the respondents, such as design thinking. One important distinction between a design thinking process and a regular development process mentioned by R10 is that with design thinking, you start by understanding the context and looking at the problems and needs out there. This is contrasted to a regular development process where you instead start with the solution and improve the solutions by looking at the existing problem and need.

"You start, completely unprejudiced, to explore what is happening and you start mapping the problems, adding structure until you identify clusters /.../ and then you think about what solutions might fit to these patterns." - R10

In a similar manner, the double diamond methodology is applied in R3's organization. It means following the steps of discover, define, develop and deliver to avoid moving into development too fast without clearly defining the problem or reaching out to potential customers. As can be seen from the company respondents' answers, both how and to which degree the innovation project management process is structured varies between companies.

Independently on project process methodologies, a majority of the company respondents discuss that all projects have some overarching project phases. Names of the phases and the exact content differ, but most of them start off with defining the problem and verifying that this is relevant to the potential consumers. Several company respondents, for example R2, R3 and R8, mention external monitoring of what is happening in the world as important in the beginning of innovation projects and that it often works as input sources for them. In the end, all processes reach a phase where the outcome of the project is scaled and launched. In some cases, such as for R1, R5 and R9, that implies that the innovation organization hands over the project to the regular organization, while in others the innovation organization follows the project the whole way. In other cases, there is no specific follow-up of the phases, such as for R5. The reason for that is, according to the respondent, that they are a small innovation unit and therefore keep it in their heads instead of having it written down.

In most cases, a project starts either in the innovation department or in a specific division of the company, often without much involvement from higher-level management. However, six company respondents mention that at some point, usually before starting to scale, there is a need to lift the projects higher in the hierarchy and get buy-in and financing from top- or division management. This is mentioned to be the critical point where value has to be proved and where measuring may be relevant. Where a project is developed can in some companies, described by R2, R6 and R9 also depend on the type of innovation concerned. In the case of R6's company, incremental improvements and incremental innovations are developed and handled within the product divisions as they feel that the regular project process works for those. However, for more radical projects, a specific process has been developed and is taken care of by an assigned innovation team. To divide groups working with more radical innovation from the regular organization is, according to E5, common as it is often hard to combine this development with day-to-day operations.

The innovation project management process is also, according to E3, dependent on the overarching innovation management process and each company's ability to innovate. Here, E5 describes a development towards a more proactive, systematic behavior within innovation management, with the implementation of standardized innovation management systems to

guide processes towards structured ways of innovating. Two company respondents, R3 and R8, mention that their innovation management process is based on, or closely connected to, the ISO standard on Innovation Management. According to R3, the standard highlights the importance of working systematically and structured with innovation. However, R8 says that even though they have based their innovation management system on the ISO standard, a lot of adaptation was needed to fit the specific company. According to E5, the systematics brought in by the ISO standard is what is needed to create more innovation among companies, to make it more similar to how companies look at, for example, quality management.

> *"I have big expectations on the standard eventually, but it is far to a level of maturity where it is as established as ISO9000 or ISO14000. Then we are talking 4, 5, 6 years ahead and maybe as many more years until it becomes a general behavior…" - E5*

Moreover, according to E3, an ISO standard focusing on innovation operation measurement is currently under development, which will have future implications for the process of innovation projects. As of the current situation, there are varying processes and methodologies carried out among the respondents of the sample, which has been elaborated throughout this section.

4.2.2 Tools for evaluating innovation projects

In the interviews, a number of tools used for evaluating the projects are discussed. One such tool mentioned is to have acceptance criteria throughout the different project phases, mentioned by five of the twelve company respondents. In the case of R4, some criteria are mandatory to reach in order to be able to continue to the next phase, while others might have less significance on the decision to proceed or not with the project. R3 describes that within the different stages of the double diamond methodology, they have a checklist with criteria to evaluate ideas and the progress of ideas. The purpose of the checklists is to ensure that the right projects are continued, and the wrong ones terminated.

The most recurring tools to demonstrate progress is prototyping and visualizing, discussed by a majority of both company and expert respondents. It is argued by E4 that it is extremely important in the beginning to have a cheap way of testing and evaluating an idea.

> *"…we just do something extremely manually, very simple and quite stupid just to test an idea and get input on it in an early stage before it costs money. I think that might be the most central thing looking at the innovation capability, that you are quick at testing things…" – E4*

A majority of the company respondents agree on the importance of being able to test ideas with customers and to be able to do so at an early stage. For example, R9 explains that working with hypotheses is an important part of evaluating projects as it enables testing ideas with customers and seeing if their theories are correct or not. In addition, R12 says that one should prototype

and create a minimal viable product (MVP) as fast as possible and test it with as many people as possible. This to get a better understanding and to avoid getting too affected by your own ideas and thoughts. The reasoning of R10 also goes in line with this, working with MVPs early on to set the scope clearly for the project. It is on the basis of that scope the projects are later evaluated and decided if they should be continued or not within the organization of R10.

In addition to testing and experimenting, the company respondents also mention different more specific tools used to evaluate projects throughout the project process. For example, in R9's organization, innovation projects are connected to themes which act as a frame for the projects and against which evaluation is made. This is also emphasized by E4 who suggest steering through themes as a potential alternative for innovation projects to provide a degree of structure. For R4, one of the most important parts in evaluating an innovation project is to perform a risk analysis. This is also done by R2 and R8. In the risk analysis, each identified risk and its possible consequences are evaluated, and a plan is created to either manage the risk or remove it. Questions asked within the risk analysis are for example:

> *"What could go wrong? Why does it go wrong? How easy is it to identify if it will go wrong? How big are the consequences if it goes wrong? And what do we do to avoid it going wrong, or how to make it easier to identify something going wrong…" – R4*

The usage of business cases is discussed by three out of twelve company respondents from quite different standpoints. For example, in R9's company, early business cases are seen as part of finding the needs and identifying testable hypotheses connected to it. However, it is also pointed out that it is very difficult to come up with business cases for innovation projects and therefore R9 prefers to call it opportunity cases instead to lower the expectations from the rest of the organization. R10 also distinguishes between traditional business cases and the ones created for innovation, where the latter takes a freer perspective on the value discussion, including more soft parameters. On the other hand, R6 states that for innovation projects, they never develop business cases but rather look at the potential in the market and work from there. Thus, current use of business cases diverge and a majority does not mention it as an evaluation tool in use.

4.2.3 Reporting status and progress of innovation projects

Several forums for reporting measured, or in other ways identified, progress is mentioned by the company respondents. Here, some are parts of the formal project process and others occur more informally in the project teams. A majority of the company respondents emphasize the importance of continuous evaluation, especially during the process rather than prior or afterwards. In many cases, evaluation is done in order to decide whether to continue on a project or not, and as previously mentioned for investment decisions at top management level. E4 mentions the complexity of reporting to top management being that it is often requested, however not necessarily optimal for the innovation business. Here, E4 suggests balancing

different perspectives such as financial, process-oriented and cultural to meet the demands for status reporting set by top management without compromising the innovation business.

As one form of reporting, meetings are stated to be necessary in order to ensure a balance between independence of moving forward and support of getting insights or input from top managers, according to R9. It can also have controlling purposes, further exemplified by R4:

> *"Everything is monitored, I would say, once in a quarter. I report once a month and do my forecasts, that is budget. I do these budget forecasts at least three times a year. So it occurs frequently"* - R4

In line with above, monthly steering group meetings are mentioned by three out of twelve company respondents. Regarding steering groups, it is further emphasized by R11 that it is important to have the right people that understand the value of innovation. It is argued that increased cross-functionality is key to decrease the focus on time, cost and quality and allow for focus on other dimensions such as the company's strategic key areas of customer, technique and business. The importance of who is selected to be part of the steering groups is also brought up by R4, who suggests that the innovation manager together with the sponsor of the project should choose the steering group for each project. In other companies, steering committee meetings are seen as a time-consuming and unnecessary, or as R5 puts it:

> "*Well, there is this... this disease again, large companies with all sorts of steering committees and forums where you report whether you have green, yellow or red light on your projects. So that is done in abundance"* - R5

The purpose of information sharing is suggested by R9 as a way of describing what has been done, tests or experiments conducted, learnings from it and future outlooks for the project. Further, E3 states that working with early phase user testing and feedback generally provides an accurate picture of future opportunities to upcoming project phases, which makes it sufficient to include in reporting situations for future potential. Stated by two of the respondents, monthly status meetings are combined with formal steering meetings a few times a year. Another way is suggested by R3, who sends status updates to top management each month through a newsletter. In R11's organization, the innovation project leaders are responsible for synchronizing their actions with overall strategic focus areas brought forward by management, without any specific demand for reporting. This is also emphasized by R6 who states that what they have to prove is that they follow the strategy of their division and the overall company. R11 further identifies a change in how projects are followed up upon:

> *"It happens continuously within the project teams. Previously it was more common that we worked with steering committees and reported sort of on a monthly basis, but that does not work if you are working agile and more with design techniques, then it has to be faster decisions and integrated."* - R11

The ways of reporting differ across the company respondents' organizations, and also within the responses. To exemplify, R2 states that it sometimes requires a large toolbox, that is several different presentations and approaches depending on who to communicate with.

> *"If you have someone who likes vision, then you will talk vision. But if they want data, then you have to bring data".* - R2

To further exemplify, two of the company respondents suggest methods such as storytelling or visualization to convince higher-level decision makers that the projects are making progress. Another example is given by R4 that they, together with the steering group, go through pre-determined mandatory checklists in order to agree upon how far the project has come. In the case of R8, everybody has access to the process steps of each project which is where they direct anyone who requests information regarding a project. The same respondent also argues that clusters of projects, rather than single projects, is what should be reported to management. From a portfolio perspective, E3 separates between strategic and operational portfolio management where strategic, which is top-down managed, is about doing the right things, and operational is about doing things right, which is reported back up through the projects to reach a balanced portfolio. In three of the companies, such high-level reporting can be identified, rather than reporting on a single-project level. For example, in R3's organization, the management follows solely two metrics through a dynamic dashboard, namely number of ideas sent in by the organization and number of ideas implemented.

4.2.4 The concept of value in measuring innovation projects

In terms of measuring the performance of innovation projects, one central theme identified across all the interviews is that it should strive to reflect some sort of value. Here, value is tightly linked to the definition of performance. However, value is described differently by the company respondents. According to E3, the perception of value is often set by management prioritizations, but is usually described in terms of return or revenue. For many of the company respondents, the value ultimately lies in the customer's perception of the innovation. According to R12 for example, a project is considered to be successful if the customer has any use of the innovation. On the other hand, some parameters might be difficult to assign a specified value. For example as R8 puts it:

> *"Innovation can lead to soft values, or at least those that are difficult to measure. People meeting in workshops, networking, the establishment of new channels, deepened relationships with customers /.../ everything around, what values does that provide?" - R8*

Two company respondents also find value to be related to the improvement of the company's ability to innovate. R3 emphasize the value of an innovative culture:

> *"If you lead a lot of innovation projects, you have very satisfied customers who talk about it on social media and say that it has brought them value, you have employees who are engaged, you see that the divisions start driving innovations /.../ then that is a sign of a good innovation culture."* - R3

This is also highlighted by R11, who discuss the complexity of attaching a value indicator to factors such as entrepreneurship, HR and culture, due to its intangible nature. In other cases, value is specified in terms of publicity or goodwill. R5 describes that they have less pressure on them to show positive sales figures but more to release visible innovations to be perceived by the market as an innovative player. R2 also suggests that building a PR story around innovation may be a valuable outcome from innovation projects, although the result itself not necessarily became what was initially aimed for. However, at the same time, R3 warns that striving solely to be perceived as innovative may lead to "innovation washing", that is, saying that you are innovating but in reality conducting business as usual.

Another brought up dimension of value is learning. For example, a majority of the respondents suggest that there might be a great degree of value in "failed" projects, as that enables learning for future projects. However, according to R5 that also requires the support of the organization in being positive towards money spent that later resulted in learnings. R10 further describes that failures are the most important in all innovation work, if managed correctly. By taking actions to analyze, understand and communicate what went wrong, the value is maximized according to R10.

4.3 Current use of innovation project performance metrics

While section 4.2 explores methodologies for evaluating project performance and reporting it, numerous metrics are also reportedly used by the respondents. Throughout the interviews, it is evident that there is no general way of measuring the performance of innovation projects. According to R1, they have no specific KPIs in use for measuring and quantifying innovation projects, instead a lot is evaluated based on gut feeling and by looking at stakeholders' interest in the innovation. However, R1, together with several other company respondents, states a need to have more suitable KPIs for measuring innovation project performance. One of the reasons mentioned for this is to be able to prove to the rest of the company why a certain project is important. At the same time, most company respondents also point out that all projects are unique, and that metrics need to be developed in relation to the business goals of each specific project.

> *"... to have average metrics or average KPIs for everything does not work, instead you have to break it down depending on what type of project it is..."* - *R3*

E4 highlights that it is important to understand that different KPIs are suitable in different parts of the innovation project process. In the early stages, focus should be on cultural aspects as there is not much value to prove at that stage, while more process oriented KPIs should be used throughout the process and financial metrics when approaching the final stages of the project. It is argued that not until then financial metrics are valuable. In addition to this, metrics also need to consider different types of value in terms of soft and hard values, but also in terms of short-term and long-term effects of the project according to E4. A number of areas of metrics are recurring throughout the interviews, presented in Figure 15. These will be presented more in depth in the upcoming sections, together with examples of identified metrics within each area.

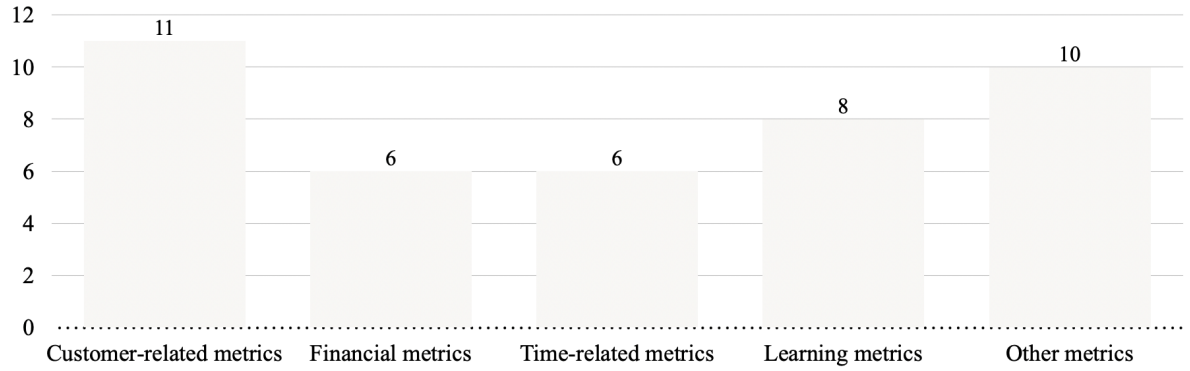

Figure 15 - Number of respondents mentioning metrics within each category

4.3.1 Customer-related metrics

A majority of the company respondents mention customer-related metrics as the best way of measuring innovation project performance. R8 prefers going directly to the customers, listening to them and based on that iterate within the project to lower the risk and increase the alignment with the customer. Another example comes from R12 who says that they always focus on the customer and how to create added value for them in everything they do. The value for the customer is also highlighted by R3 saying that one must measure the relevance for the user and figure out if it helps out an actual problem. R4 further states awareness as a parameter to measure, relating it to brand strategy. R10 suggests customer validations to know if you are on the right path with the project. However, these company respondents are quite vague in how this measurement is done and rather focuses on the importance of it.

More tangible examples given of using customer-based metrics is to be able to test innovation with customers and gather their feedback, as a way of measuring how the project is proceeding and to understand the future potential of the project. This can be done by creating proof of concepts that are tested with customers, but also by launching a beta version of an innovation and seeing whether the customers are using it or not. For example, R6 mentions that they consider the entire customer experience through engagements with the customer to evaluate how they perceive the potential offerings. It is however also highlighted that being able to test

a proof of concept is highly dependent on the established customer relationships and in some cases not manageable, according to R6.

Another customer-related indicator is, according to R9, recurring customers, which can be seen as a sign of a positive experience with the innovation. R9 also uses the parameter of customer lifetime value when measuring customer interest for innovation projects. In line with this, R5 mentions share of wallet as another indicator of customer interest in the brand or innovation. Other customer-related KPIs mentioned are the number of people reached by a product or service, perceived willingness to pay, customer feedback, satisfaction or observed customer behaviour. In Figure 16, the total identified examples of customer-related metrics are presented.

- Customer value created
- Awareness
- Customer validations
- Recurring customers
- Customer perception
- Customer lifetime value
- Share of wallet
- Number of people reached by the innovation
- Perceived willingness to pay
- Customer feedback
- Observed customer behavior
- Customer satisfaction

Figure 16 - Identified examples of customer-related metrics

4.3.2 Financial metrics

While innovation managers tend to lean more towards customer-related metrics, top management and other internal stakeholders are mentioned by a majority of the company respondents to often be focusing on financial metrics. Therefore, such metrics are commonly used across the sample as well. The metrics used vary, but some company respondents, for example R4 and R8, agree that financial metrics, such as return on investment (ROI), often is what top management is interested in. E5 explains this focus on financial metrics by the fact that the reason for innovating is to create value, which historically most often has been viewed in terms of monetary value. Hence, the success or failure of an innovation ultimately has to be measured by looking at the bottom line. According to R4 and R8, the contribution to the bottom line is also what makes it possible to compare between projects. For example in terms of cost savings or revenue, according to R6. To measure the financial outcomes of innovation projects, the same calculations can often be used as for any other project, according to E3. It is further stated by E4 that especially projects close to the core business need to be measured in terms of realized effectiveness, such as ROI. However, E3 states that there are limitations to metrics such as expected return, which may be problematic at an early stage, since the outcome is completely unknown for many innovation projects. In later project stages, models such as NPV or DCF, taking a more classic investment approach, are considered more effective, according to E4. Still, R8, R9 and R12 all mention the downside of financial business cases and estimated figures being that these are easily tweaked to get favorable results. One risk with ROI for example is that such calculations can be modified to show a positive outcome, or as R8 puts it:

> *"...I can come up with a ROI calculation with a positive outcome for anything you want in the world." - R8*

Another financial metric frequently mentioned is to measure the share of turnover that comes from new products. The exact definition of new products varies but it can for example be products that have been developed during the last 24 months, as in the case of R8. This metric can, according to E4, also be connected to having a goal that a certain share of turnover should come from new products. However, there are also a few examples when financial metrics are not deemed to be as important. R6 points out that within their innovation organization, they do not focus on money but rather on if the project is proceeding as planned, if they have the needed resources and if they can deliver as planned. It should however be noted that the same respondent also views financial metrics such as revenue generated by innovations as important in the future, but that the organization is not there yet in their measurement practices for innovation. Another example of when ROI calculations and contribution to bottom line is not as important is if the company has other goals such as for example sustainability, according to R8:

> *"...they are more prone to disregard the ROI calculation if they can see that this gives us a lower CO2 emission for this. Then that is as important as the money." - R8*

Consequently, the degree to which financial metrics are used is described to be dependent on both top management requirements and strategic priorities of the company. The examples of financial metrics mentioned by the respondents are presented in Figure 17.

- Expected/Realized Return on investment
- Profit
- Cost
- Cost savings
- Revenue
- NPV/DCF
- Share of turnover from innovation

Figure 17 - Identified examples of financial metrics

4.3.3 Time-related metrics

Time-related metrics is another area mentioned as important to top management by six out of twelve company respondents. R1 explains that by having a time plan for when project activities should be finished, it is possible to monitor whether it is moving forward as planned or not. It can also act as a sign of when it is time to stop a project if it is not moving forward at the desired pace. Moreover, time is seen as something that is easily measurable, and hence often gets measured. This is exemplified by R7:

> *"There is a large focus on trying to measure progress, and the best metric we have right now is actually that you schedule time, that you actually work on the project you are supposed to work on" - R7*

One of the reasons for R7's organization to use this as a metric is to ensure that resources and money allocated to specific projects gets used there and not somewhere else because of an emergency. As one cannot know the end result of innovation projects beforehand, time is also one of few things where the effort put into the project can be measured, according to R7. The question of time spent in innovation projects is also discussed by R4 saying that one prerequisite they have identified for innovation is to have slack, that is time available, in the schedule. When you do not have that, there is a risk that people miss out on discussing ideas and projects with relevant people within the organization.

From another perspective, using time-related metrics could however lead to missed opportunities as it might cause a feeling that everything needs to be moving fast, otherwise it will be shut down. E4 expresses this further:

> *"It will create a pressure within your innovation organization to focus solely on things you can realize within the chosen time frame" - E4*

R9 therefore suggests that time-related metrics are good for monitoring, but that they should not be used for steering. Moreover, E3 states that time-to-market is often requested as a metric by the management, however none of the respondents mention it as a metric in use. R12 says that for their company, products are expected to stay relevant for many years, and therefore it is not as important to look at time to market. Still, time can also be managed from an effectiveness perspective. For example, R1 suggests measuring how effective the organization is from idea to formalization to execution and roll out, but this is not currently done in their company. The mentioned time-related metrics are presented below in Figure 18.

Figure 18 - Identified examples of time-related metrics

4.3.4 Learning metrics

A majority of the company respondents emphasize learning as an area they want to measure in relation to their innovation projects, but none seems to have found a way to do it. Learning generated in projects can help companies develop, become more efficient, and better prepared for upcoming projects. The difficulty, according to E2, R1 and R9, lies in the fact that measuring learning easily gets arbitrary if you do not have a clearly defined way of how to evaluate the learnings. Instead, R9 suggests there needs to be a quality metric for learning, such as learning in relation to hypotheses made. Being able to measure and quantify the learning is also argued to be beneficial for justifying the projects even if all of them do not result in any new innovation. R1 suggests that learning may be difficult to quantify and that these metrics therefore require a softer approach, using words rather than numbers.

R11 states that the effective goal of learning is to implement the gained knowledge and that may require longer time horizons than what is managed for today. Further, R11 provides the example of reflecting how one outcome may have resulted in something else being developed in that specific area, or that some other areas can be ascertained to avoid. R7 also exemplifies creation of new insights, abilities and mindsets as knowledge-related results from innovation projects. Self-assessments are suggested by E2 as a potential way for teams to elaborate on status, progress and areas for improvement. The strength of it is according to E2 that the group subjectively can rate key areas and then provide the result as a foundation for discussion and navigation forward. Thus, it is rather a support tool than a control tool, and could be seen complementary to KPIs, which to a greater extent reflects real situations. However, as stated by E2, the critical point is to distinguish between what the data represents in each case, being aware that results are only subjectively reflected.

Although not being formally measured today, R10 explains that they should strive to measure failures and learnings as indicators of innovation, since that is a crucial part of it. For example, one indicator could be how fast the company can pivot after a learning, according to R10. E1 suggests that companies should be prepared to have specific resources for learning and provide metrics to incentivize education in the innovation initiatives. According to E4, one indicator of learning could be terminated projects, since that could be a part of a fail fast strategy. According to E2 however, there is an obvious challenge to learn from projects in a systematic way, as it is dependent on the people in the teams and their individual knowledge. A summary of the presented metrics related to learning is presented in Figure 19.

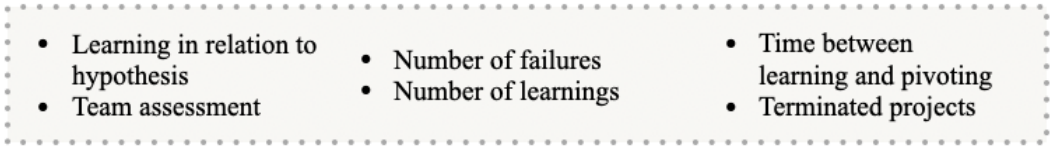

Figure 19 - Identified examples of learning metrics

4.3.5 Other metrics

Throughout the interviews, a number of other aspects concerning measurement of innovation project performance have arised, together with suggestions of metrics that do not fit into the previously mentioned categories. It is emphasized by most of the company- and expert respondents that the strategic focus areas of the company need to be reflected in the KPIs or other measurement practices used. For example, R10 suggests that if the company has sustainability as a big focus, there should be a goal of having a certain number of innovations around that each year. A majority of the company respondents highlight such strategic alignment as critical for a project to be judged as successful.

In addition to the previously mentioned metrics, three of the company respondents also include a metric dimension of technology, or technology readiness, which can be related to feasibility

mentioned by R3. It relates to the resources and time available for continuing the project. Another technology-related metric is patents, which is mentioned by both R6 and R7 as part of their current use. In addition, R4 also mentions the risk of cannibalization of current offerings as vital to estimate prior to execution of a new product or service. R3 further states that the overall innovativeness of the project is rated in their organization, as compared to their innovation portfolio strategy on how to balance incremental and radical projects.

Even though some company respondents say that they focus on soft and more subjective metrics when it comes to innovation projects, a number of quantitative metrics are also discussed. One reason for this is explained by R11 as that quantitative and objective data makes it possible to monitor in the same way over time. Metrics such as number of sent in ideas, proof of concepts generated, results entering the project creation process, number of experiments or tests performed, and share of employees involved in the innovation process are all frequently mentioned by the company respondents. As a majority of the quantitative metrics focus on internal aspects within the innovation process, they are important to understand to be able to make the organization more innovative, according to R8. The total identified examples of other metrics are presented in Figure 20.

- Strategic alignment
- Number of sent in ideas
- Proof of concepts generated
- Innovativeness
- Results entering the project creation process
- Number or experiments or tests performed
- Project feasibility
- Share of employees involved in the innovation process
- Technology readiness
- Patents (applied/approved)

Figure 20 - Identified examples of other metrics

4.3.6 Identified metrics in use per category

In the sections of 4.3.1 to 4.3.5, several metrics have been identified to be in use, according to the company respondents. These are summarized below in Figure 21.

Customer-related	Financial	Time-related	Learning	Other
• Customer value created • Awareness • Customer validations • Recurring customers • Customer perception • Customer lifetime value • Share of wallet • Number of people reached by the innovation • Perceived willingness to pay • Customer feedback • Observed customer behavior • Customer satisfaction	• Expected/Realized Return on investment • Profit • Cost savings • Revenue • NPV/DCF • Share of turnover from innovation	• Time-to-market • Planned project time • Time spent in project • Slack available • Time in project stages	• Learning in relation to hypothesis • Team assessment • Number of failures • Number of learnings • Time between learning and pivoting • Terminated projects	• Strategic alignment • Number of sent in ideas • Proof of concepts generated • Results entering the project creation process • Number or experiments or tests performed • Share of employees involved in the innovation process • Technology readiness • Project feasibility • Patents • Innovativeness

Figure 21 - Identified metrics per category

It should be noted that most of the individual metrics are mentioned by only one or a few company respondents, implying that these are not applied widely in the companies included in the study. Thus, the metrics identified should rather be viewed in terms of exemplifying the categories of metrics and emphasize the significant variation of practices.

4.5 Challenges with measuring innovation projects

All company respondents agree that there are great challenges related to measuring innovation projects and its performance. The difficulty of finding the right metrics is highlighted by R8 who points out that in many cases, people tend to measure what is measurable, not what is actually relevant. To do so creates a risk of focusing on the wrong things, as what is measured often is perceived to be important. This is confirmed by E3 and E5 who state that many companies tend to measure too much and focus on things that would not need measuring at all. There needs to be a purposeful use, according to E2, where one fully understands what is measured and why. The risk of oversteering organizations through controlling metrics is brought up by both R3, R11 and R12 as inhibitory towards innovation. Instead, a balance is desirable regarding what and how to measure in order to simultaneously facilitate innovation. Yet, measuring innovation performance is complex and still a greenfield according to E1. E3 suggests one issue of measuring on a project level lies within the abundance of definitions and context-dependency, which complicates standardization and comparisons of outcome.

> *"Companies are generally deficient in their measurement models, but I mean there is a standard for measuring but it does not state anything about the measurement points /.../, it rather concerns the methodology for measuring. Because the measurement points will radically vary across industries, different company sizes, different orientations… there are a bit too many factors that differ between them so there is no one size fits all"* - E3

In line with above, all company respondents and expert respondents propose there are varying characteristics of projects requiring different sets of metrics and ways for measuring.

4.5.1 Complexity of radical projects

A majority of the company respondents discuss a particular difference in complexity between incremental and more radical projects, where the complexity is emphasized especially for more radical projects. The incremental projects are stated by R11 to generally be clearer and more exact in what to achieve, while the more radical projects require a greater degree of flexibility during the process due to their uncertainty. For explorative projects, R7 emphasizes the need for time to explore without the demand for a solution ahead. According to E1 it is problematic from a financial point of perspective to not be able to predict an outcome or output from the actions taken. To exemplify, both R1 and R9 suggest that normal budget processes do not fit well with the innovation process. To mitigate this issue, R9 works with so-called metered funding, that is assigned financial resources to test and learn rather than to prove through

traditional KPIs such as profit or sales. In addition, some of the company respondents describe having separated explorative businesses from the operational business to mitigate the challenges. E4 further develops the reasoning of incremental versus radical projects:

> *"With incremental changes it is really easy to measure but with disruptive changes you limit your innovativeness as soon as you put a metric to it"* - E4

Especially for radical projects, most company respondents suggest that new metrics and foundations for decisions need to be put in place since the existing are not applicable. According to E4, the potential of innovation is limited by using one's current view of the world to capture the impact of radical innovation, as the point is to think beyond existing logic. Thus, current metrics are not enough to capture its full potential. As one cannot foresee any results beforehand, R7 suggests that prerequisites for innovation could play a greater role than measuring separate projects and actions. E3 also emphasizes that the complexity of measuring output, or the effect, of innovation is imminent in many companies. E3 distinguishes it from measuring the capability of innovation, where standards such as ISO are available for businesses to apply. Still, top management and steering committees are requesting updates on the status, progress and estimated potential for the ongoing projects, as presented in 4.2.3. R9 expresses that stakeholders in a company often demand short-term results, such as when they can expect a return from an innovation investment. At the same time, R3 states that the difference between highly innovative business and business as usual requires a shift in mindset of how projects are managed and measured.

> *"The risk is that you easily end up, or at least if you measure it like any other type of business, in quarterly follow-ups and such, and the risk is then that it will only be red [figures] all the time."* - R3

E4 further explains that the short-term focus is rooted in the quarterly economy, leading to incentives to invest today as opposite to investing for tomorrow. According to R6, top management themselves are evaluated on a shorter term whereas innovation requires decisions on a longer term, which emphasizes the complexity.

4.5.2 Issues of different organizational perspectives on measuring

Six out of the twelve company respondents bring up the challenge of different perspectives across their organizations. In the intersection between new and old in the organization, R12 describes an inevitable risk for conflicts of interest, and therefore suggests that innovation projects need to be managed differently than other projects. This quest for different management practices is mentioned by most company respondents. R1, R5 and R9, who are all part of separated innovation units where projects are initiated and handed over to the larger organizations, bring up the complexity of communication in the handover across organizational units. According to R9 it easily becomes a discrepancy between different perspectives of reality. R5 also highlights these differences from an innovative function perspective:

> *"We, in this little bubble that wants to measure in another way, we talk a lot to each other. But people do not focus on these things in the rest of the organization, there it is much more driven by shareholder interest."* - R5

At the same time, R5 further states that the part of the organization measuring traditionally through for example order books or sales results is larger and stronger than the part that wants to measure differently. In line with the presented issue, both R1 and R5 bring up the risk of sub-optimizing incentives goals across the organization, emphasizing the need for integrated metrics and cross-functional communication. E1 further mentions the importance, however also the challenge, of integration to the overall metrics system.

> *"The metrics system is made for production; it's never made for innovation. So it's there to control, it's there to see the real time, and that's where the paradox is: the tension between creativity and control"* – E1

The issue of varying organizational perspectives is also highlighted by innovation managers at companies where the innovation function is described to be tightly integrated in the organization. According to R4, the problem is evident when comparing the tactical focus on local markets to the strategic focus at HQ regarding planning forward. Due to its long-term impact, innovation needs to be planned strategically, R4 continues.

4.5.3 Time-related challenges

Other challenges brought up by the respondents are related to time, stated by all expert respondents and a majority of the company respondents. It is suggested by E5 that everybody wants to measure the performance of their innovation projects, however, there is a big challenge in finding the right metrics with strong correlation to the actual outcomes. At the same time, R3 states that effects from innovation projects may be indirect, in that they can origin from other parallel projects, and the effects may be delayed in time. They may also create spin-off effects in turn and generate new innovations, according to E3. This complicates the possibilities to establish proper cause-and-effect follow ups. Two company respondents particularly emphasize the potentially long payback periods usually related to innovations. E3 explains it as following:

> *"High innovativeness, that is radical innovations, will have a payback time of maybe two, three, four years before they break through /.../ which means that if you look on a two years basis then all innovation is really a waste of money."* - E3

Thus, it may take years until the market catches up on an innovation. According to R8 this also goes for incremental projects, as the effect goals are not fulfilled until the project terminates.

At the same time, R3 brings up the question of when a project can be considered ended, referring to the issue of definitions in the field.

The activity of measuring may also be more or less possible depending on what stage in the innovation process the project is located in. For example, E4 suggests that measuring is counterproductive in the initial stages of the innovation process, as it should be all about testing and less about proving at that point. E5 also states that it is more complex to measure effects in early stages since the relevance is compromised by uncertainty. At the same time, R4 identifies a risk in letting different people measure different aspects throughout the process, stating that it is more favorable to keep an overview perspective, from an innovation management perspective. In line with broadening the perspective, a final challenge is described in looking at individual projects when measuring, as there will most likely be a very high risk in relation to the payback time, resulting in a higher tendency to end the project. Instead, R1 and R6 highlight the importance of keeping a holistic portfolio perspective when estimating or following up on performance.

4.5.4 Mixed opinions regarding the merits of measuring innovation projects

Due to stated challenges, the empirical findings reveal that there are mixed opinions towards measuring the performance of innovation projects. On one hand, R1 expresses that the advantages of working with KPIs is that it supports navigating and focusing efforts on the right direction. R10 further stresses the importance of the structure added through measuring to creative processes, to confirm the value of a movement.

> *"I mean, you have to have processes and metrics that navigate you towards a result. The result can be that we shut it down, if it does not fit us, or if it turns out that the customer does not see the value, or if we simply cannot produce it"* - R10

Others are questioning the need for measuring innovation, such as R8:

> *"... are we entirely sure that we should measure and monitor? Why should we do it? What is the purpose of doing it?" - R8*

R3 mentions the risk of over-measuring innovation by pressing it into current practices, while it sometimes does not belong there. In addition, as R11 puts it, there may be large improvements of a particular KPI while still not achieving the true targets, due to difficulties of knowing what metric that would capture success in the best way. Instead, R3 highlights the importance of combining measurement with communication and common sense. Some respondents distinguish between incremental and radical projects, being positive towards measuring incremental project performance but hesitating towards radical. For example, E4 states that the projects closest to the current business are vital to keep track of while recommending caution when measuring exploratory actions.

While many company respondents emphasize a need for innovation metrics to be adjusted for the innovative nature of innovation teams and projects, it may vary across different project stages as well. From an expert perspective, it is also highly emphasized to keep the whole in mind, and that measurement can easily be done on an innovation capability level, however not always possible nor necessary on a project level. Furthermore, both E2 and E3 discuss the importance of adding structure to the systematic ways of how to manage and measure innovation. As E2 puts it:

> *"Innovation management is just as important to systematize as continuous improvements /.../ and if you just start to measure without keeping track of the other parts, that this is a process you strive to develop, then it will be significantly harder to use"* - E2

E3 also suggests that there needs to be an underlying structure in place in order to successfully measure innovation. However, as previously mentioned, what to measure may vary significantly among companies and projects. Currently, according to E2, much is done ad hoc and not systematically due to the lack of maturity within the field.

5. Analysis

The following chapter will provide an analysis of, and comparison between, the empirical findings and the findings from previous literature, presented in the literature review. The analysis serves to investigate the proposed research questions and provide a deeper understanding of how innovation project performance is and can be measured. The chapter is ended with a synthesis of analysis where the discussions are summarized.

5.1 The variety in how to measure innovation projects

Based on the findings of this study, all companies in the sample seem to somehow follow up and to some degree measure their innovation projects, as part of their innovation management practices. The significance of measuring in practice aligns well with the emphasized importance by the literature, of measuring innovation in order to track progress, discover opportunities and maximize value created (Gama et al., 2007; Frishammar & Björk, 2019). However, there seems to be a general agreement among the company respondents that measuring the performance of innovation projects is challenging, especially finding the right metrics. The main reasons for this difficulty have been suggested to be the novel and uncertain nature of innovation projects, variation of definitions and lack of experience within the field, which relate to the challenges presented by Smith (2006), Schentler et al. (2010) and Adams et al. (2006). Moreover, a majority of the company respondents point out the fact that projects are often unique and metrics therefore need to be adapted to each project. Such context-dependency is also highly emphasized by Aase et al. (2018) among others. This may be due to each project having different purposes, characteristics or implications for the company. Additionally, newness is one aspect of the otherwise varying innovation definitions that all company respondents seem to agree upon, implying that the end result of those projects will most likely be unknown. At the same time, the results of this study indicates that creating value is one of the main goals of innovation projects and metrics should preferably reflect that. However, definitions of value also vary greatly across the sample. This goes in line with the multidimensionality of performance described by Molina-Castillo and Munuera-Alemán (2009) which can be reflected in the several categories of metrics identified throughout the study. Together, the incoherent definitions of value and the different dimensions of performance may be influencing reasons to the fact that measurement varies significantly between the companies and projects, as metrics applied might be guided by the value aimed to be created or the performance aimed to be reached.

There are multiple other factors that can impact what metrics that are used in companies. One respondent highlight that the company might not always measure the most suitable things, but rather focus on what is measurable, most likely due to the stated complexity of measuring performance for innovation projects. This can have several implications, one of them being that it might lead the company to focus on the wrong things since what is measured often gets managed (Frishammar & Björk, 2019; RISE, n.d; Bourke, 2013), or at least receive managerial attention. In addition, measurement and evaluation of projects are, according to Goffin and

Mitchel (2017), especially important when making decisions around whether to continue a project or not. Hence, if the wrong metrics are guiding those decisions, there is a risk that the companies will shut down potentially important and valuable projects. This issue points out the existing tension between the need for having the right metrics in use and at the same time the difficulty in identifying and applying those metrics.

5.1.1 No best way to measure innovation projects

The results of this study indicate that there is not one best way to measure the performance of innovation projects, as the identified metrics and methodologies vary across the sample and between different projects. The greatest indicator of this is the numerous different metrics identified in both the empirical findings and the literature, together with the described softer approaches, where value is not necessarily demonstrated through specific metrics but rather through experiences or narratives. Hence, no general consensus can be generalized upon from this study. Instead, both empirical findings and previous literature (e.g. Gama et al., 2007) highlight the need for using several metrics, and to adapt the metrics used to the specific company or project. At the same time, the inherent innovation project characteristics such as novelty and uncertainty create a need for adjusting the metrics to each project. This implies that innovation project performance measurement cannot be seen as an area where consensus supposedly can be reached regarding specific metrics. To exemplify, across the sample of this study, no general way of measuring can be identified between the companies. One respondent mentions the use of gut feeling and stakeholders' interest in the absence of accurate metrics for innovation projects, which can be seen as a more informal and qualitative way of measuring, or rather estimating, potential value. In contrast, others use numerous metrics, where measurement on a project level needs to be optimized for each project. Hence, the described practices vary across the sample and instead, a holistic understanding of the *process* of measuring may be favorable to strive for that can act as a basis to find suitable metrics for each situation. As stated by one of the experts, the measurement *points* can then be allowed to vary between individual projects, to optimize its management.

Designing and selecting different metrics for each project does however complicate comparison, as described by Smith (2005), which may reduce the value of measuring in that it only can be measured towards itself and the progress made in that particular project. Thus, some degree of comparison may be favorable, which could be added through the usage of balanced models. However, while the Balanced Scorecard is frequently mentioned throughout performance measurement literature, it is not mentioned throughout the sample in this study. Rather, the importance of a balanced portfolio and combined metrics is highlighted, which indirectly may refer to the same fundamentals as the Balanced Scorecard or a multi-criteria approach. Evaluations through criteria may be a sought-after way of passing gates in a stage-gate approach or moving between sprints in an agile model, revisiting assumptions for checklist planning or creating new hypotheses for upcoming tests. Such methodology is mentioned by several of the company respondents and resembles the discovery-driven approach mentioned by Christensen et al. (2008) as well as McGrath and MacMillan (1995). By continuously testing

multiple assumptions and revising based on new discoveries, these companies may facilitate a dynamic measurement process which can be adapted to each project. Moreover, a process for revising current metrics and results can allow for identification of cause-and-effect relationship (Richtnér et al., 2017), which otherwise is a significant problem according to both expert respondents, company respondents and literature (Kerssens-van Drongelen et al., 2000). Similar to such iterative processes, prototyping and MVPs are reportedly used by many of the company respondents, where criteria or features are continuously being validated based on external input (Cooper, 2014). Thus, other forms of evaluation, in contrast to hard metrics, seem to have a significant impact on how the projects develop and how progress is tracked throughout their duration. Another example of this is the evaluation towards different strategic themes, suggested by some of the company respondents as a particularly supporting evaluation methodology for innovation.

The central point of balancing metrics is to look beyond the single impact of one factor, which is highlighted by a majority of the company respondents. Thus, the logic of the contemporary performance measurement models (Franco-Santos et al., 2012), where several metrics are combined, seems to hold true for the sample companies in this study. This may be due to their relative resource strength and innovativeness as large-sized companies, according to Burgess et al. (2007), allowing them to adopt new ways of measuring. On the other hand, the findings also indicate a predominant quest for traditional measurement practices from the rest of the internal organizations, which is problematic since innovation project performance may reach above the existing logic (Sharpiro, 2006). Thus, one bias that may restrict the adaptation of a dynamic measurement system can be the restriction of current knowledge and limited imagination.

5.2 Identified use of innovation project performance metrics

As highlighted in both literature (e.g. Gama et al., 2007 and Franco-Santos et al., 2012) and empirical findings, the main vehicle for measuring different aspects of performance is through metrics, which places them in a central position of this study. While the details of individual metrics and their implications fall beyond the scope of this study, they have been categorized into several themes of metrics, of which implications and challenges are accounted for in the upcoming sections. The identified themes are customer-related metrics, financial metrics, time-related metrics, learning metrics and other metrics. It should however be noted that as for the synthesis of theory in section 2.5 as well as in the empirical section 4.3, the suggested metrics provided are all examples identified in this study and should not be viewed as comprehensive nor exclusive in terms of empirical practices beyond this study. This may be of particular significance since the findings indicate a high variety of use and impact by measurement on innovation projects. However, identified metrics may contribute to a greater understanding of what is currently being used, and why, alongside potential barriers and possibilities.

5.2.1 Customer-related metrics

The results of this study reveal that metrics related to customers are the ones most frequently used among the sample, referring to metrics such as customer satisfaction, feedback and validations. This is also supported by the findings of Henttonen et al. (2016) showing that customer-based metrics are among the most popular compared to other types of metrics. The reasons for this can be multiple, but as argued by Shenhar et al. (1997), customers have a crucial role in whether an innovation is successful or not on the market. Moreover, a good relationship with the customer can be a foundation for customer-centric improvements during the project, as recommended by Richtnér et al. (2017), also perceived as beneficial by several company respondents. The importance of customer satisfaction is often well understood by all parts of the company. Hence, being able to prove that an innovation brings value to the customer may facilitate an organizational language that everyone understands, favoring the investment and continuation of innovation projects. Additionally, it might be related to a value dimension of performance, in that most companies in the sample emphasize the customer perception as a vital value component to be created for the business.

According to the empirical findings, interactions with customers are often conducted through experiments or tests of hypotheses, prototypes or offerings. Such interaction seems to be considered as key to many of the company respondents as well as expert respondents in facilitating successful innovation projects. As the customer's perception is suggested to be a determining factor of value created, it may be a way to include the customers early in the process and ensure that when an innovation reaches the market, it is something that brings value to them. Moreover, it seems to have a central role in many of the described innovation strategies, explained as customer-centric which emphasize the statement that strategy guides measurement (Frishammar & Björk, 2019). The way of working within for example agile project methods also supports frequent customer interactions to validate prototypes, gather feedback from the users and frequent iterations (Barlow et al., 2011). Hence, interactions with customers can be considered a natural part in the innovation process for many companies, which in turn creates opportunities for monitoring the progress of such to improve, detect opportunities or estimating future potential. This can in turn help innovation managers to prove that a project is proceeding in the right direction. Since customer-related metrics are used during the entire project process, they can be considered sufficient as input, throughput and output metrics, relating to Frishammar and Björk (2019) as well as the findings in the theoretical synthesis of section 2.5.

Even though no specific drawbacks with customer-related metrics are brought up by the company respondents, there may be some aspects to be cautious about. As a majority of the customer-related metrics are found to be qualitative, issues with subjectivity and biases brought in by the selected individuals as described by Henttonen et al. (2016) might affect the outcomes. It should also be kept in mind that all customers might not have the same opinion about a product or service, hence standing a risk of getting misleading results from small scale testing.

In addition, Peterson et al. (2018) argue that the link between customer-related metrics and profitability is complex, emphasizing the need for not solely using these metrics.

5.2.2 Financial metrics

While customer-related metrics are most frequently mentioned by the company respondents in the sample, and despite the criticism brought forth, financial metrics appear to be most commonly requested by top management and other internal stakeholders. This can be related to the fact that performance measurement historically has had the main purposes of controlling and financial reporting (Kuwaiti, 2004). Additionally, the studies by Schentler et al. (2010) and Markham and Lee (2013) suggest efficiency-related metrics, with emphasis on financial, are the most frequently used in a majority of companies. Here a distinction can be made between the innovation managers' stated desire for softer, more customer-focused metrics, and the demands put by other stakeholders on traditional, more recognized and quantifiable metrics. The current use, and opportunities for future use are most likely dependent on both.

For many of the company respondents, it seems to be a recurring problem that top management or other high-level decision-makers have difficulties grasping the full nature of innovation and innovation projects, therefore demanding the same reporting and figures for those projects as for regular projects. As previously mentioned, the outcomes of an innovation project might not occur until several years later, making the use of financial metrics throughout the process challenging, as described by both company respondents and expert respondents. At the same time, some company respondents also mention that using leading indicators such as ROI from an input stage can instead become easy to tweak into looking good because of the inherent uncertainty in the projects. The high degree of assumptions necessary to perform these calculations, especially for more radical projects, might also restrict or lead to shut down of these projects, according to Nagji and Tuff (2012). Thus, both literature and the empirical findings highlight the shortcomings of applying leading financial metrics on innovation projects.

At the same time, similarly to customer-related metrics, financial metrics support a language that most people within an organization understands (Rae, 2006) and, if accurate, often makes it possible to compare between projects as well due to its quantitative nature (Henttonen et al., 2016). Across the sample of this study, the company respondents seem to partially understand top management's wish to see financial figures for innovation projects, even though they do not agree that it is the best way of working. To mitigate the suggested misalignment, educating internal stakeholders about innovation might be a way to increase the understanding and lower the expectations on financial metrics. This reveals the importance of having a top management that understands and supports innovation. Here, it may also be an issue of definition, where the suggested variety might cause difficulties in what to distinguish as a regular project and what to define as an innovation project. In addition, the shortcomings of financial metrics might be more or less present depending on the purpose of using them, as suggested by Brattström et al. (2018) and Simons (1994).

As previously stated, another reason why financial metrics are commonly used might also be that they are traditionally incorporated in the performance measurement structures used. It is described by all company respondents that the goal with innovation is to create value and that it is most commonly and traditionally measured in monetary value. This further increases the emphasis on financial metrics. In contrast to the study from Henttonen et al. (2016) it should also be noted that financial metrics have been found to be the most frequently used efficiency metrics among the best performing companies within innovation, according to Markham and Lee (2013). This indicates that it might not be desirable to completely disregard this type of metrics even though they have to be used mindfully within innovation projects. For example, one of the expert respondents argues that financial metrics should not be used until the final phases of an innovation project, but at that stage they are as useful as for any regular project. However, it is also important to keep in mind that another reason for relying on financial metrics might be because that is how things have been done previously. Specific innovation projects are still new to many companies and the experience they have is from regular projects. In lack of better knowledge, the same principles may therefore be applied to innovation projects as well.

5.2.3 Time-related metrics

Time-related metrics is another area mentioned to be in use when measuring innovation project performance throughout this study. As with financial metrics, time-related metrics are often more quantitative in their nature and make it possible to follow progress of a project. In the literature, metrics such as time to market, hours of training (Hettonen et al., 2016) as well as time to first prototype (Frishammar & Björk, 2019) are given as examples of time-related metrics. However, focusing too narrowly on time-related metrics and if projects are proceeding as expected might, according to some company respondents, create an urge to have everything moving forward at a fast pace. This can lead to missed opportunities as not all projects are crystal clear from the beginning on how to unfold, especially not innovation projects. Thus, put into use wrongfully, they might restrict innovation projects by speeding up the process. For processes that demand iteration, such as agile processes (Barlow et al., 2011), this might impact the final result. It is suggested by one of the company respondents that time-metrics are rather to be used for monitoring but not for steering. Hence, they can be useful to inform the rest of the organization and to ensure that they know how the projects are continuing, but that it is important that everyone agrees that it should not act as a basis for shutting down projects. Moreover, they might therefore play a greater role in the input or throughput category of metrics than in output, using the separation made by Frishammar and Björk (2019).

Connected to time, slack is an efficiency metric proposed by literature (Richtnér et al., 2017; Frishammar & Björk, 2019). It is argued by Richtnér et al. (2017) that slack can result in lower costs and less risk for bottlenecks. One of the company respondents in the sample discusses slack in peoples' schedule as a prerequisite for innovation to happen within companies, highlighting the importance of the concept in practice as well. According to the literature, slack

can be measured by evaluating excess of input resources and shortcomings of output (Tone, 2001). However, across the sample for this study, no specific examples are given on metrics for slack. Therefore, among the company respondents, there does not seem to be a focus on measuring slack, indicating a slight discrepancy between literature and practice.

5.2.4 Learning metrics

A central part in managing innovation projects, brought up by most company respondents, is the learnings associated with the project progress. Cormican & O'Sullivan (2004) relates learning to communication, where lack of communication is the main reason that learning is somewhat deficient in many companies. However, there are multiple benefits from sufficient learning processes, stated in the findings. For example, it may prepare for similar situations in future projects, create new abilities and improve project processes. Even though the area is frequently mentioned as important to measure when looking at innovation project performance, both literature and the company respondents agree that it is an area difficult to capture by metrics. The main reasons for this are, according to Mitchell and Boyle (2010), that learnings are tacit, subjective and embedded in the organization, which may especially complicate any use of quantitative metrics (Henttonen et al., 2016). This is mirrored in the empirical findings where a majority of the company respondents describe that they aim to measure learnings but have not yet found a sufficient way of doing it.

Learning is described as highly subjective with diverse definitions, according to both company respondents and expert respondents. On the other hand, the strengths of qualitative metrics is that they are built on such subjective premises, according to Henttonen et al. (2016). Thus, if acknowledging the drawbacks, such as the bias towards the individuals involved in the qualitative measuring, there might be ways of capturing learning in a valuable way. One example of a methodology mentioned in the findings are self-assessments. This is also supported by Mitchell and Boyle (2010) stating that the methodologies of assessments or categorizational reflections incorporate the tacit nature of knowledge in measurement, thus mitigating the complexity to some degree. As described by one respondent, the critical point here is to agree upon what the team or the company defines as learning. Altogether, above reasoning indicates a future potential in finding new ways of measuring learning as a vital project dimension.

The desire by the company respondents to measure learning is in several cases also connected to the possibility to prove value created through innovation projects, even if the end result does not succeed. It is frequently mentioned by the company respondents that the learnings gained is what define successful innovation projects, not necessarily the outcomes. This might be a necessary attitude towards innovation due to its unpredictability, which most likely causes many projects to fail or be terminated. Another challenge connected to measuring learnings is described by one of the expert respondents as that it is dependent on the people in the teams and their individual knowledge. One goal with measuring learning might therefore be to capture and store it in a systematic way in order to lower the dependency on specific individuals. In all,

considering the diversity of dimensions in performance, learning seems to be of a relative internal nature, reflecting softer, more intangible values than for example financial metrics.

5.2.5 Other metrics

In addition to the main identified categories of metrics, four smaller categories have emerged through either literature or empirical findings. These refer to *Other communication metrics, Collaboration metrics, Technical metrics* and *Risk assessment.* In the following section, they are analyzed and included in a residual category called "Other metrics".

5.2.5.1 Other communication metrics

Besides learning-related measurement, other communication metrics suggested by the literature are not described to the same extent by the interview respondents. Throughout the literature, both internal and external communication metrics are presented, especially through interactions or involvement with internal stakeholders or external collaborators (Dananpour, 1991; Cormican & O'Sullivan, 2004). Overall, the explicit emphasis on communication metrics comes predominantly from the literature, while the connection across the sample for this study is more indirect. The empirical results indicate that internal communication is rather a part of the measurement, used to communicate progress and value created. One example of this is meetings with steering committees to report project status, which is conducted by most company respondents in some way. However, specific measuring points for communication are not brought up across the sample. Hence, there seems to be a discrepancy between theory and the empirical findings as to what degree communication itself should be measured. It should however be noted that the literature is relatively scarce within this area as well, especially within internal communication as suggested by Damanpour (1991).

Even though communication is generally seen as important for informing project progress and the findings that occur throughout projects, it does not seem to be a prioritized area to measure. One reason might be that there is not any perceived added value in putting metrics to those activities, thus no meaningful use (Bladt & Filbin, 2013). Moreover, while external communication is reportedly managed throughout the project with customers and other stakeholders, its measurement might interrelate to the metrics categorized as collaborational by the literature (e.g by Adams et al., 2006). For example, measuring customer interaction and related feedback may be a way to both manage collaboration and communication as paths to enhance the offering of the innovation project. It may also act as input for estimations of future financial profitability or market acceptance. This indicates that the suggested categories of metrics in this study are not mutually exclusive but rather tightly integrated.

5.2.5.2 Collaboration metrics

In regard to the literature section, the previously discussed customer-related metrics are placed within the area of collaboration metrics, as an external stakeholder relationship. However, according to the literature, metrics on collaboration does not only incorporate the customer-

related metrics, although these are the ones recurring throughout the empirical findings. Another part of the collaboration metrics is that of measuring interactions with other stakeholders such as suppliers and partners (Frishammar & Björk, 2019), and internal metrics looking at involvement of employees (Dewangan & Godse, 2014). These are however not specifically discussed by the company respondents. In regard to external collaboration, companies might not always include external stakeholders, beyond their customers, in their innovation process, potentially due to the competitiveness involved. Another reason why it is not mentioned throughout the interviews might be that the focus in the interviews has mainly been on the internal aspects of innovation. Taking the perspective of internal collaboration, that is frequently mentioned by the company respondents in terms of for example working in teams and reporting to management. Most companies within the sample seem to have a structure for discussing and reporting innovation projects, indicating that it is perceived important. However, it does not seem to be an area measured, but rather seen as a necessary part of the process. This can be due to the fact that this collaboration is not seen as the reason why a project is making progress or not, but rather a prerequisite for innovation projects to happen at all.

5.2.5.3 Technical metrics

Another field of interest in terms of measuring innovation projects is the technical ability to carry through with the innovation, mentioned by some company respondents in the sample. It is described in terms of input metrics, such as estimated feasibility or readiness of technology, but also in terms of output metrics such as patents. While patenting is mentioned in the literature by authors such as Goffin and Mitchell (2017) and Frishammar and Björk (2019), it may be highly context-dependent, and especially important for technology-driven companies that actively work with a patenting strategy. This may explain the fact that it is not mentioned more frequently throughout the sample as it consists of various industries. On the other hand, as Goffin and Mitchell (2017) explains, patents indicate inventions and not innovations, while a majority of the company respondents clearly include a dimension of commercialization in their innovation definition. Thus, patenting may fall out of their innovation definition, and also their roles as innovation managers. Instead, patents might in many cases rather be managed on an R&D level where technical development takes place. This can also be the case of technical quality metrics, mentioned by the literature but not in the empirical findings. Furthermore, it should be noted that all innovations may not be of technical nature, where such metrics then would not provide any value to measure. Therefore, contextual factors such as industry, offering, organizational structure or strategy might impact the degree technically-oriented metrics are perceived valuable for managing innovation projects.

5.2.5.4 Risk assessment

While Frishammar and Björk (2019) suggest several metrics related to risk, only three respondents mention risk management in relation to innovation project performance measurement. In addition, those respondents seem to rather perform risk analysis as an activity or a criterion than to manage any explicit metrics around it. On the other hand, criteria-based measurement has previously been brought up as an alternative way of measuring, compared to

using predetermined KPIs. Although its management or measurement is not discussed particularly by the other company respondents, a majority mentions the implications of different risk components or uncertainty in innovation projects, indicating that it is indeed acknowledged by a large share of the company respondents in the sample. However, its management may be informal or integrated into other aspects, complicating the ability to describe it as a separate activity. Moreover, since it is not specifically mentioned by most of the company respondents in terms of any metrics, it may be that risk as a component is less of a controlling factor but rather a prerequisite to understand when managing innovation. The assumption of risk apprehension being a necessary prerequisite is supported by several authors such as Al-Shaaby and Ahmed (2018) as well as Frishammar and Björk (2019), in that it enhances the chances for success. Thus, while not significantly highlighted in the empirical findings of this study, risk assessment is not to be overseen when managing innovation projects. Nonetheless, the desire of many top management to mitigate uncertainty, described by one of the expert respondents, may imply a certain demand for demonstrating and communicating risk management of innovation projects, where assigned metrics could be a tool for such.

5.2.6 Leading versus lagging metrics

Overall, there seems to be a greater application of leading metrics than lagging metrics across the sample. Potential explanations could be the reportedly long time-lag between input and output from innovation projects in combination with their indirect effects, complicating the correlation between cause and effect. Moreover, the critical point in time to measure seems to be right before scaling the project, when a larger investment is required, for many companies across the sample. Thus, the stakeholders that take part of the measured information may be more interested in future potential, that is, if the investment will pay off, than if a project invested in many years ago did or did not pay off. On the contrary, Cordero (1990) argues that both leading and lagging metrics are needed also in the later phases of innovation projects. One of the company respondents stated that innovation needs to be planned strategically, indicating a forward-looking approach rather than backward, which might explain the focus on leading metrics. The findings also reveal that measurement is mainly about finding, validating and communicating potential value. In addition, the relatively small share of applied lagging metrics throughout the sample may be a reflection of the newness of the field of structured innovation management, in that the effects from recently initiated innovation projects are not yet visible. While numerous potential metrics have been identified throughout this analysis section, the findings of this study also suggest several factors and challenges impacting which metrics to use. These will be analyzed further in the upcoming sections.

5.3 Factors and challenges impacting the choice of metrics

5.3.1 Reporting and top management demands

The type of information or metrics that is requested from an innovation project varies between the companies in the sample. While some company respondents are asked for business cases

and financial figures, others focus more on the alignment with the overall strategy of the company. Previous studies have found a link between selected metrics and the aims and motives of the specific company (Chiesa & Frattini, 2007; Chiesa et al., 2009), indicating that the metrics perceived important will vary across companies due to the variety of strategies. This also goes together with how, and to what degree, the projects are reported within the organization and to top management. In some organizations, reporting to top management is frequently requested while in others it mainly occurs within the innovation unit or between innovation managers. The degree to which information is delivered in a formal setting, through specific meetings, or informal setting, through for example members of the organization requesting information, also vary. This goes in line with the general view of performance measurement systems including both formal and informal processes which ensure management of strategic objectives (Ferreira & Otley, 2009). While formal reporting creates a structure within the organization for how these projects are handled, it can also force the projects into a reporting setting that does not really fit. In those cases, informal reporting might be more suitable to be able to describe a project as accurately as possible. On the other hand, informal reporting might lead to different projects having different prerequisites depending on unforeseeable circumstances. However, the literature in combination with the empirical findings indicate that the two should not be seen as mutually exclusive, but rather as complements. Instead, it is important to be aware of the implications of the two and figure out how to best combine them.

Across the sample, pressures for using certain types of metrics seem to come mostly from top management, whereas innovation managers themselves might prefer other metrics more suitable to the complexity and dynamics of innovation projects. The seemingly high influence on metrics from top management may be due to the fact that measurement often strives to inform management about the status (Nagji & Tuff, 2012), and that they, as receivers of the information, therefore can impact what is considered important. The difference in preferred metrics between top management and innovation managers might be explained by the different approaches of their roles. While innovation managers have innovation as the main priority, top management answers for the entire company, including other functions as well. Hence, they need to keep a more holistic perspective of the company with limited insight into specific projects. This can make it difficult for them to handle innovation projects in a different way than regular projects. On the other hand, one respondent emphasizes the value of adapting the communication with internal stakeholders, such as top management, to enable a greater understanding for the innovation projects and their potential for the company. Moreover, since innovation enhances competitiveness and growth (Badrinas & Vilá, 2015), it should be a key strategic priority for most companies, thus also a top management priority to ensure sufficient facilitation for.

5.3.2 Impact from strategy

As previously stated, it is evident across the sample of this study that strategic prioritizations of the company affect what is measured. While not all company respondents have expressed a

clearly designed innovation strategy, a large majority emphasize the strategy's role in ways of measuring or designing appropriate metrics. One example is the reporting through strategic themes, where evaluation of projects occurs towards its alignment with a specific theme or the overall strategy of the company. Here, strategic alignment is suggested to be a criterion to evaluate when convincing other parts of the organization about its future potential for the company. In addition, many company respondents describe a customer-centric innovation strategy, where frequent interactions are carried out together with the customers to evaluate performance and develop further. Thus, it implies that the strategy guides the actions for project evaluation. The importance of including qualitative metrics such as alignment with strategy is also emphasized by Schentler et al. (2010), highlighting the need to include those parameters to measure efficiency. With clear strategic goals, it is more important to capture those values within the measuring. Hence, for innovation managers wanting to decrease the focus on for example financial metrics, ensuring clear goals and strategic direction of the company's innovation work can be a way to achieve that.

The importance of strategy-driven measurement is also highlighted by Frishammar and Björk (2019), and Goffin and Mitchell (2017), placing it as one of the main elements of innovation management, where performance measurement takes place. The context-dependency of innovation project metrics described by Aase et al. (2018) may therefore be highly influenced by strategic direction, both from the overall company or if any specified innovation strategy is being carried out. Consequently, the strategy seems to act as a navigator towards how to evaluate innovation project performance, such as through mapping performance to predefined themes, or through criteria such as strategic alignment as critical to reach before continuing to the next stage. There is a general awareness of the strategy's role for innovation management overall, being translated into how companies in the sample choose to measure. The results of this study indicate that having a clear strategy can both guide the decisions on what to measure, as well as decrease the emphasis put on financial metrics that might not always be suitable.

5.3.3 Measuring radical compared to incremental innovation projects

In addition to the limitations of each metric category, several challenges have been identified throughout the study, impacting the measurement practices applied. One of the main challenges identified by the results relates to measuring radical, or explorative, projects, which is also emphasized throughout the literature (e.g. by Christensen et al., 2008). The nature of innovation projects opposes traditional measurement models and metrics, as explained by Nagji and Tuff (2012). Especially from an expert point of view it is emphasized that traditional metrics restrict the innovativeness of radical projects, thus limiting the potential outcome or leading to abandonment of potentially valuable projects. Moreover, two of the company respondents state that radical efforts might have less of a structured strategy, which can be one of the reasons why such projects are mentioned to be harder to measure. Incremental projects, on the other hand, are found to be more predictable in outcomes, similar to regular projects, which may explain why traditional metrics are described to function well. The findings therefore suggest that different requirements of varying project characteristics should be appropriately balanced

when measuring or evaluating innovation projects. To mitigate the challenge of measuring radical innovation projects, different strategies have been suggested within the sample. For example, some companies leave the radical project teams with the sole strategy of being outside of the box, in contrast to the incremental projects where innovation strategies seem to more frequently be the navigator which measurement is built upon. In general, it is emphasized that radical projects can nor should be controlled in the same way as incremental innovation projects. On the other hand, it should be noted that the variety of definitions within innovation may play a significant role in how the separation between incremental and radical projects is perceived across the sample.

Noteworthy is also that while Goffin and Mitchell (2017) describe radical innovation as rare, several pursuits for this kind of innovation can be found across the sample. The findings do not indicate how often these projects are successful, which implies that pursuits for radical innovation and rarity of radical innovation does not have to be opposites. Instead, numerous radical innovation projects might be needed before one succeeds, confirming the rarity of these innovations. What the pursuits to perform radical innovation does indicate is that companies see radical innovation as important for the company. Often, however, these efforts seem to be separated from the core business, most likely to allow for radical projects to be managed in a separate manner. This is logical in line with the balancing of exploring versus exploiting (O'Reilly & Tushman, 2004) as innovations on the opposite sides of the continuum require opposite metrics (Nagji & Tuff, 2012).

5.3.4 Potential conflicts of organizational interests when measuring

Even though separating radical innovation projects from the core business might be beneficial, it also comes with challenges that affect what gets measured. Every respondent that is stated to be part of a separate explorative unit describes integration challenges towards the rest of the organization who both manage and measure differently. Here, Frishammar and Björk (2019) mention that different use of metrics may result in sub-optimized project management in terms of conflict of goals. This can be linked to the identified issue of conflicting organizational perspectives which also have implications for how the company metrics innovation project performance.

Reasons for conflicting interests across the organization may be due to the inconsistent definitions of innovation as a concept, previously described by both theory and empirical findings, or internal political factors, such current structures or resistance to change, as suggested by Ritchnér et al. (2017). For example, some company respondents suggest that the incentives of the main organization are driven by shareholder interests and top management prioritizations, which tend to be financial and short-term. In contrast, innovation projects are stated to be driven strategically, mostly with customers as key priority, and often with a longer-term objective. Therefore, such prioritizations are stated by both theory and the sample company respondents to restrict innovation, especially radical. In connection to this, the impact of organizational culture on innovation is discussed by both literature (Goffin & Mitchell,

2017; Adams et al., 2006) as well as most company respondents where the culture can both enhance and restrict innovation. For example, one of the company respondents mentions that the organizational culture is making it harder to implement new processes and structures to enhance innovation. The established culture, structures and measurement system could therefore counteract the implementation of new, dynamic methods and metrics, explicitly necessary for radical projects where the traditional models are not sufficient enough.

5.3.5 Measuring throughout different project phases

Another identified challenge affecting the possibilities to measure innovation project performance is the different characteristics throughout the various stages of a project that seemingly put different requirements on evaluation. On one hand, while many of the project processes described in 4.2.2 resemble either the stage-gate or agile approaches presented by Cooper (1990) and Barlow et al. (2011), they all seem to differ between the various companies. Thus, from the sample of this study, one cannot generalize across any specific common project process for innovation projects. On the other hand, some common traits can be found in the early phases, often including the activity of defining a problem or idea, and in the later phases, with scaling and bringing it to the market. This is not significantly different from the model from Frishammar and Björk (2019) of input-, throughput- and output on a high-level basis, which could act as a navigator for measuring in different stages.

As estimations are mostly done in the early phases, the reasoning from Henttonen et al. (2016) suggests that qualitative metrics should be dominant at that point. In a similar manner, from an expert perspective, the findings suggest that the uncertainty in early phases shifts the focus, from proving value to testing value. This indicates a greater openness towards making subjective assumptions followed by testing. If solely making assumptions based on the limited information in early stages, several company respondents agree that figures easily can be manipulated to favor the projects, relating to the downsides of estimation bias from qualitative metrics suggested by Henttonen et al. (2016). Moreover, as one expert suggested, measuring should perhaps be conducted on cultural aspects in the early phases, to ensure that facilitation for innovation is evaluated rather than proving potential value. This also relates to improving the innovation culture, which is desired by many of the company respondents and may also be a way of strengthening the innovation capability on a company level. In addition, the same expert suggests that process-oriented metrics should be used during the process and financial metrics in the final stages, which goes in line with the conceptual separation of metrics presented by Frishammar and Björk (2019). On the other hand, there may be differences in perceptions of when different phases take place due to the variety of project processes and project management methodologies suggested in the sample. Hence, from a holistic perspective, the projects should potentially be viewed in its whole rather than separated at certain points. The separation might lead to a too narrow focus where the variety of processes might limit the application of systematic structures or disregard certain projects that do not fit into the measurement system designed for other types of projects in other phases.

5.4 Challenging the usefulness of measurement

While a majority of the sample is positive towards measuring innovation projects, three of the company respondents and additional expert respondents display criticism towards measuring innovation, some at the project level and some overall. The hesitation towards measuring may originate from not understanding the purpose of it, which Richtnér et al. (2017) call an underestimation of its significance, and a belief that it would restrict innovation potential. This is mentioned by one of the expert respondents as a tension between creativity and control. As suggested previously in this study, that may sometimes hold true, but not necessarily for all projects or metrics. Across the sample, there are also differences in attitudes towards measuring different kinds of projects, where the company respondents generally are more positive towards measuring incremental innovation projects rather than radical ones. One reason for this might be that the two in many cases require opposite metrics (Nagji & Tuff, 2012), where traditional metrics such as NPV are stated to be more suitable for incremental projects.

On another hand, managers can also overestimate the significance of measurement, measuring too much without contributing to business value, what Bladt and Filbin (2013) call vanity metrics. By the company respondents, it is emphasized that measurement must have a clear purpose and support projects rather than imposing a controlling mechanism. This emphasis is also supported by the conclusion of Bititci et al. (2012) that the field of performance measurement is shifting towards focusing more on cultural control and learning processes rather than controlling metrics. If the right metrics are used, Gama et al. (2007) argue that they can act as a data-driven ground for investments and optimize the evaluation, emphasizing the importance of actually measuring. Hence, there might be a discrepancy between what value the right metrics can provide and the degree to which companies have the ability to find and use the most suitable metrics. In addition, the suggested tension between creativity and control may then rather be about finding the proper balance between the two; controlling enough to keep the process structured and confirming value, and simultaneously allowing creativity and responsiveness to newly discovered information during the process. The suggestion by one respondent, that measurement should be combined with communication and common sense, may further strengthen the assumption that it needs to be well understood for it to provide any value for the company. This relates to the criteria of adequate metrics according to Birchall et al. (2004) where one criterion refers to understanding both the benefits and the flaws of the metrics selected. Thus, the reported lack of maturity within the field of innovation performance measurement on a project level may contribute to the somewhat questioning attitudes towards measuring within the sample. At the same time, to understand what metrics that are suitable they also need to be questioned and thoroughly evaluated. Seen from that perspective, the questioning attitudes found might be beneficial, as long as it does not lead to complete avoidance of project evaluation.

5.5 Towards a holistic perspective on measuring innovation

Pointed out by many company respondents, and especially expert respondents, it is considered critical to keep a holistic view of innovation and look beyond the individual project when evaluating the value of innovation. For example, it is argued by some company respondents that reporting project progress on a single-project level is too detailed for management to handle and that instead, that reporting should be carried out on a portfolio level. This is supported by the reasoning from Schentler et al. (2010) in that there is an interlinkage between the parameters of a single project, portfolio and the organizational level in terms of performance measurement. To focus measurement too narrowly is also acknowledged by Richtnér et al. (2017) as one of the main pitfalls when measuring innovation efforts, or in this case projects. This may be one of the reasons two of the expert respondents are somewhat hesitant towards measuring on a single project level. Another potential reason may be the lack of maturity within the field, in that managers do not know how to measure. As suggested by the findings from Adams et al. (2006), that may cause poor measurement without added value for the company. Therefore, recognizing the interlinkages between different levels of measurement and their implications may be of importance when designing sufficient metrics. While this importance seems to be understood by the innovation managers, measurement appears to not always be integrated on various levels. For example, one respondent describes decentrally managed projects and many company respondents are part of innovation units separated from the original business. Thus, the holistic perspective of innovation may in some companies be deficient. On the other hand, it may also be dependent on the strategy of the individual company as to whether the innovation process is clearly predefined or if each initiative is thought to appear randomly within the company. Therefore, a holistic perspective from the innovation manager may not always be desired.

In line with the described interlinkage between levels of measuring, and stated by two of the expert respondents, the innovation project management process depends on the overall innovation management process and the capability for innovation. This reinforces the view of innovation management as a system of interconnected processes as suggested by Pisano (2015). Another sign of such systematics may be the complexity of cause and effect, as well as the spillover effects from, or into, other projects and parts of the organization. This indicates a difficulty to measure a project in isolation. Furthermore, while the measurement points in terms of what to measure in each project most likely will differ between various projects, it is described by one expert that there is a systematics in measurement models, or simplified in how to measure or how to select what to measure. Hence, it should be possible to find generalizable measurement models between and within companies, which are then applied using different metrics depending on the specific project. This might be one approach to make the field of innovation project performance measurement more mature.

At the same time, a need for underlying structure in place to be able to measure successfully is also suggested by two of the expert respondents. Therefore, a functioning innovation

management system may act as a foundation for measuring innovation project performance. Although the ISO standard for innovation management was released only two years ago (Tidd, 2020), two of the company respondents have reportedly adapted it into their innovation management practices. This indicates an interest in systemizing the innovation management, potentially due to the advantages presented by Badrinas and Vilá (2015). On the other hand, in some cases, the innovation units are young, and hence not yet fully established, where the lack of maturity may complicate the interpretation of the standard, which Tidd (2020) states is one of the downsides. Thus, the ability to systemize and structure innovation performance measurement may depend on the maturity of the innovation management practices. Yet, although it is recommended from an expert point of view, the maturity of the market is still to catch up, according to the indications from this study.

5.6 Synthesis of analysis

Throughout this analysis a number of key areas have been examined, mutually impacting the way innovation projects can be measured and followed up upon. The findings indicate a great variety in how large-sized companies choose to measure innovation projects. While several categories of potential metrics have been exemplified throughout the study, they all have separate advantages and drawbacks. In addition, there might be organizational as well as project-related challenges to account for when putting metrics to use. Consequently, a comprehension and purposeful use of such are considered important to grasp the implications for each metric put to use. Due to contextual factors, such as strategy, industry or specific project processes and characteristics, each innovation project needs careful consideration in finding suitable metrics. As suggested by Richtnér et al. (2017) it is critical that each company sets their own expectations and revisit measurement practices continuously. Furthermore, the findings indicate the need for dynamic measurement processes, balancing multiple metrics of different nature to cover various aspects of the project performance. Alternative ways to measure, compared to the traditional hard metrics, have been identified throughout the study. Examples of such are assessments, feedback, and thematic evaluations.

Overall, there seems to be a fine line between measurement and management, where the two activities most likely need to be tightly integrated to enable steering of innovation projects as well as purposeful use of metrics. It can be seen in the cases of for example risk assessment, collaboration or communication, that what is proposed by the literature does not necessarily apply in practice in terms of measurement. On the other hand, that does not automatically imply that it is not managed. This can also be reflected in the varying attitudes towards measuring as such, described by the company respondents in the study. However, as suggested by both findings and literature, measurement can add value for innovation project management as a navigating and supporting function when the purpose of it is well understood by its users. Due to the lack of maturity in the field, in both practice and literature, there are sizable opportunities for advancement moving forward. An enhanced understanding of measurement practices will

most likely have positive impacts for innovation project performance and the interlinked innovation capability on a higher level.

6. Conclusion

This chapter serves to answer the proposed research questions of how innovation project performance can be measured within large-sized companies, what current practices looks like and what the main challenges are. In addition, implications of the answered research questions for both practitioners and researchers are discussed, together with proposals for future research within the area.

6.1 Answer to research questions

The purpose of this study has been to explore how innovation project performance can be measured from the perspective of large-sized companies. In doing so, it has particularly focused on current measurement practices and their implications together with identified challenges that might affect how measurement can be carried out. The study has taken a holistic view on innovation project performance measurement, by drawing upon the experiences from innovation managers in twelve Swedish large-sized companies in combination with five expert respondents within the broader field of innovation. Combined with literature on innovation, project management and performance measurement, built up by the two sub-questions of current practices and main challenges, the overarching research question "How can large-sized companies measure the performance of their innovation projects?" is answered.

Even though varying greatly in terms of specific metrics and methodologies used, it has been concluded that Swedish large-sized companies within the sample do measure and follow up their innovation projects today. The necessity of doing so is also highlighted throughout the majority of both empirical findings and literature. Several measurement practices in use have been identified, such as evaluating through criteria or strategic themes, testing assumptions, conducting risk analyses and especially through combining different metrics. The metrics applied can be categorized into different dimensions, each with its own advantages and disadvantages. Customer-related metrics have been found to be most frequently used having the benefit of ensuring a close connection to the customers, as well as having the ability to prove other value than solely monetary. Moreover, these also seem to be most favored by the innovation managers. On the contrary, most customer-related metrics are of qualitative nature, implying challenges of subjectivity and varying consumer preferences. In addition, the explicit connection to profitability can be difficult to identify. This can be contrasted to financial metrics which are more commonly quantitative and hence, enables a foundation for comparison between projects. These metrics are traditionally used within project management and have been found to frequently be requested by top management. However, the criticism towards applying financial metrics on innovation projects is significant, from the company respondents as well as from literature. The main issue brought up is that the uncertainty inherent in innovation projects cannot be properly handled when evaluating them based on financial metrics. On the other hand, completely disregarding the financial metrics has not been found desirable. Instead, it is suggested that they should predominantly be used in later stages of an innovation project, when it has become more similar to regular projects and the degree of

uncertainty has decreased. Even though most financial metrics are well-established, there is still future potential in being able to adjust and properly apply them to innovation projects.

A third group of metrics identified is that of time-related metrics. As with financial metrics, time-related metrics are often quantitative, hence having similar benefits. At the same time, it has been found that time-related metrics also can lead to pushing projects forward too fast as the movement is what is measured. Fourth, learning metrics have been suggested as a group of metrics frequently brought up throughout the study. However, this is an area where most companies of the sample do not seem to have found a sufficient metric and hence, there is a lot of future potential within this area. By being able to capture and measure the tacit aspects of learning, projects that are unsuccessful in terms of market success can still be proved valuable through learnings gathered throughout the process. Besides the mentioned groups, additional metrics within communication, collaboration, technical aspects and risk have also been discussed. Consequently, it is evident that there is a great number of various metrics available for innovation projects. This study has highlighted the importance of understanding the implications and shortcomings of the metrics utilized to be able to choose between them and purposefully apply them to innovation projects.

The diversity, uncertainty and complexity of innovation projects have been argued to be the main challenges when measuring its performance. Examples of these challenges are evident especially in the indicated need for opposite metrics between incremental and radical projects, the potential conflicts of organizational measurement interests and the difficulty of measuring across the various project phases. Additional challenges identified relate to variation of definitions and a general lack of experience within the field. In addition to considering the challenges, other factors such as strategy and reporting demands from top management seem to play a significant role in what metrics are used. Emphasis should therefore be on finding metrics that ensure projects are in line with what the company strives to achieve.

Based on the findings, it can be concluded that there is no best way of measuring the performance of all innovation projects. This is exemplified by the large number of different metrics presented throughout both literature and empirical findings. Hence, for the large-sized companies in the sample, there are numerous ways innovation project performance can be measured, and the emphasis is put on the importance of finding the right way for each specific company or project. Moreover, in terms of systemizing and searching for best practices, the findings indicate that focus should rather be on the process of measuring, not specific metrics or measurement points.

Finally, measuring innovation project performance is still a greenfield with a lot of future potential, according to both literature and practice. The great variety in metrics and approaches used might be partially due to this novelty of the field, thus having the possibility to become more streamlined as the field becomes more established. In general, the attitude of innovation managers within the sample toward measuring is positive. However, some hesitation is present,

especially toward measuring the performance of radical innovation projects due to the high degree of uncertainty associated with these projects. The study has therefore stressed the need for adapting the ways of measuring innovation projects rather than dismissing it. The importance lies in finding the right metrics for the company and the specific projects and ensuring that the metrics are aligned with the strategy. By doing that, the metrics will provide value for the company and the benefits of measuring will be realized.

6.2 Implications from conclusions

6.2.1 Implications for practice

The findings of this study highlight the differences in how measurement is conducted for the performance of innovation projects between companies and the numerous opportunities available. At the same time, it is suggested that there is no best way, and that metrics needs to be applied with regards to the specific context to fulfill its purpose. As implications for practice, the result of this study provides guidance and practical recommendations based on the experiences from innovation managers and innovation management expert respondents in combination with researched literature. These may be valuable to consider when adopting measurement practices or metrics into the current processes of innovation projects, especially considering the current lack of sufficient knowledge suggested by Brattström et al. (2018).

More specifically, it is important for innovation managers to understand that there is no best way to measure and that each company therefore needs to find their own way. What works for one company or one project might not work for all. Instead, the findings of this study can act as a basis for identifying potential metrics for further exploration. Before put to use, the fit with both the specific company and setting needs to be carefully evaluated. In addition, the challenges identified seem to be applicable to a significant majority of the companies in the sample, indicating the importance of taking these aspects into consideration. From a holistic perspective, the study might even act as a benchmark to some degree, in how current practices are experienced and their opportunities for improvement. Moreover, the study contributes to raising the awareness for companies about the implications of performance measurement on an innovation project level.

6.2.2 Implications for research

The academic contribution of this research is foremost an addition to the body of work within the innovation performance measurement literature, reducing somewhat of the discrepancy between theory and practice previously identified (e.g., by Adams et al., 2006). Specifically, it increases the comprehension of performance management from a project level, highlighting its interlinkages to other levels of analysis and its complexity in measuring. Concluding that there is no universal measurement methodology or practice across the sample, it also emphasizes a call for context-dependent research within the field. However, this study has only touched upon the surface of innovation project performance measurement from a holistic perspective. This,

in combination with the relative novelty of the field creates numerous opportunities for future research. Suggestions of potential research areas will be presented in the section below.

6.3 Recommendations for future research

The holistic perspective taken of this study comes with limitations as it provided a broader overview rather than in-depth explanations of each case or measurement practice. Therefore, a case study on one or a few companies could provide another level of detail within the area. With a case study, the process of measuring could also be observed rather than described, deepening the understanding and allowing for a more detailed focus. Case studies would also allow for a greater understanding of the connection between specific contexts and how projects are measured and evaluated, as that has proven to be a significant determining factor from the results of this study. No concern has been given to specific industries or types of innovations in terms of product/services, processes or business models. Together with the highlighted need for contextual measurement, potential branches from this study therefore refer to specific industry- and/or innovation settings.

Another potential perspective to explore is that of top management. Throughout this study, the impact of top management has frequently been discussed in terms of for example metrics requested and lack of understanding regarding the differences between regular projects and innovation projects. The reasons for this misalignment that seem to occur in many companies can be many, and to further investigate top management's view of the topic might broaden the understanding of their reasoning. Insights on this topic can also be valuable for innovation managers struggling to create a common language between the innovation department and the rest of the organization, understanding where the challenges lie and how they can be mitigated. From this study it can only be speculated that lack of knowledge around the nature of innovation and a wish to do things the same way as always could be impacting factors worth further investigation.

Thirdly, as this study has taken the perspective of Swedish large-sized companies, the results are limited to that specific context. Hence, the field of innovation project performance within other markets and within SMEs still remains unexplored. As the characteristics and prerequisites of companies in different markets and of different sizes frequently differ, it is reasonable to believe that it might be the case within this field as well. For example, SMEs might not have dedicated innovation managers which might impact the perspective taken on innovation projects and hence how they are evaluated.

Put together, the novelty of the field comes with a large number of areas to be further explored. Increased understanding of how to evaluate the performance of innovation projects will be beneficial for practitioners within the field, due to the increasing importance of being innovative.

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Appendix

Appendix 1: Company respondent interview guide

Interview guide company respondents (English version)

Background

- Please tell us about your current role.

Definition and innovation strategy

- How do you define innovation?
- What is your the innovation strategy of your company?

Innovation projects

- How does the process for innovation projects look like today?
- How do you define a successful innovation project?
- How do you define a failed innovation project?

Measuring innovation projects

- How do you follow up on innovation projects today?
- How do you measure project performance?
- What metrics are used?
- Who decides about the metrics?
- How is ongoing project status reported?

Challenges and future opportunities

- What challenges do you see with measuring innovation projects?
- In the future, how would you want to see that measuring is conducted?
- Is there anything that we have not asked you that you would like to add?

Interview guide company respondents (Swedish version)

Bakgrund

- Berätta om din nuvarande roll.

Definition och innovationsstrategi

- Hur definierar du innovation?
- Vad är er innovationsstrategi på företag X?

Innovationsprojekt

- Hur ser projektprocessen ut för era innovationsprojekt idag?
- Hur definierar ni ett framgångsrikt innovationsprojekt?
- Hur definierar ni ett misslyckat innovationsprojekt?

Uppföljning och mätning av innovationsprojekt

- Hur följer ni upp era innovationsprojekt idag?
- Hur mäter ni utveckling/framsteg i projekten?
- Vilka mått används?
- Vem beslutar om måtten?
- Hur rapporteras pågående projektstatus?

Utmaningar och framtida möjligheter

- Vilka utmaningar ser du med att mäta innovationsprojekt?
- Sett framåt, hur skulle ni vilja att uppföljning eller utvärdering såg ut?
- Är det någonting som vi inte har frågat om som du skulle vilja lägga till?

Appendix 2: Expert respondent interview guide

Interview guide expert respondents (English version)

Background

- Please tell us about your background and current occupation.

Definition and practical experiences

- How do you define innovation?
- What is your experiences of companies ability to measure and follow up on their innovation projects?
- Do you see any differences or similarities between companies?
- To what extent do you see that measuring innovation is generalizable (and to what extent does it have to be adapted to each project or organization?)

Measuring innovation projects

- Seen from a project level, what components are the most critical in order to measure and evaluate innovation projects?
- How can companies decide which metrics that are best suitable for a specific project?
- How do the demands for measuring differ between different types of innovation projects?
- How do the demands for measuring differ between early and late phases of innovation projects?
- How can companies create sufficient prerequisites for continuous evaluation?

Other

- What challenges do you see with measuring innovation projects?
- Is there anything else you think that we should ask practitioners in the field about?
- Is there anything that we have not asked you that you would like to add?

Interview guide expert respondents (Swedish version)

Bakgrund

- Berätta om din bakgrund och vad du arbetar med?

Definition och praktiska erfarenheter

- Hur definierar du innovation?
- Vad är din uppfattning om företags förmåga att mäta och följa upp sina innovationsprojekt?
- Ser du några likheter och skillnader mellan företag?
- Till hur stor del ser du att mätning av innovation är generaliserbart (och till hur stor del tror du att det måste anpassas till varje unikt projekt eller företag?)

Uppföljning och mätning av innovationsprojekt

- Sett från en projektnivå, vilka komponenter är mest kritiska för att mäta och utvärdera innovationsprojekt?
- Hur kan företag avgöra vilka mått som passar bäst till ett specifikt projekt?
- Hur skiljer sig kraven på mätning mellan olika typer av innovationsprojekt?
- Hur skiljer sig kraven på mätning mellan tidiga faser och senare faser för projekt?
- Hur skapar man rätt förutsättningar för kontinuerlig uppföljning?

Övrigt

- Vilka utmaningar ser du med att mäta innovationsprojekt?
- Är det något speciellt du tycker vi borde fråga praktiker som arbetar som innovation managers inom detta ämne?
- Är det någonting som vi inte har frågat om som du skulle vilja lägga till?

Appendix 3: First contact message to company respondents

First contact message Linkedin (Swedish)

Hej [NAMN],

Jag kontaktar dig i samband med min masteruppsats inom Innovation & Industrial Management vid Handelshögskolan i Göteborg. I vår uppsats kommer vi att undersöka hur företag arbetar med uppföljning av sina innovationsprojekt och vill gärna höra dina tankar kring detta som [ROLL] på [FÖRETAG].

Har du möjlighet till en onlineintervju på max 60 minuter någon gång i mars? Självklart kommer både ditt och företagets namn vara anonymt och ni får tillgång till den färdiga uppsatsen senare i vår som tack för hjälpen.

Låter detta intressant skickar vi gärna mer information över mail och bokar in en tid för intervju.

Ha en fortsatt bra dag!
Med vänliga hälsningar,
[NAMN]

Appendix 4: Coding* for thematic analysis

Code	Example	Theme
Innovation definition	*"There are many definitions but the one I like the most is that it is something new that creates value for something" - R7*	Innovation Management practices
Innovation strategy & goals	*"The idea is that we should lead and shape the market, to be first" R4*	
Leadership & culture	*"It's a cultural change that is needed, to gain anything from innovation you have to risk a little too" -R6*	
Innovation management system	*"When you have an innovation management system, you have an infrastructure in place to drive innovation projects" E3*	
Project process	*"Product development processes, well they have this traditional waterfall process, while for services, well we work a lot with this design thinking process." - R5*	Project management and evaluation
Evaluation methods	*"We have different checklists with deliveries that has to be in place with a certain time" - R4*	
Reporting practices & demands	*"We have steering group meetings which are very much time, cost, quality" - R10*	
Value definition	*"Value can be a lot of things but if we are to have a common yardstick then maybe it will most likely be money in this setting" - R8*	
Customer-related metrics	*"It can be about how much the customers are recurring or other KPIs that enables an under an appreciation one the market fit" - R9*	Metrics
Financial metrics	*"We try to measure in different aspects, such as what are the resources return on investment" - R3*	
Time-related metrics	*"The best metric we have right know is actually that you schedule time, that you actually work on the project you are supposed to work on" - R7*	
Learning metrics	*"The goal is the learning process, and it is of course rather, well, hard to reflect… what you really learn" - R11*	
Technology metrics	*"When it comes to technologies we have goals of when we think we will reach a certain maturity level of a technology" - R7*	
Other metrics	*"Can we see a high risk or a low risk to success or fail with this? It's several parameters that we continuously look at" -R8*	
Innovation management challenges	*"The quarterly economy is the most predominant reason businesses generally are bad at innovation"- E4*	Challenges
Challenges with measuring	*"The metrics that have been made, are not integrated with the current metric system" - E1*	
Challenges with innovation projects	*"If you look at each project, then perhaps the risk is huge on all of them really/…/ and then you tend to throw the all away" R56*	
Attitudes towards measuring	*"Does everything have to be measured and followed up on?" - R8*	

**The above figure presents examples in English however it should be noted that coding was conducted on the Swedish transcriptions. The examples are translated to English to facilitate understanding.*