CHALMERS
UNIVERSITY OF TECHNOLOGY

Development of KPIs for Innovation Platforms

A case study of CampX by Volvo Group

Master's thesis in Technology Management and Economies

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CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2023
www.chalmers.se
Report No. E2023:119

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Development of KPIs for innovation platforms between corporates and SMEs:
A case study of CampX by Volvo Group to find out what KPIs could be employed to evaluate an innovation platform with collaboration projects between corporates and SMEs.
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Cover:
An abstract illustration of an innovation platform including measurement and monitoring effects.

Gothenburg, Sweden 2023

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SUMMARY
This master thesis aims to identify key performance indicators that can effectively evaluate innovation platforms, with a specific focus on CampX, an innovation platform developed by the Volvo Group. The study formulates three research questions related to KPIs, factors for evaluating performance, and relevant measurement variables. The scope of the study focuses on the accelerator function of CampX, which serves as an incubator, accelerator, and venture builder.

Data for the study was collected through 17 interviews with key stakeholders representing external, internal, and management perspectives of CampX. The findings of the study contribute to the understanding of how innovation platforms facilitate technology advancement through external partnerships with SMEs, although the generalizability of the findings to other innovation organizations and industries may be limited due to the case study nature of the research.

The study concludes by identifying five crucial factors for measuring performance in innovation platforms namely: innovation strategy, innovation structure, leadership, culture and knowledge management. Furthermore, a set of 20 KPI categories with associated KPIs were established. Through consolidation, the five factors are simplified into three, resulting in a total of 12 KPI categories. The study recognizes the importance of combining both hard quantitative values and soft qualitative ones for measuring performance innovation. Furthermore, both soft and hard KPIs are proposed to measure the identified KPI categories.

The study recommends that the KPI categories for CampX should be tailored to the organization's specific characteristics and account for the dynamic nature of performance measurement. Regular reassessment and adaptation of KPIs are necessary to align with internal and external factors. Conventional KPIs may not be sufficient for measuring performance in innovative contexts, therefore should organizations adopt a flexible and customized approach to innovation performance measurement, considering alternative KPIs. Eight of the 12 identified KPI categories are highlighted as particularly important for CampX to measure.

Keywords: Innovation, Collaboration, Mobility industry, CampX, Volvo Group, SMEs, Performance measurement, Innovation Projects, KPI, Key Performance Indicator, Open innovation.

Acknowledgements

We would like to express our appreciation for the completion of this master thesis, which represents the final hand of our studies in the master program in Management of Economics and Innovation at the Department of Technology Management & Economics, Chalmers University of Technology. This study was conducted in collaboration and as a case study at CampX by Volvo Group.

First and foremost, we are grateful for the opportunity to conduct our research at CampX, an collaborative innovation platform. We extend our sincere gratitude to our supervisor, Christian Johansson, whose support, valuable insights, and belief in our abilities have been instrumental throughout this journey. We would also like to express our gratitude to the entire CampX team for their warm welcome and continuous support.

We also extend our thanks to all the interviewees: internal employees at Volvo Group, managers within the organization, as well as external stakeholders from within and beyond the industry, who generously shared their time and knowledge. The interviewees' participation and valuable contributions have made this research possible.

Furthermore, we would like to acknowledge and express our appreciation to our Chalmers supervisor, Kamilla Kohn Rådberg, for her guidance and invaluable insights throughout the research process. Kamilla's expertise and feedback have greatly enriched our work.

Finally, we would like to take a moment to express our thanks to the friends we have made during our Bachelor's program in Industrial Engineering and Management and our Master's Program in Management and Economics of Innovation at Chalmers University of Technology. The happy memories and fun experiences we have shared together have fortified our academic journey.

Maja Bengtsson & Matilda Wiklund, Gothenburg, June 2023

Abbreviations

SME - Small and Medium-sized Enterprise
PM - Performance Measurement
IPM - Innovation Performance Measurement
BSC - Balanced Scorecard
IAM - Intangible Asset Monitor
PP - Performance Prism
KPI - Key Performance Indicator
SNA - Social Network Analysis

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1. Introduction

1.1 Background

It is imperative for every business regardless of its size to assess and understand the progress of its performance (Cruz Villazón et al. 2020; Staron et al. 2016; Curiel-Ramirez et al. 2020, España et al. 2012). Hence, measurement systems are necessary in order to establish organizational objectives and monitor its effectiveness and efficiency (Cruz Villazón et al. 2020). A common method of conducting these measurements is through the use of Key Performance Indicators (KPIs). These indicators act as measurable benchmarks that provide insight into the performance and effectiveness of various aspects within an organization (Haddadi & Yaghoobi, 2014). By establishing and tracking KPIs, businesses can gain valuable insights into their operational efficiency, financial health, customer satisfaction, and overall performance (Ogunlana et al., 2010).

The emergence of new challenges in industries due to technological innovation and customer demand for more sophisticated technology and services is driving change, as emphasized by Barreto (2017). Similarly, Orihata and Watanabe (2000) state that across various sectors, companies rely on technological innovation to drive progress and create a competitive edge. To foster an open and interactive environment that promotes the exchange of ideas and flow of information, Curiel-Ramirez (2020) suggests that informal and unstructured organizations are useful during times of rapid change, as they strengthen innovative projects. While unstructured structures facilitate effective knowledge management and innovation, as companies grow, complexity often leads to a shift towards more hierarchical structures, according to Claver-Cortés et al. (2007). To overcome inertia, high-tech contexts are increasingly using open innovation models, such as innovation platforms, as a solution, as discussed by Longo and Giaccone (2017). Open innovation involves collaboration among various actors involved in the innovation process and is a tool used by firms to develop new ideas and innovative products, as demonstrated by Chesbrough (2003), Youtie and Shapira (2008), and Magnusson (2009).

The development of clear and fair KPIs for evaluating the results of innovation platforms has been a topic of debate (Mack & Mayer, 2016). Some scholars argue for the significance of KPIs in measuring success, while others raise concerns about the limitations of using metrics to gauge value (Yin et al. 2020). According to Wickham (2020), metrics have a tendency to be overly controlling and normative, distorting perceptions of what is considered good or bad, while providing only a narrow representation of reality. A performance indicator can be classified as either soft or hard (Bourne et al. 2003). Bourne et al. (2003) describe soft indicators as those that are

not directly measurable and are typically qualitative in nature, such as customer satisfaction, company reputation, and employee motivation. On the other hand, hard indicators are directly measurable and quantitative, such as the number of customers and the time taken to produce a plan (Popova & Sharpanskykh, 2010; Bourne et al. 2003). Popova & Sharpanskykh (2010) emphasizes that it is often clear how hard indicators should be defined and measured, however softer performance indicators are more difficult to assess. Furthermore, the nature and objectives of innovation hubs can vary greatly, making it necessary for each hub to tailor its KPIs accordingly (Mack & Mayor, 2016).

1.2 Objective and scope

The objective of this master's thesis is to investigate KPIs for evaluating the performance of innovation platforms, with a specific focus on the case study of CampX by Volvo Group. To find suitable KPIs, the study aims to initially identify critical factors that influence an organization's ability to manage innovation. Thereafter, each factor will be broken down to appropriate KPI categories, followed by a comprehensive evaluation that suggests both hard and soft KPIs.

Moreover, the study seeks to contribute to the advancement of Innovation Performance Measurement (IPM) theory, particularly by highlighting the factors that are important to consider when measuring innovation. Specifically, the study aims to provide valuable insights to carefully selected scholars who share common perceptions which factors influence an organization's ability to manage innovation.

To fulfill the objective of the master's thesis, the following research questions have been formulated:

- What type of KPIs could be employed to evaluate the performance of an innovation platform?
    - Which factors are influencing an organization's ability to manage innovation?
    - What approach could be used to measure the factors influencing an organization's ability to manage innovation?

CampX, serves as an incubator, accelerator, and venture builder for startups. However, the scope of the study is to exclusively examine the accelerator function, which aims to scale up technology. The rationale behind this choice is that the accelerator function is well-established within CampX, whereas the other functions are still in early stages of development. Consequently, this study focuses on KPIs related to technology scaling, aligning with the primary objective of the accelerator function.

By analyzing factors that affects CampX's ability to manage innovation, we can extrapolate the findings to other innovation platforms with similar goals, thereby enhancing the understanding of how such platforms facilitate technology advancement through external partnerships. However, it is important to acknowledge that being a case study, the generalizability of the findings to other types of innovation organizations and industries may be limited.

The data for this study was gathered from 17 interviews conducted with key stakeholders, encompassing perspectives from external participants, internal team members, and management representatives, thus ensuring a comprehensive understanding of the innovation platform. It is crucial to recognize that the availability and reliability of these data sources may impose limitations on the study. Furthermore, it is essential to note that the study focuses exclusively on the CampX innovation platform in Gothenburg, Sweden, and does not address the activities of CampX's innovation platforms in other regions.

2. Open innovation and innovation performance measurement

In the following chapter, theories related to open innovation, as well as theories related to innovation performance measurement (IPM) will be presented. Firstly, the chapter begins by providing a comprehensive definition of open innovation. Following that, the performance measurement section describes the most commonly used frameworks synthesized from several prominent scholars in the field of IPM. Additionally, this section will identify crucial factors influencing an organization's ability to manage innovation and propose potential approaches for measuring these factors. Ultimately, the chapter will establish a connection between the theories and the purpose of this study.

2.1 Open innovation

Open innovation has gained significant attention in recent decades as firms strive to stay competitive in an increasingly globalized and technology-driven market (Chesbrough, 2003). The concept involves integrating both internal and external sources of knowledge to drive innovation, enhance competitiveness, and create value for stakeholders. Chesbrough (2003) pioneered the concept of open innovation, highlighting the need for firms to expand their competitive strategies beyond internal R&D activities. Rather than solely focusing on in-house development, firms can enhance competitiveness by adopting various approaches leveraging external actors (West & Bogers, 2014). For instance, firms can leverage external technologies through licensing agreements, integrating them into their own knowledge base. Simultaneously, when a firm out-licenses its product to another company, it enables the product to be developed further (West & Bogers, 2014; Link & Siegel, 2007). Additionally, firms may collaborate with others jointly, combining internal and external knowledge, to develop innovative solutions, fostering knowledge sharing and close integration (Chesbrough, 2003; Laursen & Salter, 2006). Figure 2.1 provides a visual representation of these open innovation practices.

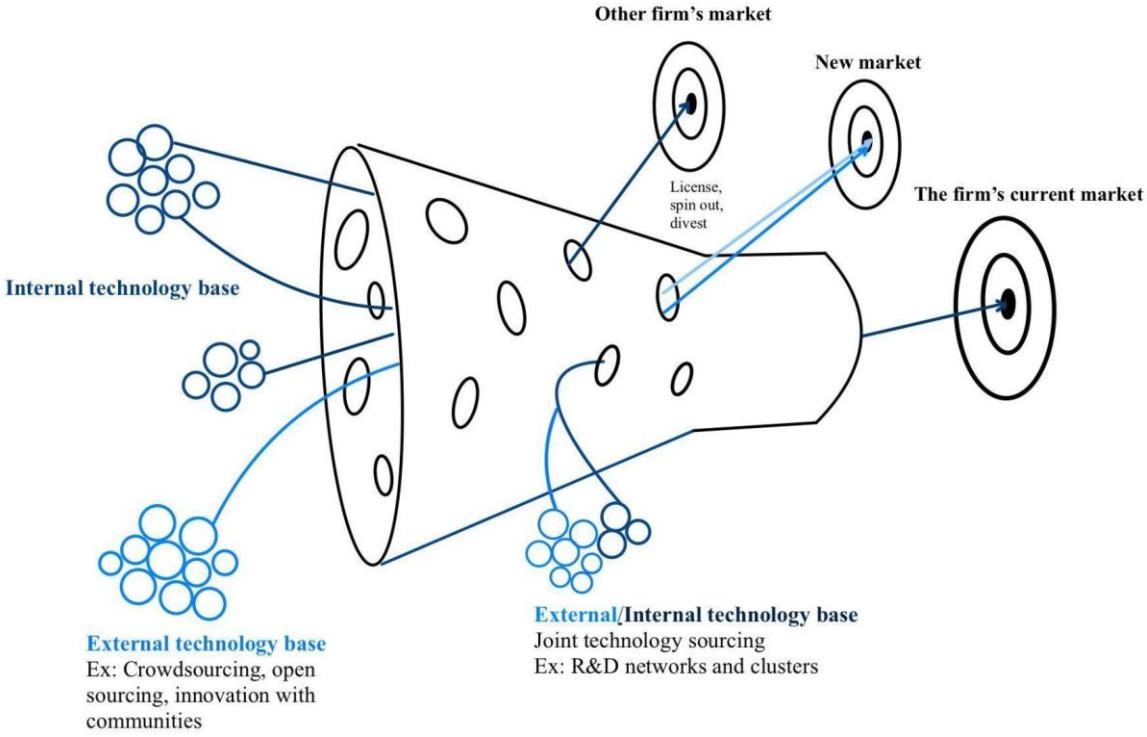

Figure 2.1: Illustrate Chesbrough's (2003) depiction of the innovation funnel, which has been opened but still follows a linear stage-gate process.

The above mentioned practices of open innovation has evolved into a comprehensive framework that encompasses the definitions of inbound open innovation (e.g., external sourcing of knowledge), outbound open innovation (e.g., commercialization of internal knowledge), and coupled open innovation (e.g., collaborative innovation with partners) (Chesbrough, 2003; Laursen & Salter, 2006). Inbound open innovation refers to the 'outside-in' process of acquiring knowledge, ideas, and technologies from external sources to enhance internal R&D efforts (Chesbrough, 2003). This form of open innovation is prevalent among firms that are looking to leverage external expertise to accelerate innovation (Wallin & Von Krogh, 2010). One example of inbound open innovation is the use of crowdsourcing platforms, which allow firms to tap into a large pool of knowledge and ideas from a diverse group of individuals (Brahbam, 2008). Another example is the use of technology scouting, which involves identifying promising technologies and ideas outside the firm and bringing them in-house to develop and commercialize (Chesbrough et al. 2006).

Outbound open innovation refers to the 'inside-out' process of commercializing internal knowledge, ideas, and technologies outside the firm (Lichtenthaler, 2009). This form of open innovation is useful when a firm has developed a technology or idea that is not part of its core business, and it seeks to monetize it through licensing, spin-offs, or partnerships (Chesbrough, 2006b). For example, in 2005, IBM employed

outbound open innovation by spinning off its PC business as it was not core to its operations and allowed instead the company to concentrate on its core competencies (Chesbrough, 2011).

Lastly, coupled open innovation is a combination of inbound and outbound open innovation (Huizingh, 2011). This integrated approach involves using external knowledge to enhance internal R&D efforts and commercializing internal knowledge outside the firm (Chesbrough, 2006). Firms adopting this approach aim to establish a seamless innovation ecosystem characterized by the free flow of ideas and knowledge between the company and its external partners (Lichtenthaler, 2009). One example of coupled open innovation involves collaborating with external organizations to identify and commercialize novel products and technologies (Chesbrough, 2006).

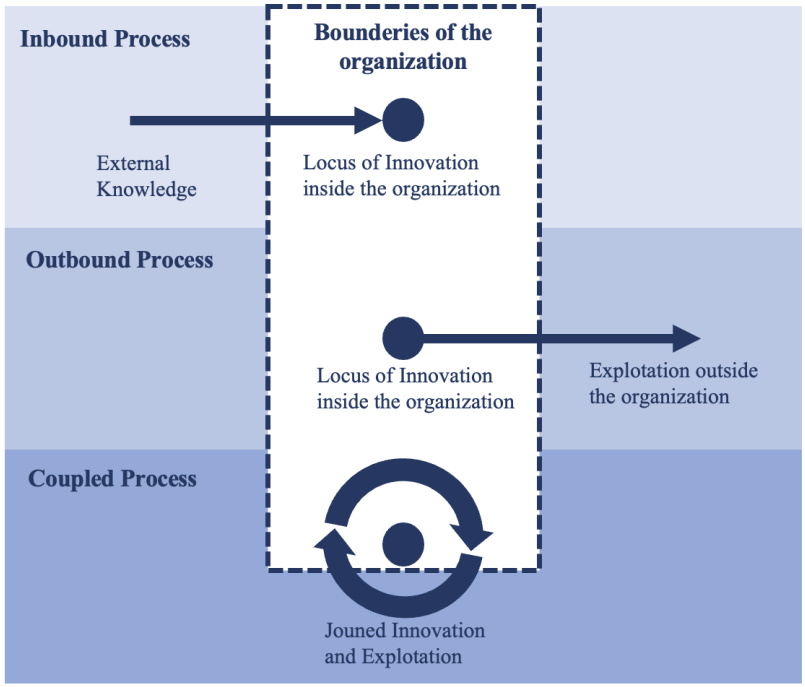

Figure 2.2: Visualization of inbound-, outbound- and coupled open innovation adjusted from Nerone et al., (2014).

At the core of open innovation is the notion of a focal firm, which is a company that drives the innovation process by actively seeking out external partners and collaborators to share knowledge, resources, and expertise (Chesbrough, 2003). Focal firms are typically more open to collaboration and less strict about ownership of intellectual property, as they recognize the value of a wider network of actors in generating new ideas and bringing products to market (Laursen & Salter, 2006).

Scholars have extensively studied multiple aspects of open innovation, including its antecedents, outcomes, moderators, and implementation obstacles (Laursen & Salter, 2014). For instance, Huizingh (2011) identified four key drivers of open innovation

adoption: external knowledge availability, internal R&D capabilities, strategic orientation, and organizational culture. Similarly, Lichtenthaler and Lichtenthaler (2009) found that firms with higher levels of open innovation activities tend to have better financial performance than those with lower levels. However, the relationship between open innovation and performance is complex and contingent on various aspects, such as firm size, industry context, and innovation type (Laursen & Salter, 2014). Moreover, implementing open innovation practices can be challenging due to the need for effective coordination, communication, and intellectual property management (Chesbrough & Bogers, 2014).

The concept of open innovation has become more established in larger firms, particularly concerning collaboration with startups as a source for radical technologies and innovations (De Groothe & Backmann, 2019; Du & Templier, 2016; Chesbrough, 2006). The shift from internal to external organizational processes through collaborations encourages information exchange, and resources are now designed to facilitate the exploration, exploitation and identification of new opportunities for innovation (Gassmann, 2006; De Groothe & Backmann, 2019). According to Chesbrough (2003) open innovation can bring benefits for both parties involved. For instance, a startup collaborating with an incumbent gives the startup access to a broader knowledge base and support with financial resources to help accelerate their growth (De Grooth & Backmann, 2019). Moreover, Yang et al. (2018) explain that startups face liabilities of smallness and newness, which can make it challenging for them to establish credibility and gain the trust of customers, suppliers, and other stakeholders. However, by partnering with an incumbent, startups can leverage the incumbent's reputation and market presence to overcome these liabilities and establish credibility in the market. Simultaneously, the startups support incumbents to exploit new technologies, access special expertise and agile methods to drive the “innovation engine” faster (Raasch et al. 2019).

2.1.1 Collaborative innovation

Collaborative innovation has become an essential component of organizations innovation processes, and it involves bringing together diverse stakeholders to generate e.g. new ideas, products, or services (Walters & Rainbird, M, 2007). Open innovation and co-creation are two types of collaborative innovation that can accelerate the pace of innovation by providing opportunities for collaboration (Butt et al. (2019). Chesbrough (2011) emphasizes the benefits of open innovation, including the ability to access external sources of knowledge and expertise, reduce costs and risks, and accelerate time-to-market. By engaging in collaborative innovation and leveraging the benefits of open innovation, organizations can develop innovative solutions to complex problems and gain a competitive advantage in their respective markets. Innovation hubs, platforms, and collaborative ecosystems are different forms of innovation collaboration that aim to foster collaborative innovation (Chasbrough, 2011; Gassmann

& Enkel, 2004). These entities serve as catalysts for innovation projects by offering valuable resources, tools, and expansive networks, thereby facilitating the process of innovation (GAssmann & Enkel, 2004).

Wickham (2020) conducted a study of 18 innovation hubs and found that the aim of collaborating through innovation hubs is to create synergies that can be achieved between the large company's resources, expertise, and economies of scale and the small company's innovative ideas and entrepreneurial drive. Furthermore, one of the key tasks of the innovation team was to secure support from the senior management of host companies (Wickham, 2020). Similarly, Chen & Huang (2020) describes that securing support is crucial, particularly if the innovation hub is intended to be integrated with and potentially challenge the established business model and line organization of the host company. Wickham (2020) further emphasized that without understanding and support from the management, the innovation hub will never have any strategic influence.

Biemans et al. (2016) and Wickham (2020) both argue that innovation teams in innovation hubs must balance the need to understand and work with the host company's business and operational processes, while also challenging existing structures and thinking creatively. Innovation hubs face a risk of losing their exploratory and innovative role if they align too closely with the host company's agenda, or if they are too far removed and have their ideas ignored (Paasi et al. 2019). To manage this balancing act, innovation teams should develop a process that includes both alignment with the host company's goals and exploration of new opportunities (Jansen et al. 2009).

2.2 Innovation performance measurement

In management research, performance is considered as encompassing the central goal of organizations (March & Sutton, 1997). According to Neely et al. (2002), performance measurement is critical to the success of organizations because it helps managers make informed decisions and improve organizational effectiveness. Micheli and Mari (2014) further describe that effective performance measurement can benefit organizations in various ways, such as improved communication with stakeholders, enhanced brand reputation, better strategy formulation and evaluation, increased employee motivation, and promotion of organizational learning. Moreover, Neely et al. (2002) emphasize that effective performance measurement systems need to incorporate both financial and non-financial measures, as well as consider the perspectives of different stakeholders to achieve the entailing benefits.

Scholars in management research have also studied a wide range of issues related to the design, implementation, use, and validation of performance measurement systems

(Chenhall & Langfieldsmith, 1998). Despite substantial investments, poorly executed performance measurement initiatives can fail to meet expected outcomes and may even have negative consequences (Micheli & Mari, 2014). Thus, it is essential to comprehend the specific circumstances under which performance measurement and management practices can actually lead to improved performance. Furthermore, there are several multi-dimensional PM systems that aim to integrate measures to assess the tangible and intangible value generated by enterprises (Taticchi et al. 2010). Some notable examples of PM systems are the balanced scorecard (Kaplan & Norton, 1992), the performance prism (Neely et al., 2002), and the intangible assets monitor (Sveiby, 1997), which are discussed more in detail in section 2.2.3 Traditional PM Frameworks.

Along with evaluating an organization's overall performance, it is crucial to also assess innovation initiatives to ensure that investments are allocated appropriately, as noted by Dewangan and Godse (2014). This evaluation helps organizations understand whether their innovation efforts are yielding the desired results and whether they need to be improved or redirected. To facilitate this evaluation process, Innovation Performance Measurement (IPM) systems have been developed and widely adopted by organizations (Dewangan & Godse, 2014; Dodgson et al., 2008; Chiesa et al., 1996). However, despite the existence of various proposed IPM systems in the literature, Dewangan and Godse's (2014) extensive review of IPM literature and practitioners survey found that none of these adequately address the complete needs of innovative firms, according to practitioners' suggestions.

The literature of IPM consistently supports a multi-dimensional approach to effective innovation performance measurement, but there is significant disagreement about what dimensions should be included (Dewangan & Godse, 2014). The evolution of IPM literature starts with Brown and Svenson (1988) favoring a process-based approach on measuring R&D productivity. Brown and Svenson (1988) argue that performance measurement systems often fail because of excessive focus on measuring internal processes and behaviors, resulting in outputs of questionable value and complex measurement systems. Thereafter, Cooper and Kleinschmidt (1995) proposed a model that considers both program impact and profitability, with indicators related to the impact of the program on the firm such as product success, and profitability and relative performance of the new product program. Later, Cruz-Cázaresa et al. (2013) proposed a method to calculate the coefficient of technological innovation using R&D capital stock, high-skill staff, number of product innovations, patents, and yearly efficiency change.

2.2.1 Difficulties of measuring innovation

Innovation is a dynamic and evolving process that poses significant challenges for measurement (Hanelt & Von Stamm, 2019). While measuring established and stable processes is relatively straightforward, there is no clear consensus on how to measure

innovation effectively (Dodgson et al. 2008; Laursen & Foss, 2003). The lack of agreement has become a significant concern for enterprises today, as innovation has emerged as a top priority for business success (Dodgson et al. 2008). Kaplan and Norton (1992) argue that traditional financial performance measures are no longer adequate for measuring innovation in today's economy. Many firms lack sufficient measurement capabilities, and there is a lack of agreement on which metrics to use (Nandal et al. 2020). Despite significant investment in innovation, companies often face a substantial gap between desired and actual outcomes (Birchall et al. 2011).

Existing performance measurement methods have not kept pace with the demands of measuring innovation management success (Neely et al., 1995). A survey conducted by Griffin and Page (1993) found a discrepancy between the metrics currently used and those desired by managers. As such, it is essential to develop new, more effective methods of measuring innovation that capture its dynamic and evolving nature. However, Milbergs and Vonortas (2005) state that the motivation for developing better innovation measurements is the realization that existing measurements primarily reflect the industrial era and do not adequately capture the knowledge economy that is evolving today. Milbergs and Vonortas (2005) further note that current measurements tend to emphasize products and artifacts, while neglecting ideas and processes.

Kerzner (2022) explains that the definition of innovation varies among individuals, and extensive research has been conducted to establish a common definition (Freeman & Beale, 1982; Cooper and Kleinschmidt, 1987; Baccarini, 1999). Despite these efforts, the scholars conclude that there is no universal definition of innovation where “one-size-fits-all”. According to Nanal et al. (2020) many people distrust that innovation can be measured, given the statement that it is impossible “to measure the immeasurable”. Innovation is a vague concept that is difficult to define and measure (Kerzner, 2022). Furthermore, the concept is characterized by a complicatedness, width, novelty and subtle nature making pre-set measuring schemes unapplicable. It may also be the case that the most efficient innovations are those that are changing the current measuring schemes and creating new types of measurements (Tidd et al., 2005). Since there is no general set of innovation metrics, (Nanal et al. 2020) argue that the innovation metrics need to be adopted to the specific needs of each firm and will require an interaction of several metrics.

Björk et al. (2022) emphasize that innovation metrics often necessitate a qualitative nature. Supporting this perspective, Fagerberg and Srholec (2008) argue that many firms overlook the use of qualitative measurements for assessing innovation activities, such as employees' skills and freedom level, leading to inaccurate results. Furthermore, focus is put on short-term measurements instead of long-term, because short-term measurements are easier to achieve (Vinsel & Russell, 2019; Kerzner, 2013). Additionally, Björk et al. (2022) explain how managing innovation measurement is

more challenging than managing other measurements since innovation touches the whole organization and not only a single department.

While advancements in measurement techniques have enabled companies to track a dozen or more project metrics, this has created a potential problem of information overload (Belton & Stewart, 2002). Too many metrics may provide viewers with unnecessary information, making it difficult for them to determine what is truly important and discern the project's status. On the other hand, too few metrics may hinder viewers' ability to make informed decisions (Mir & Pinnington, 2014). The cost of metric measurement must also be considered, as selecting more metrics than necessary can lead to unnecessary expenses (Kerzner, 2022). Therefore, it is essential to strike a balance between the number of metrics used and the benefits of their implementation.

2.2.2 Defining project innovation success and failures

Van de Ven et al. (1999) highlight the challenges in defining innovation success, which can evolve over the investment life cycle due to changing priorities, goals, challenges, and opportunities. Furthermore, Turner and Müller (2003) argue that project managers often focus on operational success criteria, such as delivering a product or service within the iron triangle (budget, scope and schedule), since these criterias are tangible and easier to measure. However, innovation projects may face a range of constraints beyond the traditional iron triangle, such as stakeholder satisfaction, cultural and organizational aspects, which requires tradeoffs and careful consideration of which constraints are most critical (Kerzner, 2013; Turner & Müller, 2003). Similarly, Cooper et al., (2002) describe that innovation projects must not only satisfy competing constraints such as financial viability, technical feasibility, and market potential but also provide tangible business value that aligns with the overall objectives and strategy of the firm (Kerzner, 2022; Cooper et al., 2002). Furthermore, the idea that meeting constraints automatically provides value is not always true, and it is essential to question why a company should work on an innovation project that may not create value in the short- or long-term (Kerzner, 2022).

Success of an innovation project could be defined as the amount of long-term business value created (Chesbrough, 2003). However, selecting projects that may appear to guarantee the creation of business value or an acceptable Return of Investment (ROI) is challenging as some of these projects may not deliver the expected value immediately after their completion. (Kerzner, 2022; Leach, 2005). This is particularly true for innovation and new product development, where as many as 50 or more ideas must be explored to generate one commercially successful product (Krezner, 2022). Predicting the value at the start and tracking the value during execution is difficult since there are multiple views of the definition of value (Thiry, 2010). In other words, value may be viewed as a perception at project selection and initiation based on data available

at the time (Kerzner, 2022). At project completion, however, the actual value becomes a reality that may not meet the expectations that had initially been perceived (Kerzner, 2022).

Kerzner (2013) emphasizes that defining innovation failures is even more difficult than defining innovation success. Davila et al. (2006) describes how failures should be viewed as a natural part of the innovation process and established as an opportunity for learning and improving future effort. There is a need to recognize an innovation failure so teams continue working on projects that do not create business value and resources are being squandered (Cooper et al., 2001).

Defining innovation success and innovation failure is essential to establish criterias on which projects to run and when to terminate projects (Eisenhardt & Tabrizi, 1995). The criterias are often set initially where success criterias for innovation projects is often a mirror image of the failure criterias (Kerzner, 2022). Furthermore, the criterias could be established as a guidance to what innovation metrics a firm should use to validate if the project is reaching the criterias (Bogers et al., 2017).

2.2.3 Traditional PM frameworks

Over the years, various performance measurement frameworks have been developed to improve organizational performance (Gomes et al., 2011). Notable examples of such frameworks include the Balanced Scorecard (Kaplan and Norton, 1992), the Performance Prism (Neely et al., 2002), and the Intangible Assets Monitor (Sveiby, 1997). The objective of this section is to examine whether these traditional frameworks can effectively measure the performance of innovation platforms.

The ***Balanced Scorecard*** (BSC) was developed by Kaplan and Norton in 1992 to replace traditional financial performance measurements, which were deemed misleading in the modern competitive landscape. The BSC is a tool that has four perspectives: Customers, Internal Processes, Financials (shareholders), and Innovation and Learnings (Kaplan & Norton, 1992). While it places a primary focus on shareholders, there has been a growing recognition of other stakeholders, particularly customers, which is why the customer perspective has been included in the BSC (Neely & Adams, 2001). Employees are also important stakeholders and are often addressed under the internal processes or innovation and learning perspectives. However, suppliers, who are crucial stakeholders in manufacturing and many service industries, are not yet included in the balanced scorecard (Neely & Adams, 2001) which may be a problem as companies become increasingly reliant on their suppliers.

Moreover, Voelpel et al. (2006) and Gama et al. (2007) both argue that the BSC is not suitable or practical for measuring innovation outcomes in an open innovation model, where companies must collaborate with external partners to develop new solutions.

The original BSC was developed before the current trend of open innovation and collaboration became vital to remain competitive in the global business environment (Al-Ashaab et al., 2011). As a result, the four proposed perspectives view the company as a closed entity and do not recognize the strategic need for firms to lead in product and process innovations to stay competitive. Furthermore, the original scorecard does not take into account that many new developments can be carried out with external partners, such as universities or research institutions outside the firm's boundaries. Contradictorily, Cengic and Fazlic (2008) explain that the Balanced Scorecard is frequently employed in collaborations with external strategic partners. It allows both companies' managers to establish common partnership objectives, fostering understanding and trust and reducing transaction costs and discrepancies between them.

Neely et al. (2001) introduced the ***Performance Prism*** (PP), a developed version of the BSC to select a firm's performance measurements, comprising five interrelated factors: Stakeholder Satisfaction, Strategies, Processes, Capabilities, and Stakeholder Contribution. To satisfy stakeholders, the firm must identify important stakeholders and understand their needs, including regulators, suppliers, communities, and intermediaries. Strategies focus on creating value for stakeholders, while processes are essential to follow the company's strategy, including developing new services and products, fulfilling and generating demand, and managing enterprises. Capabilities are important for sustaining competitive advantage, and determining required capabilities ensures that processes operate effectively. Stakeholder Contribution considers how stakeholders contribute to the company through partnerships, such as employees contributing to the company in exchange for salary and a good working environment (Neely et al., 2001).

The PP framework was developed to provide organizations with flexibility in their approach, allowing them to focus either broadly or narrowly based on their specific needs (Neely, 2004). Furthermore, the PP is argued to be essential since organizations nowadays cannot afford to concentrate only on the demands of one or two stakeholder groups, as it is no longer considered acceptable or practical (Neely, 2002). Many performance measurement frameworks center around the requirements of the shareholders and, at times, the customers. However, other crucial stakeholders, such as employees and suppliers, are frequently overlooked (Bourne et al., 2003). Although the PP model is not highly developed for analyzing innovation performance, it is still possible to measure it by examining two of its components: processes and competences (Ivanov and Avasilcai, 2013).

The ***Intangible Assets Monitor*** (IAM) was introduced by Sveiby (1997) as a method for measuring intangible assets which is essential when considering innovation. Both tangible and intangible assets depend on human action and are reliant on human

existence. Organizations create internal and external structures for individuals to express themselves, resulting in new intangible structures and processes. Relationships and experiences can be created externally, constituting an "invisible" part of the balance sheet. The challenges of measuring these relations and experiences root in not having a definition and that they are difficult to measure compared to a standard. However, Sveiby (1997) suggests a method of measuring this “invisible” part by dividing these intangible assets into: Employee Competence, Internal Structure, and External Structure. Employee Competence refers to an employee's ability to act internally and externally, while Internal Structure covers concepts, models, patents, and administrative and computer systems. External Structure includes relationships with trademarks, customers, and suppliers, brand names, and reputation, which are uncertain and dependent on external factors.

Ittner (2008) argues that even with measurement frameworks like the IAM, it is uncertain if measuring intangible assets for management leads to better economic performance. Ittner and Larcker (2003, 2005) explain that many companies do not set targets for intangible asset measures, which can result in investing too much without getting better returns. It is important to set realistic targets to get the most benefit from intangible asset measures. The IAM could be applicable for the context of innovation platforms’ performance since it facilitates the measurement of the transferring of competence between a large company and startups. However, the original IAM framework was designed for a single firm, not a collaborative platform that has relationships with external parties. Furthermore, since the framework only considers intangible assets, it does not account for the tangible assets that still are a big part of innovation platforms’ value proposition.

The BSC, PP and IAM are comprehensive frameworks that are utilized to measure the overall performance of an organization, including its innovation capacity. While these frameworks consider a broad range of organizational performance measures, key performance indicators are more specific and tailored to measure progress towards achieving specific business objectives. In the following section, a detailed examination of the concept of KPIs will be provided.

2.2.4 Key performance indicator

Key Performance Indicators (KPIs) provide a way to measure and monitor performance and can be used to identify areas where improvements are needed (Neely et al., 1995). The use of KPIs is not new, it has been a longstanding practice in management for many years (Neely, 2007). However, with the increasing complexity and uncertainty of business environments, the importance of using relevant KPIs has become more critical than before (Bititci et al., 2000).

According to Kerzner (2013), a KPI is a measurable metric that can vary across different projects and throughout the project lifecycle. Kerzner (2013) deconstructs the term KPI into three components:

- *Key*: a metric that is crucial to the success or failure of the project and has the potential to significantly impact the outcome.
- *Performance*: a measurable metric that can be controlled and adjusted to improve performance.
- *Indicator*: a reasonable representation of current and future performance.

Similarly, Eckerson (2006) defines KPIs as metrics that measure performance in operational, tactical, or strategic activities critical to current and future success. Bauer (2004) adds that KPIs reflect an organization's performance in achieving its goals and serve as indicators of strategic value drivers. Velimirović (2011) notes that KPIs serve to remove subjective emotions from the business and concentrate on the primary goal of profitability. Moreover, Velimirović (2011) also emphasizes that KPIs have a developing and guiding function that serves as the basis for formulating and executing an organization's strategy, and a motivation function that inspires management to pursue goals and motivates all stakeholders to achieve these goals, even at an elevated level.

The selection of appropriate KPIs for the measurement in the context of innovation is more complex since innovation is challenging to measure (Bock & George, 2019) as discussed in section 2.2.1 Difficulties of Measuring Innovation. In innovative contexts, soft indicators can be considered to be more relevant than hard indicators, even though they can be challenging to quantify (Garcia-Perez-de-Lema et al., 2019). According to Griffin and Page (1993), the most innovative companies prioritize metrics that reflect recent and future growth, whereas less innovative companies concentrate on efficiency-oriented metrics. Similarly, Hitt et al. (1996) highlight that innovative companies place greater emphasis on strategic controls than on financial metrics. This observation is supported by Storey and Kelly (2001), who argue that innovative firms tend to prioritize soft indicators, while less innovative companies tend to focus on financial metrics. However, a challenge connected to the soft indicators is that they tend to be given lower priority by the management as they are less tangible than concrete outputs from the company's main business (Wickham & Styhre, 2022).

To address the challenges with soft KPIs, Popova and Sharpanskykh (2010) suggest that it is often helpful to identify one or more closely related hard indicators that can be measured to provide insights into the state of the soft indicator. For example, customer satisfaction is a critical soft indicator that is difficult to assess. However, it may be possible to measure it accurately through well-designed questionnaires, a combination of other indicators, such as the percentage of returning customers, the percentage of on-time deliveries, or the number of complaints.

2.3 Identification of factors influencing organizations ability to manage innovation

After evaluating the traditional measurement frameworks by Kaplan & Norton, 1992; Neely et al., 2002; Sveiby, 1997, it is evident that these frameworks are not entirely suited for effectively measuring performance within innovation platforms. These frameworks reveal shortcomings in terms of addressing critical aspects such as external collaboration, flexibility, adaptability, non-financial metrics, and intangible values. Consequently, they may not be well-suited for accurately capturing the unique dynamics and requirements of innovation platforms. Consequently, this section focuses on a carefully selected set of literature: Adams et al., 2008; Smith et al., 2008; Grant, 2021; Saunila et al., 2014; Daronco et al., 2022; Melkas and Harmaakorpi, 2011, that specifically examines factors that influence a firm's ability to effectively manage innovation. Building upon this literature, Table 2.1 has been constructed to present the five most prominent factors, which will be comprehensively discussed in this section. Furthermore, additional references, not mentioned in Table 2.1, will be provided to reinforce the validity of these factors and strengthen the literature.

Table 2.1: Compilation of theoretical factors

Factors	Literature
Innovation strategy	Adams et al.(2008), Smith et al. (2008), Grant (2021)
Innovation structure	Melkas & Harmaakorpi, 2011 Daronco et al. (2022), Grant (2021)
Leadership	Adams et al. (2008), Saunila et al. (2014), Melkas & Harmaakorpi (2011), Smith et al. (2008)
Culture	Adams et al. (2008), Saunila et al. (2014), Melkas & Harmaakorpi (2011), Smith et al. (2008), Daronco et al. (2022)
Knowledge management	Adams et al. (2008), Saunila et al. (2014), Melkas & Harmaakorpi (2011), Smith et al. (2008)

2.3.1 Innovation strategy

In the 21st century, organizations face new challenges that significantly influence their strategies, such as digital technologies leading to substantial changes in the competitive dynamics of numerous industries, winner-takes-all markets, and battles for industry standards (Grant, 2021; Eisenmann et al. 2006). The emergence of disruptive technologies and the acceleration of change have also contributed to a shift away from planning and toward the creation of future options, strategic innovation, and the exploration of uncontested market space (Grant, 2021; O'Reilly & Tushman, 2008).

These complex challenges have made it difficult for firms to be self-sufficient, leading to the increasing adoption of alliances and collaborations in firms' strategies (Grant, 2021).

One way of meeting these challenges is through the concept of options, which has broadened beyond financial securities to evaluate the value of investment projects and firms (Grant, 2021; Trigeorgis, 1996). The option analysis has become significant for strategic decision-making and investment choices, especially in enhancing enterprise value by utilizing option valuation principles, such as flexibility options (Grant, 2021).

Adams et al. (2008) define innovation strategy as a sequence of internally consistent and conditional resource allocation decisions aimed at achieving an organization's objectives. Additionally, innovation strategy should align with an organization's overarching strategy and relate to its competitive environment in terms of new product and market development plans (Adams et al., 2008). Innovation strategy functions as a catalyst and a binding force that steers firm resources, practices, and competencies towards innovative endeavors aimed at initiating or responding to the external environment (Smith et al., 2008).

Grant (2021) distinguishes between two types of strategies: business strategy and corporate strategy. Business strategy relates to how a company competes and creates a competitive advantage in a particular market or industry. Furthermore, corporate strategy relates to where a firm competes, such as geographical, vertical, and product scope (Grant, 2021; Collis & Montgomery, 2008). The corporate strategy needs to reflect the organizational culture and communicate the shared vision and goals of the organization to all employees (Smith et al., 2008). Thus, it is essential to reflect innovation in the corporate strategy to help employees understand how it impacts their day-to-day tasks and achieve the organization's goals. Furthermore, KPIs are especially important for corporate strategy for predicting, measuring, and outlining business performance (Cruz Villazón et al. 2020).

2.3.2 Innovation structure

Smith et al. (2008) emphasize the importance of understanding the innovation structure of an organization in order to enhance its innovative performance. Furthermore, Smith et al. (2008) argue that the innovation structure of an organization should be seen as a multi-dimensional construct consisting of four dimensions: centralization, formalization, complexity, and connectivity. However, an optimal innovation structure can vary depending on the organization's specific context and goals, but having a clear understanding of the organization's innovation structure can help it to identify factors for improvement and enhance its overall innovative performance (Smith et al., 2008; Damanpour, 2014).

Smith et al. (2008) emphasizes the direct impact of organizational structure on employees, particularly in terms of team organization and formality levels. The nature of jobs in the organization is shaped by its structure and although individual employees can develop innovative ideas, teams are more critical to an organization's overall ability to innovate (Smith et al., 2008; Anderson et al., 2014). However, team-based working is subject to other factors, such as an open and collaborative organizational culture and participatory management style, which can make employees more receptive to new ideas (Smith et al., 2008, Anderson et al., 2014).

Melkas and Harmaakorpi (2011) suggest that there are two main types of organizational structures: functional and divisional. Functional structures group employees by the functions they perform, such as marketing or finance (Robbins et al., 2017). Divisional structures group employees by the products, services, or geographic regions they manage (Melkas & Harmaakorpi, 2011; Robbins et al., 2017). It is argued that each structure has its advantages and disadvantages, and that the choice of structure should depend on the organization's specific goals and circumstances (group employees by the products, services, or geographic regions they manage (Melkas & Harmaakorpi, 2011). Additionally, there is an importance of organizational design, which involves determining the optimal structure, roles, and responsibilities for each employee (Melkas & Harmaakorpi, 2011). Organizational design should be an ongoing process, as the organization's goals and environment may change over time (Daft & Armstrong, 2018). Furthermore, group employees by the products, services, or geographic regions they manage emphasize the importance of aligning organizational structure and design with the organization's goals and strategy in order to optimize performance and achieve success (Melkas & Harmaakorpi, 2011).

Melkas and Harmaakorpi (2011) and Daronco et al. (2022) both highlight the importance of flexible and open organizational structures in promoting innovation since it encourages the generation of new ideas. Furthermore, Melkas and Harmaakorpi (2011) argue that decentralized and informal structures can effectively facilitate innovation. Therefore, Melkas and Harmaakorpi (2011) suggest that innovation should be a responsibility shared by all employees, regardless of their role within the organization.

Grant (2021) argues that when companies develop new capabilities, the organizational structures typically become more complex. Grant (2021) and Jones and George (2016) all suggest that one of the biggest challenges facing management is designing structures that balance efficiency through specialization with effective integration, drawing on a vast body of organizational theory. In short, organizational structure plays a vital role in promoting innovation, and a flexible and open structure can encourage new ideas and facilitate their implementation. However, achieving this balance requires careful consideration of the organization's capabilities, resources, and management approach.

2.3.3 Leadership

Saunila et al. (2014); Melkas and Harmaakorpi (2011); Smith et al. (2008); Adams et al. (2008) all argue that leadership plays a key role to establish a successful innovation infrastructure. Melkas and Harmaakorpi (2011) describe that leadership involves breaking down barriers between people, ideas and resources, and fostering cross-functional communication and collaboration. Saunila et al. (2014) define a participatory leadership culture as the set of behaviors and conditions established by managers to encourage and motivate innovation. Furthermore, Smith et al. (2008) explain how managers lead their team and motivate employees to be more creative and take risks.

Effective leadership, according to Melkas and Harmaakorpi (2011), involves providing employees with both freedom and guidance towards the right direction instead of simply issuing orders. The approach not only allows employees to act on good ideas but also promotes a participative and consultative management style. Smith et al. (2008) add that empowered and autonomous employees tend to have greater control over their work, leading to increased comfort and confidence in being innovative within their work environment.

Additionally, Adams et al. (2008) argue that a manager's attitude and personality towards innovation are reflected in the norms and support provided for it. Thus, fostering an environment conducive to implementing innovations requires a person with a suitable personality that has a managerial willingness to accept change and potential conflict resolution during the process (Adam et al., 2008; Scott & Bruce, 1994).

In order to promote innovation within teams, managers should welcome a range of cognitive and behavioral traits, and form teams that leverage the unique strengths of each member (Nijstad & Paulus, 2003). Grant (2021) describes this approach as "creative abrasion". Rather than replicating individuals with similar traits, managers should encourage the formation of "whole brain teams”.

2.3.4 Culture

Organizational culture has been identified as the most critical factor in an organization's ability to manage innovation, due to its all-encompassing impact on innovation management (Smith et al., 2008; Schein, 2010). For instance, the culture encompasses the organization's stance on collaboration, communication, and risk-taking according to Smith et al. (2008). When referring to "culture" in the context of innovation management, Smith et al. (2008) relate it to the organization's principles and convictions and their effect on how innovation is managed internally.

On the other hand, Daronco et al. (2022) explain the precursor to a culture that fosters innovation is the presence of shared norms, beliefs, and values among individuals within groups and throughout the broader organization. These factors give rise to a culture that is supportive of innovation. Examples of such values include attitudes towards power dynamics, willingness to take risks, and acceptance of change, which is similar to Smith et al. (2008) that culture is seen in an organization's risk-taking ability and willingness to cooperate. Moreover, Smith et al. (2008) also emphasizes that an organization's approach to innovation undergoes a transformation when engaging with other organizations, whether on a long-term or short-term basis.

Saunila et al. (2014) and Melkas and Harmaakorpi (2011) emphasize the importance of employee well-being in the organizational culture to promote innovation development. It is contended that the management should prioritize endorsing the questioning of established norms, encouraging individuals to challenge routines, and adopt an exploratory mindset, even if it may disrupt the organization's stability (Saunila et al., 2014) Furthermore, Adams et al. (2008) emphasize the importance of a culture that prioritizes employee satisfaction, as it promotes the organization's attractiveness as an innovative workplace. Furthermore, Grant (2021) also points out the importance of employee satisfaction when explaining that recognition, opportunities for education, and professional growth are more important to employees than assuming managerial responsibilities.

To foster a creative culture, a different management approach is required compared to that of efficiency (Grant, 2021). Similarly, Adams et al. (2008) also discuss how the culture of organizations that adopt an innovation-oriented approach will vary from those that do not those who are creatively inclined require a work environment that is egalitarian, with adequate space and resources that allow for spontaneity, freedom, and fun while performing tasks that they feel make a difference to their organization and possibly the world.

2.3.5 Knowledge management

Absorptive capacity refers to an organization’s ability to identify, acquire and utilize external knowledge and can be critical to a firm’s successful operation (Adams et al., 2008; Zahra & George, 2002). Furthermore, it involves an ability to recognize the value of new, external knowledge, assimilate it, and apply it to commercial ends (Adams et al., 2008). Similarly, Melkas and Harmaakorpi (2011) describe exploitation of external knowledge as absorptive capacity, the organization’s capacity to acquire and exploit new knowledge. Furthermore, Adams et al. (2008) emphasize that one aspect of innovation relates to combinations of new and existing knowledge, which privileges the contribution of internal and external knowledge and the mechanisms by which it flows into and within an organization.

The more often organizations exploit their knowledge resources, then the greater chance they have of increasing the number of innovations they develop (Smith et al., 2008; Zahra & Nielsen, 2002). For instance, organizations with a strong culture of innovation are adept at learning from their mistakes and possess a talent for generating new knowledge and ideas (Smith et al., 2008). Similarly, Adams et al. (2008) emphasizes the importance of generating sufficient numbers of ideas as it is the raw materials for innovation. According to Adams et al. (2008), it is relatively inexpensive to generate and screen ideas, yet this can have a significant impact on ultimate success or failure.

Saunila et al. (2014) highlight the importance of the proper behavior of exploiting external networks and knowledge to the overall organizational innovation capability. Employees' individual activity in developing innovations is needed to form the organization's overall innovation capability (Smith et al., 2008). Furthermore, a concept called regeneration means an organization's ability to learn from earlier experience and to use that experience to create innovations and develop their operations (Saunila et al. 2014), similar to Smith et al. (2008) previous argument.

A cultivating learning culture can be achieved through learning from past projects or seeking knowledge externally (Adams e al., 2008). Furthermore, effective knowledge flows are critical for sparking and developing innovative concepts where networks can serve as enablers for this purpose (Adams et al., 2008. Melkas and Harmaakorpi., 2011) argue that integrating diverse knowledge types from various disciplines is essential for dealing with emerging innovations. Therefore, the ability to establish and interact within a network, both internally and externally, plays a crucial role in innovation management.

However, each network presents unique challenges, and success depends on how efficient knowledge mobility is within the network (Adams et al. 2008). Nonetheless, Melkas and Harmaakorpi (2011) stress that knowledge mobility, defined as the smooth transfer, acquisition, and application of knowledge within the network, is essential because innovation creation is only possible when specialized knowledge is shared.

2.4 Measurement of the factors

This subsection will delve into the measurement of the five factors discussed in the previous section, drawing from the selected literature; Adams et al., 2008; Smith et al., 2008; Grant, 2021; Melkas and Harmaakorpi, 2011; Daronco et al., 2022; Saunila et al., 2013. Additionally, the selected literature will be supplemented with additional sources to provide comprehensive measurement suggestions for factors where the selected literature may be lacking.

2.4.1 Innovation strategy

Organizations often strive to develop and implement effective innovation strategies, and measuring the success of these strategies is crucial for improvement and growth (Adams et al., 2008). In examining the various perspectives on how to measure an organization's innovation strategy, there are similarities and differences in the scholars' approaches. Adams et al. (2008) highlight two approaches to measuring innovation strategy: objective and subjective. Objective measures draw upon existing scales and indicators from strategic management research. For instance, scholars have used scales developed by Covin and Slevin (1989) to assess innovativeness in organizations. These objective measures often focus on quantifiable aspects such as new product development and market activity. Similarly, Leydesdorff (2001) suggests indicators related to the innovation strategy such as the number of new product or service launches, the speed of innovation cycles, and the success rate of projects (Schilling, 2019).

On the other hand, Adams et al. (208) discuss that subjective measures involve evaluating an organization's emphasis on innovation from a subjective perspective. This includes assessing factors such as risk-taking, proactiveness, persistent commitment to innovation, and top management responsibility for driving innovation within the organization. Subjective measures also consider the alignment of innovation goals with overall business objectives, strategic orientation, leadership, and resource allocation.

Gunday et al. (2011) propose the utilization of customer-centric metrics as a means to evaluate an organization's innovation strategy. These metrics encompass customer satisfaction, market share, and customer retention rates. According to Gunday et al. (2011), assessing these metrics provides valuable insights into the impact of innovation on customer value and market position. Additionally, both Grant (2021) and Smith et al. (2008) emphasize the significance of considering market position within the corporate strategy. Furthermore, organizations can measure their innovation strategy by evaluating the alignment between their corporate and innovation strategies and the resulting impact on their ability to effectively manage innovation (Smith et al., 2008)

Dodgson et al. (2013) suggest another way of measuring the innovation strategy by benchmarking against industry peers and competitors which can offer valuable insights into the firm's innovation performance. By comparing key innovation metrics with similar organizations in the industry, firms can identify areas where they excel or lag behind, enabling them to adjust their strategy accordingly (Dodgson et al., 2013).

2.4.2 Innovation structure

According to Adams et al. (2006), measuring organizational culture and structure is crucial as it can significantly impact the level of innovation in organizations by

influencing how staff are grouped and the culture within which they work. Furthermore, Adams et al. (2006) point out that organizations can create environments that encourage or hamper innovation and that innovation can be managed effectively and efficiently if there is sufficient freedom and control. Adams et al. (2006) emphasize that measuring the factors that promote innovation is vital for organizations to evaluate their innovation activities, identify areas for improvement, and differentiate between innovative and non-innovative organizations. Although there is relatively little evidence of extant measures of flexibility in the literature, Adams et al. (2006) suggest that measuring the adaptiveness of R&D personnel to technology changes, the willingness to try new procedures, and personnel flexibility are some of the possible measures of organizational flexibility.

The article by Saunila et al. (2014) do not specifically mention how organizational structure can be measured, but do refer to a few factors that can contribute to its assessment. For example, it is suggested that the degree of centralization or decentralization within an organization can be an indicator of its structure. Furthermore, Saunila et al. (2014) discuss the importance of formalization, which refers to the extent to which an organization has standardized procedures, job descriptions, and rules. Additionally, Saunila et al. (2014) mention that the level of complexity within an organization can be an indication of its structure. The level of complexity can be measured by looking at the number of departments or levels within an organization, as well as the degree of differentiation among those departments.

Smith et al. (2008) review various approaches to measuring organizational innovation structures similar to Adams et al. (2006) and Saunila et al. (2014). Smith et al. (2008) proposes a framework that includes five dimensions: centralization, formalization, complexity, connectivity, and autonomy. Furthermore, Smith et al. (2008) suggest that these dimensions can be used to identify potential barriers to innovation and to assess the organization's innovation capabilities. The advantage of using this framework is that it provides a more holistic view of innovation in the organization and can help identify areas for improvement (Smith et al. 2008). However, one limitation is that the framework may not be applicable to all organizations, as innovation structures can vary greatly depending on industry and organizational context (Smith et al. 2008).

2.4.3 Leadership

Leadership measures are primarily qualitative in nature and involve exploring perceptions, particularly the extent to which individuals recognize the presence or absence of specific factors (Adams et al. 2008). Furthermore, only a limited number of measures have been identified to assess the quality of leadership, and most measures focus on indicators of the presence of leadership. For instance, signs of commitment in annual reports or the level of concern among the management can be indicators of present leadership (Adams et al. 2008; Dulebohn et al., 2012). Adams et al. (2008)

offer a set of reflective questions that organizations can use to evaluate their expectations and understanding of the leadership role. For example, one question asks whether the organization should empower innovation teams to bend rules or bypass certain procedures to promote innovation commitment.

Upon analyzing the other selected literature by Saunila et al. (2014), Melkas and Harmaakorpi (2011), Smith et al. (2008), it becomes apparent none of these scholars were presenting suitable measurements within the leadership factor. Instead through a comprehensive analysis of other scholars discussing leadership measurement, it is evident that leadership can be assessed using objective performance measurements. Notably, both Bass and Riggio (2006) and Yukl (2006), emphasize that the effectiveness of leadership can be indicated by examining organizational outcomes and team performance. These objective measures provide valuable insights into the impact and effectiveness of leadership practices.

Moreover, Swasy and Grove (2003) explain that network analysis could be used as an measurement approach by gaining a comprehensive understanding of a leader's network within an innovation platform. Social Network Analysis (SNA) is a method to evaluate the leader’s influence and effectiveness in fostering relationships and facilitating collaboration among participants within the network (Wasserman & Faust, 1994). The SNA metrics could for instance include degree centrality (number of connections), betweenness centrality (bridging diverse groups), and closeness centrality (reachability).

Moreover, more general ways of measuring leadership include self-report measures, observer ratings, and interviews (Judge & Piccolo, 2004). Self-report measures involve individuals rating their own leadership behavior, traits, or effectiveness using questionnaires or surveys (Avolio & Bass, 2004). Furthermore, observer rating is another method, where assessments are gathered from individuals who observe the leader's behaviors and evaluate their effectiveness (Atwater & Yammarino, 1992). Observers, such as peers, subordinates, or supervisors, offer valuable insights into a leader's performance. Observer ratings are typically collected using rating scales or structured assessments, allowing for multiple perspectives on leadership to be included (Atwater & Yammarino, 1992).

2.4.5 Culture

Within the context of organizational culture, Adams et al. (2008) present a model of flexible organizational forms designed to seamlessly adapt to diverse competitive environments. Measuring cultural organizational flexibility encompasses several key aspects as identified by Adams et al. (2008), including corporate responsiveness, resource allocation, and personnel adaptiveness. When considering personnel flexibility, it is essential to evaluate their adaptiveness to technological advancements

and their willingness to embrace experimentation. In addition, Adams et al. (2008) introduce a related concept at the firm level known as "organizational responsiveness.

The Team Climate Inventory (TCI) is an established and reliable method for evaluating the work culture in terms of creativity (Adams et al. 2008). The TCI, consists of four main factors: participative safety, support for innovation, vision, and task orientation. Participative safety measures the team's willingness to participate in decision-making and propose new ideas. Support for innovation assesses the degree of practical support for innovation attempts. Vision evaluates the team's objectives and how clearly they are defined and valued. Task orientation measures the team's commitment to achieving high standards of task performance, including the use of constructive progress monitoring procedures. An additional fifth factor has also been discussed, “interaction frequency” which pertains to the frequency of communication and contact among members of the project team.

Measures of autonomy involve both qualitative and quantitative methods (Adams et al. 2008). Examples include "the degree of freedom employees have in their day-to-day operating decisions, such as when to work and how to solve job problems," and the "percentage of R&D portfolio with explicit business unit and/or corporate business management sign-off." General measures such as "freedom to make operating decisions" and "degree of empowerment" have also been proposed by several authors (Schein, 1990). The number of job applicants and the age profile of scientists and engineers could be used as indicators of the attractiveness of the organization as a place to work and undertake innovative activities, which can reflect the climate for innovation (Adams et al. 2008).

Similarly as in 2.4.3 Leadership, the other selected literature by Saunila et al. (2013), Melkas and Harmaakorpi (2011), Smith et al. (2008) lacks direct suggestions on how to assess the organizational culture unlike Adams et al. (2008). Hence, there are other scholars who do offer more practical suggestions on how to effectively measure the culture of innovation within organizations. Cameron and Quinn (2006) propose conducting cultural surveys as a reliable measurement method (similarly to Adams et al. (2008)). Additionally, Puccio et al. (2011) argue that cultural artifacts and symbols serve as tangible manifestations of an organization's culture. By examining physical spaces, office layouts, artwork, and the utilization of technology, valuable insights into an organization's dedication to innovation can be gained. For instance, an open and collaborative workspace design, accompanied by flexible meeting areas and innovation hubs, may signify a culture that fosters experimentation and encourages knowledge sharing (Puccio et al., 2011).

2.4.4 Knowledge management

Melkas and Harmaakorpi (2011) describe that innovation development depends on internal and external resources. Internal resources refer to a firm's capacity to create and utilize knowledge to enhance products and processes, while external resources refer to a firm's ability to acquire knowledge from external partners and adapt to the competitive environment. Melkas and Harmaakorpi (2011) explain that the internal sources of innovation in firms can include knowledge embodied in employees, which can be measured by the level of formal education and technical experience of the workforce. Another important internal resource is knowledge about the competitive environment and the strengths and weaknesses of the firm, which can be embodied in the firm's strategies. Knowledge creation is also a crucial determinant of innovation, which can be facilitated through research and development (R&D) activities. The number of employees involved in R&D activities can be a measure of this internal resource.

There are various measurements that can be used to obtain external knowledge for innovation. These include market sources of knowledge obtained through interactions with clients, suppliers, competitors, and consultants, research sources of knowledge obtained through interactions with universities, public research centers, technology transfer centers, patent documentation, and technology transfer organizations. Collaborations with other businesses and public and private research organizations can also generate new knowledge, as well as interactions with economic development agencies and innovation support organizations (Saunila et al. 2012).

If knowledge is a crucial component of innovation, it should be feasible to gauge the firm's knowledge repository, which encompasses its accumulated knowledge (Adams et al. 2008). A crucial aspect of innovation pertains to the amalgamation of new and existing knowledge, which emphasizes the contribution of both internal and external knowledge and the means by which it permeates throughout the organization (Adams et al. 2008). Several quantitative methods have been developed to measure the influx of tangible imported knowledge where the most commonly used approach involves counting the number or value of patents acquired (Dechezleprêtre & Glachant, 2014).

Patents can serve as a form of measuring codified knowledge, but tacit knowledge is still crucial to organizational innovation. However, Polanyi (1966) mentions that measuring tacit knowledge is challenging, for instance there is a lack of measures for appropriate skill levels. On the other hand, Adams et al. (2008) describe that even though measuring tacit knowledge is challenging, techniques such as questionnaires designed to capture informal R&D work hours that are believed to be concealed within other activities or occur outside of formal working hours could be used. Furthermore, causal mapping and using market value versus net book value can also be utilized (Adam et al., 2008).

Information flows within a company are important for generating ideas (Adams et al. 2008). Several measures attempt to count the number of ideas generated in a period, while others probe the extent to which organizations are using different generative tools and techniques (Damanpour & Schneider, 2008). Other measurement techniques for information flows include gauging external and internal linkages and formal information gathering practices (Damanpour & Schneider, 2008). Most measures of linkages are binary, with only a few implying any qualitative assessment of the nature of the linkages (Adams et al. 2008). It is suggested that measures of the quality and diversity of linkages could be significant, such as visits to exemplary projects. Comparing an organization's information gathering practices to its competitors' methods can serve as a benchmarking strategy (Adams et al. 2008). Moreover, Smith et al. (2008) explain that to measure the learning that occurs in a project, employee satisfaction can be assessed to determine if they gained knowledge from the project, regardless of its outcome.

2.5 Our research question

Several studies have been examined that present common factors that influence an organization’s ability to manage innovation: innovation strategy, innovation structure, leadership, culture, and knowledge management. These factors form the foundation of answering the research question: “Which factors are influencing an organization's ability to effectively manage innovation?”

The theories that will be considered when answering this research question is for instance literature by Grant (2021) that suggest that innovation strategy includes the concept of option which has become significant for strategic decision-making. Furthermore, Adams et al. (2008) highlight the importance of alignment between the innovation strategy and an organization's overarching strategy. Lastly, Grant (2021) describes the two different strategies: business strategy and corporate strategy.

Within the innovation structure a flexible and open organizational structure is crucial (Smith et al. 2008), where a facilitator is decentralization (Melkas & Hermaakorpi, 2011). However, it is also mentioned that the optimal innovation structure depends on the context but organizations need to have a clear understanding of its structure (Smith et al., 2008).

Saunila et al. (2014); Melkas and Harmaakorpi (2011); Smith et al. (2008); and Adams et al. (2008); all emphasize the importance of the factor leadership in establishing a successful innovation infrastructure. Leadership involves breaking down barriers, fostering cross-functional communication, and motivating innovation (Adams et al.

2008). Effective leadership provides freedom and guidance, empowers employees, and reflects a manager's attitude towards innovation (Melkas & Harmaakorpi, 2011).

Organizational culture is crucial for managing innovation, as it influences collaboration, communication, risk-taking, and the organization's principles and convictions (Smith et al., 2008). Shared norms, beliefs, and values foster a culture supportive of innovation, including attitudes towards power dynamics, risk-taking, and change (Daronco et al., 2022) . Engaging with other organizations can transform an organization's approach to innovation (Smith et al., 2008). Employee well-being and satisfaction are important aspects of an innovative culture, promoting questioning of norms, exploration, and providing recognition and growth opportunities (Saunila et al., 2014; Melkas & Harmaakorpi., 2011). A creative culture requires a different management approach compared to efficiency, emphasizing egalitarianism, adequate resources, and a fun work environment that enables employees to make a meaningful impact (Grant, 2021).

Absorptive capacity is discussed in the factor knowledge management, as it involves the ability to identify, acquire, and utilize external knowledge (Adams et al., 2008). Generating a sufficient number of ideas and learning from past projects contribute to a learning culture and enhance innovation capability (Smith et al., 2008). Effective knowledge flows and networking, both internally and externally, are essential for knowledge management (Adams et al., 2008. Melkas and Harmaakorpi., 2011.)

Furthermore, the literature also provides suggestions on measurement variables to evaluate the factors, covering the research question: “What approach could be used to measure the factors influencing an organization's ability to manage innovation?”. The theories of how to measure the five factors based on the literature by the targeted scholars. For instance, Adams et al. (2008) suggest measuring innovation strategy through objective evidence and subjective evaluations, while Smith et al. (2008) propose identifying factors that affect an organization's ability to manage innovation, including corporate strategy. For innovation structure, Adams et al. (2008) suggest measuring factors that promote innovation (e.g. the degree of decentralization), while Saunila et al. (2014) identify centralization, formalization, and complexity as indicators of organizational structure.

Measuring the effectiveness of leadership in promoting innovation is challenging. Although Adam et al. (2008) provide reflective questions for organizations to evaluate their expectations and understanding of the leadership role, measuring its effectiveness remains a challenge. For knowledge management, measuring both internal and external knowledge resources is important, and different methods can be used to capture tacit knowledge. Information flows and employee satisfaction can also be used to measure learning from a project. Finally, the scholars discuss how culture can affect

innovativeness. Adams et al. (2008) suggest measuring personnel and organizational flexibility, autonomy, job applicants, and age profile of scientists and engineers can be indicators of an organization's attractiveness for innovative activities. All these theories related to the factors will be considered when evaluating the innovation platform in the case study.

By combining the findings from these two research questions with the outcomes of interviews, the main research question: “What type of KPIs could be employed to evaluate the performance of an innovation platform?” could be answered.

3. Method

3.1 Research strategy

When choosing the research strategy it is essential to determine the nature of the study as emphasized by Creswell and Creswell (2018). This master's thesis focuses on studying innovation platforms and exploring methods to assess their performance. The foundation of such organizations is generally based on the theory of open innovation that facilitates knowledge sharing over organizational borders (Chesbrough, 2003). The concept of open innovation was also explored in this study but more focus was on specific innovation platforms where large corporations and start-ups collaborate to accelerate technology.

For this study, both deductive and inductive approaches were initially considered. Given the extensive literature on performance measurement and KPIs, a deductive approach seemed appropriate at first (Eisenhardt, 1989). After analyzing various frameworks, no general rule or hypothesis that could be applied to specific innovation platforms involving collaborations between start-ups and corporates was found, which is a necessary condition for employing a deductive approach (Bell et al., 2019; Bhattacherjee, 2012). Hence, the appropriateness of an inductive approach was later analyzed instead. However, since each innovation platform is a unique organization, attempting to draw broad conclusions based on specific facts and observations would be impractical, which is necessary for an inductive approach (Creswell, 2013). Consequently, the abductive approach, which combines elements of both deductive and inductive reasoning, was ultimately adopted (Timmermans & Tavory, 2012). The abductive approach allows for flexibility in the study, enabling the researcher to incorporate essential components of different frameworks and theories to generate new insights rather than simply validating existing ones or limiting options (Bell et al., 2019).

Many innovation platforms are novel initiatives that are still being formed, not only the organizations themselves but also its position in the ecosystems (West & Bogers, 2014). The innovation platforms have core resources and capabilities and those of the greatest include people (Teece, 2007). Hence, the organizations are highly dependent on the people within it which is affecting the culture. The concepts of performance and innovation are reliant on people's creation and can therefore not be considered as an external objective reality (Teece, 2007). Based on the foundations that the main concepts in the study are affected by social construction the ontology is subjective (Bell et al., 2019; Flick, 2018).

The choice of research method for a master thesis depends on several factors, such as the research question, design, and objectives (Silverman, 2016). There are several advantages and disadvantages to both qualitative and quantitative research methods, and it is crucial to carefully consider which approach is most appropriate for the study at hand (Creswell & Creswell, 2017). As the aim of this thesis was to gain a deeper understanding of a phenomenon through observations and interviews with participants in a real-world context, a qualitative research approach was ultimately adopted (Bell et al., 2019). This was due to Creswell and Creswell (2017) argument that qualitative research is more suitable for investigating the subjective experiences, beliefs, attitudes, and behaviors of individuals, groups, or organizations.

3.2 Research design and process

The research methodology utilized is an empirical study approach, which involves the collection and analysis of data through observation or experimentation using various methods such as surveys or experiments (Neuman, 2014). More specifically, the empirical method consisted of a case study, where semi-structured interviews were conducted to gather data. According to Bell et al. (2019), a case study is an in-depth exploration of a specific case, such as a community, individual, or organization. In this master thesis, the case study approach was used to examine an innovation platform.

According to Bell et al. (2019), business research encompasses "academic research focused on topics relevant to the field of business and managers, with a social science orientation." This description by Bell et al. (2019) aligns well with the present study. The research questions in this master thesis have been influenced by the advancements in management and business, thus demonstrating a connection to the concept of business research. Furthermore, Bell et al. (2019) argue for the multifaceted purposes of business research, including addressing complex organizational problems, tackling challenges such as sustainable development and digitalization, and gaining a deeper understanding of various topics or phenomena. This study plays a role in achieving these objectives. Consequently, the research process drew inspiration from the steps commonly used in business research, as outlined by Sreejesh et al. (2014). Figure 3.1 provides a visual depiction of the research process steps.

Figure 3.1. The research process steps adjusted from Sreejesh et al. (2014)

Business research can employ either deductive or inductive reasoning depending on the research question, objectives, and available data (Creswell & Creswell, 2017). Deductive reasoning is often employed in business research to test hypotheses, while inductive reasoning is used to generate new theories or explore phenomena that are poorly understood (Creswell & Creswell, 2017). However, as stated previously, this

study used an abductive approach, consequently a mixture between deductive and inductive reasoning.

To conduct a thorough background analysis of the value of innovation platforms, existing research and well-established concepts for measuring innovation initiatives were critically examined. Relevant articles and literature were searched using keywords such as "KPIs innovation projects" and “Performance measurements innovation platforms” on search engines like Google Scholar and Chalmers Library. Based on these findings, research questions were formulated.

3.3 Data collection

When conducting a master thesis, choosing the appropriate data collection methods is crucial for obtaining reliable and valid results (Saunders et al., 2019). The selection of methods typically depends on the research questions, data requirements, and available resources (Creswell, 2014). In this particular study, primary sources were utilized to collect data through semi-structured interviews with key stakeholders from various backgrounds, with a focus on innovation platforms and KPIs. In the context of this study, data collection relied on primary sources, specifically through semi-structured interviews conducted with key stakeholders representing diverse backgrounds, both internally and externally associated with the innovation platform CampX. This approach aimed to gather a diverse range of perspectives and insights to address the research questions effectively.

The interviews were carefully selected to include relevant stakeholders who could contribute to the study’s objectives. A purposive snowball sampling technique, described by (Biernacki & Waldorf, 1981), was employed to identify individuals with valuable insights on the topic. The process began by purposefully selecting a few participants based on specific criteria, who were then asked to recommend others who could also contribute. This approach facilitated the access to diverse perspectives from both inside and outside the organization. Specifically, three interviews were conducted with management representatives, six with external stakeholders, and eight with internal stakeholders. The external stakeholders were selected from various industries and ecosystems that had similarities or connections to CampX. A list of the interviewees can be found in Appendix 1.

3.3.1 Semi-structured interviews

To address research questions, relevant stakeholders were interviewed using a semi-structured approach. This qualitative method allowed for insights and concepts to be gathered on the values that are important to measure according to CampX's key stakeholders (Rubin & Rubin, 2011). The interview questions were open-ended and covered various topics related to existing theory and themes from the background

analysis. These topics were developed from the innovation literature, with the aim of capturing which aspects are important when measuring the performance of an innovation context. Prior to the interview, the purpose of the study was explained to the interviewees and they were informed that the interviews would be part of the study.

The interviews were conducted with key stakeholders who were closely associated with CampX, including its employees. Each stakeholder was asked a set of questions tailored to their specific connection with CampX, with the phrasing adapted accordingly. Most of the interviews were conducted in person, while a few were conducted online. Each interview lasted between 30 to 60 minutes.

3.3.3. Data analysis

A multi-stage approach was utilized to analyze our data, following the steps illustrated in Figure 3.2. The analysis process was iterative, involving the continual revision and refinement of themes to accurately capture the nuances and complexities of the data. The themes were then interpreted in relation to our research questions, utilizing relevant quotes and examples from the data. Our approach drew inspiration from the thematic analysis framework established by Braun and Clarke (2006), providing a valuable foundation for exploring the intricate and multifaceted concepts of innovation, collaboration, and value capture in our study.

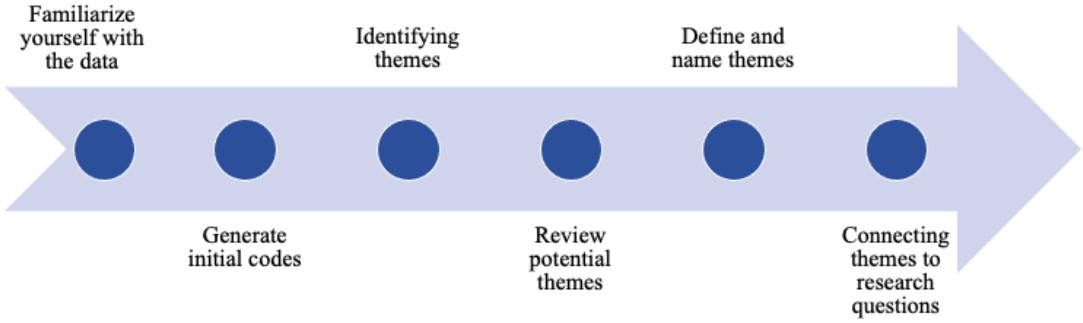

Figure 3.2: The data analysis process adjusted from Braun & Clarke (2006)

3.4 Quality of data

To ensure the quality of our study, we employed several strategies that are commonly used in qualitative research. In particular, we evaluated the reliability and validity criteria according to the framework proposed by Bryman and Bell (2011). In addition to these criteria, we also employed alternative criteria of trustworthiness and authenticity, which were proposed by Lincoln (2007) and Guba and Lincoln (1994), respectively. Further elaboration of these data quality strategies will be provided in the subsequent sections.

3.4.1 Reliability

Performing a case study poses challenges in ensuring external reliability due to its focus on capturing the social context within a limited timeframe (Smith & Johnson, 2018). It therefore becomes difficult to determine the extent to which the study can be replicated, as it essentially captures the state of an innovation platform at a specific time period. However, by conducting interviews with multiple individuals from a stakeholder group, the likelihood of replication increases since the opinions of a larger group are expected to exhibit less variation compared to those of individual respondents.

To enhance internal reliability, a strategy was implemented to maintain consistency among observers throughout the interview process. Interviews were consistently conducted in pairs to uphold interobserver agreement. Immediately after each interview, we confirmed and aligned our findings and observations. The transcription of the interviews was evenly divided between us, and during the summary writing stage, the transcriptions were exchanged to ensure that both of us analyzed every aspect of the data independently.

3.4.2 Validity

In terms of validity, Bryman & Bell (2011) suggest that qualitative researchers should aim to achieve several types of validity, including internal, external, and construct validity. Internal validity refers to the extent to which the research design and methods support the conclusions drawn from the data (Cook & Campbell, 1979). The internal validity of this study is constrained by the observation period, which restricts the ability to establish a strong alignment between the findings and theoretical concepts. Given the time limitations of the study, there is insufficient time for conducting internal validation among all stakeholders involved.

Cook and Campbell (1979) describe external validity refers to the extent to which the findings can be generalized beyond the specific context in which the research was conducted. Construct validity refers to the extent to which the study's measures and instruments accurately reflect the theoretical constructs being studied (Cook & Campbell, 1979). The external validity encounters challenges stemming from the distinctiveness of the setting and the study's design as a case study with a limited number of interview participants.

3.4.3 Trustworthiness and authenticity

Trustworthiness refers to the extent to which the study can be relied upon to provide a true and accurate representation of the phenomenon under investigation (Lincoln & Guba, 1985). Authenticity refers to the extent to which the research reflects the

perspectives and experiences of the participants, and the degree to which the research process is transparent and open to scrutiny (Tracy, 2010).

To ensure trustworthiness and authenticity in our study and analysis, we employed several methods, including member checking, triangulation, and reflexivity. Member checking involves sharing the research findings with the participants to ensure that they accurately reflect their experiences and perspectives (Lincoln & Guba, 1985). Triangulation involves using multiple methods and data sources to confirm the findings of the study (Denzin, 1978). Finally, reflexivity involves reflecting on the researcher's own biases and assumptions, and how they may have influenced the research process and findings (Finlay, 2002).

The selection of interviewees aimed to ensure a balanced representation of various viewpoints from different stakeholder groups. The companies within the hub were carefully chosen to encompass a diverse range, including both emerging businesses and those that have exited. All investing stakeholders were invited to take part, with the exception of a single participant who chose not to participate.

4. CampX

The mobility industry is highly volatile with top selling companies constantly changing from year to year. To increase speed and keep a competitive advantage one of the key enablers is to master and adopt new technologies. In 2019 Volvo Group inaugurated CampX, an innovation hub with the specific purpose to accelerate technology and business innovation through partnerships with Small-Medium enterprises (SMEs).

The innovation hub started at Campus Lundby in Gothenburg but is now established as a global concept and has expanded to Bangalore, Greensbro and Lyon. Both Gothenburg and Bangalore have the focus areas; Electromobility, Connectivity and Autonomous solutions. Lyon focuses on urban solutions, sustainability and uptime & productivity to serve the customers while Greensbro searches for solutions within sustainable transports, autonomous transports and digital services & products.

CampX by Volvo Group aims to develop its capabilities to be more innovative while the SMEs want access to facilities and competence in order to survive the valley of death. CampX does not strive to invest in the SMEs instead the business model is about sharing infrastructure and knowledge to increase the innovativeness and reinforce the mobility ecosystem by bridging the gap between large companies and external SMEs.

In the Incubator startups are selected within the prioritized domains, namely automation and electromobility, to be co-located in the innovation hub in Sweden. The Venture Builder focuses on testing and validating new business opportunities with an increased speed and lower costs and risks by starting with an internal IP opportunity or internal business ideas. There is a close collaboration with product and business owners to support validation and forward bringing of cases with large business potential.

The Accelerator was the first branch of CampX and is the most developed one. In the Accelerator demand-driven co-creation projects with external partners are created to harness the ecosystems against challenges and gaps in Volvo Group's roadmap. In other words, the accelerator establishes partnerships to scale up technologies. The main focus is external corporate-startup collaboration where the startups are required to have a product, customer and IP for CampX to validate the solution in their context. The partnerships with startups are prioritized within the areas of Electromobility, Autonomous solutions and Vehicle technology, and Connected Services and Sustainability. Within electromobility CampX aims to accelerate the validation of products with digital twins and virtual methods but also to optimize data driven energy and predictive maintenance. Furthermore, electromobility also includes challenges of thermal management, optimization of the battery life, charging services and transport mission management. The area of autonomous solutions and vehicle technology strive to improve perception across several weather and visibility conditions. In this area

CampX also wants to authorize high fidelity simulation to learn from real world data. Furthermore, it is also prioritized to enable vehicle architecture driven from software and to improve teleoperations and intrusion detection. Connected services intend to improve logistic systems and truck operations. Moreover, connected services and sustainability also evolve solutions to improve energy and fuel efficiency and managing transition to sustainable transports. Until today the accelerator has established 60 projects within these different areas, where 25 are currently on-going and 7 have been launched as spin-offs, extended partnership or integration.

The workflow of the Accelerator is a three step process consisting of: explore, validate and launch. The first step explore can further be broken down into three steps where CampX starts by identifying current gaps and opportunities within the focus areas. When the gaps and opportunities are identified, CampX scouts for suitable partners within MobilityXLab, Drive TLV or other Volvo Group related initiatives. MobilityXlab is an innovation hub in Gothenburg founded by six leading companies: Volvo Cars, Volvo Group, Veoneer, Autoliv, Ericsson, and Zenuity. The innovation hub offers a six-month program for startups and scaleups to collaborate with their partners in developing new mobility products and services. Drive TLV is an Israeli startup accelerator and innovation hub focused on smart mobility technologies, including autonomous vehicles, connected cars, and transportation data analytics.

Finally CampX defines and kickoff a “Proof of Value " project with the chosen partner. Running a proof of Value project varies between 3-6 months and is the Validate step of the Accelerator process, which aims to confirm if the “Explored” actually creates value. The solution that the partner offers should solve a challenge for the client, which in CampX’s case is the product- or business owner. The validation is done together with a Volvo Group expert, i.e. an engineer. The last step, Launch, includes the termination and conclusion of the projects which can be done in five different ways: Integration, Extended partnership, Fast-track, Spin-out or Technology assessment. If CampX integrates, the acquired knowledge from the project is handed over to the main workflow and processes of Volvo Group. The extended partnership includes a continued collaboration between the startup and Volvo Group after the initial project. The initiative can also go out to the market as fast as possible, which is called the fast-track. When the internal business idea from the project gets spun out, separated from Volvo Group and a new business is created, a spin-out is made. The newest way of launching a project is the technology assessment which covers an early identification and valuation of new technology application and changes.

5. Results and analysis

This chapter presents the results obtained from interviews, examining them through the lens of the theoretical factors established in section 2.3. Each section of this chapter analyzes the responses provided by the interviewees in relation to the identified factor identified in the theory. By doing so, practical examples are provided to illustrate the relevance of these factors in real-world scenarios. Additionally, the analysis identifies various KPI categories associated with each factor, aiming to establish effective measurement methods. Finally, an analysis of the relationships between the identified factors is conducted to find interdependencies.

5.1 The factors within the case study context

5.1.1 Innovation strategy

Table 5.1: The interviewees response to questions related to the innovation strategy and connected measurement suggestions

Factors & KPI categories	Citations from interviews	Measurement
Innovation Strategy ● Business strategy ● Corporate strategy ● Employee awareness ● Flexible options ● Project diversity	● "Our business strategy is to have a learn-as-we-go approach" ● "In our department there is more focus on long-term strategy right now than finance as we are building a new business models" ● "Even though we want many initiatives, every initiative needs a hypothesis and a clear purpose - what do we want to achieve and prove?" ● "We must understand that there are different strategies when doing projects with startups. You have to be quick-footed compared to developing a new truck that takes around five years" ● "CampX is a bit on the sidelines and has different conditions and expectations and can be detached a bit from the Volvo Group." ● "We need to decide which areas to focus on and how the distribution between initiatives should be within each area" ● "You have to have patience, the success of innovation will only show itself in the future" ● "Brake down the strategy into gates: first in an unlimited time we will reach XXX, in 5 years we will be in these areas and then also day-to-day activities" ● "We are more about carry through certain activities than reaching more quantitative KPIs" ● "One of the reasons we need to gather around a common platform is that the challenges of the future are so large that complementary products are required, that	● Weekly surveys to track overall progress and identify successful weeks ● Project deadlines ● Speed of project completion ● Number and size of projects ● Number of patents filed ● Number of workshops organized ● Funding success for the startups ● Number of Proof of Value (POV) and Proof of Concept (POC) ● Regular meetings with the startups ● Number of startups on the platform and their sizes ● Number continued collaborations with startups ● Number of startups leading to commercialization ● Number of spin-out projects ● Number of go-to-market projects ● Number of collaborations resulting in legal contracts ● Number of external meetings and pitches ● Number of startup pitches evaluated ● Organizational poll surveys to track progress ● Visual representation of progress and results ● Employer branding success through regular evaluations and trend analysis ● Applicant metrics for the innovation hub ● Success rate of technology/idea/productification ● Ecosystem KPIs instead of linear KPIs

	we might not even know today. We have the core-product but we might need to collaborated with digital and devices in the future" • "There is a need for incitement to drive this transformation forward, the challenge is that all people are driven by different incentives." • "We are facing competence transformation at Volvo and CampX has a role to help us shift that competence base, and some of that is the physical products, but sometimes it just the knowledge transfer"	

CampX has established an arena where Volvo meets external actors to access new knowledge. Several stakeholders interviewed indicate that this vision is living up to its presetted expectations. Furthermore, CampX's strategy is based on the method of developing and accelerating technology through collaborations with startups according to the interviewees. While this method may appear complex and unclear to some, one interviewee states that CampX has made it more user-friendly and efficient through simplified agreements and transparency. Moreover, CampX's business strategy involves a "learn as we go" approach according to another interviewee. The company did not have a fully established structure or way of working at the outset, but instead, the team learned by trial and error, and continually refined their approach based on what succeeded and what did not. This iterative process of learning and adapting has helped CampX to stay competitive and innovative in its market field, which can be compared to the mindset of a startup.

Regarding the corporate strategy, CampX has placed a significant emphasis on its geographical scope when establishing CampX platforms globally. To ensure a robust network for the platform, the firm considered factors such as Volvo Group's other operations but also the location of startups and competence clusters. By focusing on its corporate strategy, CampX has been able to expand its reach and establish a strong presence in key markets according to the interviewees.

One internal interviewee at CampX was not entirely aware of the innovation strategy of the organization. Another interviewee said that their first encounter and awareness of the CampX team was due to an external party that had earlier experience with the team. This might be evidence that the innovation strategy of CampX is not explicit and well-known through the entire organization. Moreover, some of the external interviewees mention that they measure R&D and patent activities, however many also state that it is not the most important focus of the operation but instead the knowledge exchange captured in external interactions. For instance, an interviewee highlights that although one of CampX's platforms frequently presents invention and patent notifications to management to demonstrate innovation, this alone does not guarantee true innovativeness or effective knowledge sharing. Instead there might be other ways to showcase successful innovation performance.

In terms of risk-taking in new business areas and proactiveness CampX may not be at the forefront, as their primary focus lies in selecting startup and technology collaborations that align with Volvo Group's current needs rather than exploring diverse areas without a defined purpose for innovation. The reasoning behind this approach, according to management, is that projects and partnerships have a better chance of surviving and thriving if it has clear incentives to be developed. On the other hand, a contrasting viewpoint arises from another interviewee working in another innovation platform who underscores the significance of diversifying innovation projects and involving a wide range of participants and projects to remain up-to-date and competitive in the face of emerging alternative technological advancements.

Moreover, another interviewee highlights the value of industry convergence in strategic discussions. They emphasize the need to strike a balance across various dimensions, such as areas, projects, or nationalities within an organization, in order to capture a diverse spectrum of knowledge. Therefore, these perspectives provide evidence that CampX may be perceived as less risk-taking and proactive compared to other innovation platforms. However, the interviewee also mentioned that by promoting variety, expertise and deep knowledge might get compromised. Similarly, one internal interviewee explained that CampX was an enabler for people from different business areas to meet and exchange ideas and experience.

5.1.2 Innovation structure

Table 5.2: The interviewees response to questions related to the innovation structure and connected measurement suggestions

Factors & KPI categories	Citations from interviews	Measurement
Innovation structure ● Flexibility ● Decentralization ● Integration	● "Other similar innovation initiatives have also organized a place for external and internal parties to collaborate, but preferably at arm's length distance, a little outside the gates with the mindset that they should not be infected by the old tired culture. The problem with that is that they also don't get the nourishment from the expertise found in the established company." ● "It's not just any startup company that we bring in, it must respond to a specific problem that we want to solve." ● "Our department at Volvo Group is located at CampX since we need to be close with them when we continue growing" ● "The environment at CampX suits us very well right since we are in our growth phase". ● "Each CampX site is locally anchored, which means that everyone has some kind of steering committee that directs the local operations. What we realized is that it is important that it must not become too	● Frequency of engagement with startups on a weekly basis ● Total number of innovation processes ○ Number of collaboration agreements with startups covered by legal contracts ● Total office space in use ● No. of companies ● Results of organizational-driven poll surveys on innovation effectiveness ● Number of business units engaged in innovation projects (flexibility, decentralization) ● People data ○ the diversity profile ○ demographics ○ how are people moving in and out of

	complex for the Product Owners, that they should not have to anchor things first locally and then globally, having to go through several instances to get a project started." • "We use people data to understand the organizational structure, not just how many people but what's the diversity profile, demographics, how are people moving in and out of the organization, what is the structure, because when you have 6000 employees, you got massive data"	the organization ○ retention

According to interviews at CampX, the organization does not have a clear organizational structure. Instead, the emphasis is on maintaining a loose and flexible structure that can facilitate effective workflow. The structure is entirely network-based now, and one interviewee stresses the importance of avoiding theoretical notions of what the structure should be like. Instead, the organization must experiment and learn as it goes to determine the most effective structure and processes for its specific business needs.

Another interviewee describes the structure as highly decentralized, and states that this setup is beneficial for CampX's operations. The various global innovation hubs of the organization are all anchored locally with network-based leadership. This means that there is no global manager who governs every hub, instead, each hub has its own local board. Furthermore, the interviewee acknowledges that this arrangement can sometimes create complexity, but it also brings a lot of advantages with this local anchoring. The interviewee believes however that this local anchoring is critical for success in a networking-based business like CampX, which operates both locally and globally and relies highly on contacts.

According to several interviewees, the CampX concept has been successfully integrated into Volvo Group. One interviewee states that CampX has leveraged the resources of the incumbent Volvo Group while maintaining the passion, agility, and drive of a startup. However, some interviewees note that the CampX team may not be well-established and recognized throughout the entire organization. In terms of integration, the location of CampX plays a critical role in enhancing performance as it is situated at the center of knowledge, engineers, laboratories, and other key resources. Startups that operate within CampX are meticulously selected based on the specific needs of the organization, fulfilling a precise purpose.

5.1.3 Leadership

Table 5.3: The interviewees response to questions related to the leadership and connected measurement suggestions

Factors & KPI categories	Citations from interviews	Measurement

Leadership ● Engagement ● Encouragement ● Trust ● Autonomy ● Flat organization ● Fuzzy organizational boundaries ● Learning-oriented ● Reporting methods ● Open for different ways of working	● “Collaboration is the new leadership” ● “The management does not need specific details, he trusts us and let’s us work pretty freely” ● “Thanks to the personality of the management, CampX has gotten a lot of encouragement.” ● “Management has made it clear that they trust us, that we make a method to deliver results” ● “However management hear what we are doing but they want us to visualize it more” ● “If it had been a “theoretical” person at the management position, then the result of how CampX is managed and steered in would be in another direction” ● “We are in a huge transformation, where you as a leader needs to be humble and respectful, to get everyone on board” ● “If you ask the management they will probably say: how much money are you spending and what is the result”? ● “The purpose of CampX depends on who you ask: management would say to push the boundaries of Volvo, how open we are, how much we share, how fast we can work etc.” ● “I've moved my focus to the soft values but I know by no that everyone has not moved there” ● “It is often the managers who are over 50 who do not understand the importance of the soft values but are still focused on showing the hard ones. They also refer to their entire track of records that they have done in one way all these years.” ● "Management is forced to believe in this curiosity and innovation initiative, you cannot sit in the driver's seat and strive against it when we talk about "partnership is the new leadership". ● “Many times when we talk about collaboration is the new leadership it is with these big ones; Daimler etc ...but usually not with the little ones" ● “If you are used to lead an organization because you control your resources, you control the people and plan - you got a methodology and a mechanical way of running a project - then moving into an environment like CampX where you have to let go of that plan and rely more on other people, it is another way of driving progress, which can be a bit scary - new skills as a leader is then needed” ● “Before I was very result-driven and wanted to only see hard value, and I have realized that this makes exploration harder”	● Questionnaire with a likert scale ● How many of the startup I am engaged with on a weekly basis (check-in's) ● Number of projects working across department borders

Several interviewees describe that the leadership has a central part when starting and running an innovation platform like CampX. Further, interviewees explain that collaboration and communication across borders, both between different departments

and between different firms, have been beneficial for the development of new technical innovations. Given that different departments and functions likely face similar challenges, working across borders can create win-win situations and result in mutually beneficial outcomes. Hence, it appears from the interviews that the leadership should facilitate and encourage this type of structure.

Interviewees are consistent that they need to show results to the top management continuously. However, different approaches to show the results of the organization are discussed. One interviewee suggested using demos to visualize the innovation progress, which creates possibilities for interactions and conversations. Further, it is also advised to put leaders in a different mindset than traditional decision-making, as they deal with decisions on a daily basis. For innovation, curiosity is needed, and leaders should therefore be learning-oriented instead of action-oriented.

In the context of CampX's leadership, interviewees argue that there is a need for a visionary in management to support organizations and motivate the employees to perform in a given direction. However, it is observed that the visionary leadership decreases from the bottom-up within an organization. Interviewees also explain that the employees also have a lot of freedom and trust in what they are doing, which have had positive effects on the result and the employees feel more motivated. Furthermore, one interviewee explained that if someone with a different personality and experience was the manager, the initiative might not have received the same level of support and trust for innovation, potentially limiting the level of innovative achievement. In addition, interviewees suggested that managers need not be solely focused on profitability based on numerical metrics which is more equitable when evaluating the success of innovation initiatives since there are other valuable aspects beyond financial outcomes. Another enabler for CampX's success is that the management team is open for change and encourages new ways of working. Hence, no clear concept or method needed to be set from the very first start, but has been able to develop over time depending on what has been beneficial and not.

5.1.4 Culture

Table 5.4: The interviewees response to questions related to the culture and connected measurement suggestions

Factors & KPI categories	Citations from interviews	Measurement
Culture ● Openness ● Trust ● Risk-taking ● Talent attraction ● Change management ● Employee	● "In the past, I was very results-driven, but now I value intangible assets more, but I notice when I talk to other colleagues that they are not on the same track at other departments." ● "The culture at Volvo Group is a bit more old fashioned and process driven than the culture at CampX."	● Survey ○ Employee engagement ○ Employee retention rate ○ Inspired employee ○ Employee satisfaction ○ Product Owner satisfaction ○ Diversity and inclusion ○ The correlation between

satisfaction ● Department-specific cultures ● Culture mismatch	● "There is a very open culture that is based on open communication. ● "CampX still has this feeling of forward-moving-mentality despite challenges." ● "There is a high belief in new thinking, technology, change, innovation and patents, which makes it attract people who like these aspects" ● "There is room for your own opinions" ● "Bottom-up culture deep down in the organization" ● "I would say the culture is different from other parts of the Volvo Group: it's a different dynamic, a different way of talking, you meet other businesses, and have informaland have informal meetings. Mix of different cultures…" ● "Low power distance." ● "Innovation is viewed as a necessity." ● "Dare to share culture." ● "Maybe there is a truck in five years that is going to have a piece of startup equipment, that's nice, but that's the side-product. What we are hoping is that we can change the culture and the mindset of the engineers". ● "Letting external startups doing the job is valuated third as expensive as doing it in-house at Volvo, when also bringing all the soft benefits of it" ● "One of the biggest challenge working with startups is the mismatching of cultures" ○ "Startups and corporates have just different ways of telling time" ● "If there would be no challenges working with startups, it would not add value, it would just be like working with another corporate" ● "I am often frustrated working with the Volvo culture and not the startup culture. It probably depends on my background, people that have worked for Volvo a long time before are often the other way around". ● "We tried to show the municipalities that we are changing the university culture: showing that entrepreneurship is a validated career choice" ● "The biggest barrier between Volvo and the startup is that they don't trust each other - therefore we will end up measuring trust" ● "A certain rate of retention and turnover is healthy so you bring new blood in to achieve a diversified culture" ● "It makes me frustrated that not everyone is on board and understand what we do, how could I explain it in	CampX's innovation and the innovation of its people ○ Level of collaborations ○ Innovation environment ● Team satisfaction ● Number of external company/startup/mature company meetings ● Number of workshops hosted ● Reputation enhancement of startups through the innovation platform ● Entrance and usage rate of the building's facilities (such as restaurants and lunchrooms) ● Applicant demographics for joining the innovation platform ● Feedback from startups on partnering experience with the larger corporation ● Number of startup pitches heard ● Talent attraction metrics: ○ How many new hires? ○ How many apply for jobs? ○ How many of the talents stay after one year etc.? ● How happy are we? ● How would you rate your week? (Rate on fridays and then on mondays see the average result of weeks, then you can compare good weeks and bad weeks to analyze circumstances and find trends) ● Satisfaction based on smiles, to get a fast signal of the experience - temperature check. ● How much trust did you have in this project? (Then map out the trends, correlation between trust/success/learnings) ● Employee branding: an incremental planning every 10 weeks, a survey based on 5 parameters: Assessment, Collaboration, Innovation level, etc. ---> based on the results, analyze and identify the trends. ● Network analysis: which would look at how people at CampX are working with people across the rest of GTT. There are tools out on the market that can look at those contacts, who is collaborating/networking with who - you end up with a spider looking diagram - this would help see why some people are just talking to each other and not that person…etc. ● The level of innovation: number of patents & new products (business core metrics). ● How high is the culture and innovation valued by the employees? ● Health check (what do people risk, do we understand what risk we are running when we employ 6000 people, then you look at recognition rates, how

	another way” ● “We maybe can’t rely on the standard way of Volvo’s way of measuring culture or employee engagement for CampX” ● “Employee branding dimension as an intangible assets, very valuable” ● “CampX for me is a way of driving new ideas, but it is also a inspirational place that can attract talent, which leads to good employer branding”	deep/hierarchy the organization is - does it got too many levels), ● How strong is our succession plan: ○ How many are ready to take the leader role today. ● Measure employee satisfaction with project outcomes

Several interviewees have extensively discussed how organizational culture is the leading factor associated with an organization's capacity to handle innovation. Furthermore, several interviewees describe that the culture of CampX is based on open communication, where people are curious, transparent and have a willingness to share everything with each other. In other words, CampX is an organization with a lot of support and trust which is an enabler for culture that supports collaboration. Furthermore, CampX serves as an outward-facing representation of the organization, attracting top talent through its reputation as an attractive workplace. Its strong employee branding dimension serves as an intangible asset, fostering curiosity and inspiration among employees. Meeting different startups also brings new energy into the company.

Interviewees note that change management has become even more critical these days as the mobility industry undergoes a significant transformation, requiring everyone to eventually come on board with new approaches and technologies. However, it is also explained that change management can be challenging when people do not share the same mindset. Therefore, interviewees describe that it is crucial to approach the change with humility and emphasize that the new solution will complement, not replace, the existing one. It appears in the interviews that in the context of the Volvo Group, the collaboration with startups has been recognized for exposing expert engineers to a new culture, leading to a positive change in mindset that has driven an overall cultural transformation. Interviewees generally describe engineers as slow and thoughtful, why this cultural transformation entails a faster way of working. CampX aims to transform into a database that facilitates collaboration between product owners and startups even without the aid of CampX. In other words, that the CampX organization becomes self-sufficient. However, another vision at CampX is to encourage employees with ideas that do not fit their business unit to turn to CampX, which has been slower to gain traction, but is improving according to a management interviewee.

During interviews, multiple individuals emphasized that the culture and mindset at CampX differed significantly from that of other departments within the Volvo Group. It is noted that the people at CampX were more open-minded, forward-thinking, and willing to share information and previous experience. In contrast, the more traditional

departments were seen as being more old-fashioned and process-driven. One senior manager interviewed emphasized that such a culture is essential for an organization like CampX, stating that "the environment we intentionally created at CampX is meant to be more flexible and free than other parts of the company. This affects the culture and atmosphere, and requires team members to be unpretentious, transparent, open, and curious." These qualities are necessary for success in the CampX environment. Another interviewee observed that the team at CampX focused on facilitating collaborations and knowledge sharing, rather than just being results-driven like other departments.

An interviewee also acknowledges the challenges associated with culture, noting that mismatches may arise between startups and corporations when collaborating. The interviewee also suggests that startups and corporations have divergent perspectives on both quality and time. Startups often prioritize speed, with "fast" meaning tomorrow, while corporations typically have longer timelines, with "fast" meaning completing something within two weeks.

5.1.5 Knowledge management

Table 5.5: The interviewees response to questions related to the knowledge management and connected measurement suggestions

Factors & KPI categories	Citations from interviews	Measurement
Knowledge ● External knowledge acquiring ● Generation of ideas ○ Pull vs. push ● Process for knowledge transferring	● “Startups have a deeper knowledge than our department can gather on our own” ● "I would like to follow lessons learned from CampX that are actually used in the development of Volvo's various parts - so we can see that what happens at CampX actually generates value” ● “In this kind of initiative we have to have many embryos in, we have to have many initiatives because only a few will succeed” ● “We put a lot of focus on knowledge which result in a lot of focus on the recruitment, what in turn put a lot of focus in diversity and mix of people in every dimension” ● “Young people see the Volvo Group as a "boring" company that makes trucks, therefore CampX exists as a way to show that we work in a modern and fast way” ● “We successfully learn rather than fail with glory” ● “Failure is viewed as a strength rather than a weakness.” ● “Failure is not a failure, since you bring knowledge with you”	● Evaluate project outcomes and lessons learned ● Track number of workshops ● Gather feedback from startups what they learned ● Follow up with engineers on their knowledge gained from the collaboration with the startup ● Conduct interviews in addition to surveys ● Measure KPIs in failures ● Track number of startup pitches listened to ● Academic inflow ○ Number of Master Theses ○ Number of graduates ○ Number of doctors etc. ● Self-reflection moment with the engineers: what will you bring with you? ● Amount of learnings from external sources ● Quick go/no-go gates as a ”fail fast" approach in filtering ideas and projects

	• "Of course, it is easy to say that it is successful if it generates an income for the company, but it is also successful if we shut it down, and do it quickly because then we have learned something." • "The learnings from the startups are that we get to see different ways of operating in a more creative and innovative startup-mentality that we can take back into the Volvo Group and apply in our existing organization"	

Many of the interviewees described that the main value with the startup-collaborations at CampX is the knowledge sharing aspect of the partnership. One internal stakeholder stated "startups have a deeper knowledge than our department can gather on our own". CampX provides a faster way of accessing and validating new technology, requiring only a small amount of resources than other traditional departments at Volvo according to interviewees. Startups offer new insights and ideas to the company, and legal agreements formalize the way startups interact with CampX. Moreover, startups also get funding and support from dialogues.

Several interviewees state that CampX focuses on validation of projects and technologies that work in Volvo Group's setting to generate learnings rather than take it to market. In other words, the main purpose of the CampX team is not to create initiatives for commercial ends as spin offs. Furthermore, several interviewees state that CampX has a clear "pull" focus, meaning that rather than pushing out multiple ideas that might not generate in any implementation and application, the innovation collaborations must have a clear need from the start. Moreover, a few interviewees also described that they have no intention of expanding the amount of startups collaborations, that too many participants on their technology development platform would make it difficult for CampX to support the startup effectively and the purpose might drain.

In the interviews it is explained that failed innovation projects should not be referred to as failures, but rather as learnings. This mindset shift can generate great value and change the organization's mentality to focus on learning instead of failure stated one interviewee. One interviewee from management stated "I would like to follow lessons learned from CampX that are actually used in the development of Volvo's various parts - so we can see that what happens at CampX actually generated value".

After conducting the interviews it is concluded that knowledge generation is important at the platform. However, interviewees at CampX reported that there is still an ongoing debate about how to effectively capture and measure the knowledge generated by the projects. According to the interviewees, there is no official method for transferring

knowledge within the CampX network. Instead, each stakeholder has their own approach. For example, the project owner has a roadmap that integrates knowledge from validated projects to see if it functions.

5.2 Interdependencies between the factors

The factors that influence an organization's ability to effectevly innovate have been identified mutually exclusive until now, without considering their interdependencies and cumulative effect on innovation. Hence, the impact of these linkages on innovation is largely overlooked. This analysis reveals several interdependencies between these factors, showcasing their hierarchical relationship as depicted in Figure 6.1.

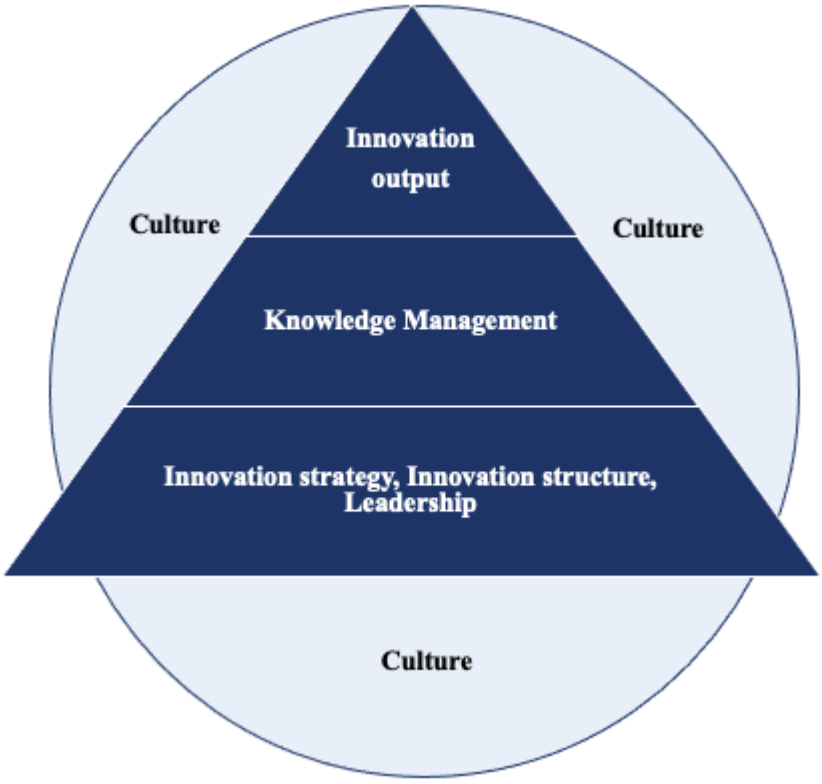

Figure 6.1: Interdependencies between factors

5.2.1 The role of culture

Throughout the thesis, culture emerges as the most frequently discussed factor related to innovation management. Culture is widely argued in both literature and interviews to be the primary driver of innovation, and also plays a crucial role in managing innovation by impacting all other factors. Hence, we started by analyzing the relationship between culture and the other factors.

The leadership style of an organization is often reflected in its culture. It has been seen that a shift towards a participatory and democratic management style suggests a culture that values innovation. Furthermore, it has become clear that effective leadership

fosters cross-functional communication and collaboration, which is facilitated by the organizational culture. Moreover, empowering employees by giving them autonomy can possibly increase motivation and incentivize innovation, which is closely linked to the culture. Additionally, it is widely recognized that an organization that is receptive to change and encourages new ways of working tends to be more innovative, and this is reflected in its culture.

The knowledge management and organization's culture also appear as closely intertwined in terms of impacting the innovativeness of organizations. For instance, a culture that values learning and knowledge generation can foster a dynamic and innovative workplace. Embracing a "learning orientation" culture can enable organizations to seek new learning opportunities and generate knowledge from diverse sources, including external sources and past projects. Throughout the study it is evident that organizations should prioritize creating a culture that encourages learning from both successful and failed innovation projects, with a mindset that views failures as opportunities to learn. A culture that prioritizes knowledge creation, sharing, and learning is often indicative of strong leadership, as it encourages ongoing learning and innovation.

By analyzing the innovation strategy and organizational culture a correlation shows that the innovation strategy determines the firm's ability to manage innovation effectively, while the culture of the organization has an all-encompassing impact on innovation management. Furthermore, it is suggested that the development of innovation strategy should align with the organizational culture and effectively communicate the shared vision and goals of the company. Moreover, firms that prioritize option flexibility in their innovation strategy tend to have a broader and more diverse culture since they explore a broad line of different options. In contrast, firms that have a more selective innovation strategy tend to have a more narrow culture.

Throughout the study it has been challenging separating organizational culture from organizational structure due to their parallel development throughout the lifespan of the organization. An innovation structure that is characterized by an iterative and flexible approach, which enables experimentation with new ideas, pivots when necessary, and continuously refine their approach based on what succeeds and what does not, which is consistent with the idea of learning by doing and encourages a culture of experimentation and risk-taking. Individual employees can develop innovations, but the ability of the organization to innovate appears to be greatly influenced by teams. Furthermore, the effectiveness of a team-based working structure has been observed to be contingent upon various other factors, such as the presence of an open and collaborative culture and a participatory management style.

5.2.2 The hierarchy of the other factors

In the hierarchy of the factors impacting a firm's ability to manage innovation, the innovation output has been positioned at the top, while the culture is regarded as the fundamental driver that impacts all other factors. The culture is a continuous and evolving factor that needs to adapt and change when adjustments are made on the other levels. Directly below the innovation output is knowledge management, which plays a crucial role in determining the innovation output. Innovation strategy, innovation structure, and leadership are exogenous factors that influence knowledge management, meaning they are not impacted by the other factors. These exogenous factors provide the foundation of the organization, while knowledge management acts as the intermediary between the organization and innovation output. By delivering ideas and expertise between the two parties, knowledge management bridges the gap and enables the organization to realize its innovation potential.

The manner in which the innovation strategy is formulated and implemented directly influences the knowledge management practices within the organization. For instance, CampX, whose innovation strategy is network-based, placing a strong emphasis on collaboration and connectivity among diverse stakeholders to foster innovation. This approach opens the doors to a wide array of knowledge sources, as information flows in from various channels, contributed by individuals possessing different skills, competencies, and experiences. Consequently, the knowledge available to the organization becomes broad and diversified, enriching the potential for innovation.

However, such a networked innovation strategy also poses challenges in managing and harnessing this vast knowledge pool effectively. One of the primary hurdles lies in the conversion of tacit knowledge into explicit knowledge. Tacit knowledge, being highly personal and context-dependent, resides within the minds of individuals. Transferring this valuable tacit knowledge into explicit, codified formats, which can be shared and utilized by others, becomes a complex task in such a collaborative and diverse environment.

The impact of the innovation structure on knowledge management within an organization should not be underestimated. The way an organization is structured, whether centralized or decentralized and formal or informal, can significantly influence how knowledge is managed. Consider the distinction between a centralized structured organization and a decentralized and informal one. Decentralized and informal structure can enable more creative and risk-taking knowledge sharing, for example, cross-border collaborations that might not have occurred if otherwise. However, in such decentralized and informal settings, there is a potential drawback in the form of unstructured knowledge sharing. Without proper tools, processes, and mechanisms in place, capturing and harnessing the knowledge effectively becomes challenging. The risk of valuable insights being lost or overlooked looms large.

On the other hand, a centralized structured organization tends to have more formalized processes and systems for knowledge management. The structure provides a sense of order and control, enabling the organization to capture knowledge systematically. With designated roles and responsibilities, the knowledge management process becomes streamlined, ensuring that valuable information is collected, documented, and made available to those who need it. However, this formal structure may also limit the spontaneity and creativity that arise from informal knowledge sharing.

The leadership should empower and grant autonomy to employees to create a sense of control over their work and foster an environment where new ideas and approaches are explored, promoting innovation within the organization. Hence, leadership style plays a crucial role in knowledge creation by allowing employees the freedom to innovate. Furthermore, the employees also require adequate resources, including time, trust, and finances, to facilitate idea generation. As such, it falls to the management team to ensure that the employees are appropriately supported and equipped to engage with it effectively. The case of CampX demonstrates that effective management can provide the necessary resources and guidance to create an environment that nurtures knowledge creation and enables employees to realize their creative potential.

Moreover, controlling the flow and dissemination of knowledge within the organization become more complex. With knowledge pouring in from various sources, ensuring its accuracy, relevance, and reliability becomes a critical concern. The management team must therefore establish mechanisms to validate and curate the knowledge, ensuring that it aligns with the organization's goals and objectives. Without proper control and management, the organization risks being overwhelmed by information overload or encountering conflicting knowledge that could hinder progress and decision-making.

6. Discussion

6.1 Combining theory and result and analysis of the factors

This section aims to combine theories with the obtained results and analysis from the interviews, in order to identify both similarities and differences. By doing so, the contribution of the case study's outcomes to the existing literature on innovation performance is showcased.

6.1.1 Innovation strategy

The findings from the interviews provide valuable insights into the innovation strategy of CampX, how it aligns and differs with the theory of innovation strategy by Adams et al. (2008), Smith et al. (2008), and Grant (2021). For instance, Adams et al. (2008) suggest that innovation strategy performance can be objectively measured by monitoring new product development and market activity. However, the interview data reveals that this approach may not be suitable for innovation platforms focused on accelerating technology. Interviewees emphasized that the aim of the innovation platform is not to generate as much spin offs and new product development as possible but. Instead, the emphasis shifts from short-term deliverables, to knowledge generation and intangible assets. Consequently, the case study enriches the literature by Adams et al. (2008) with another perspective on innovation strategy within the context of innovation platforms.

Moreover, Adams et al. (2008) also suggests that innovation strategy could be subjectively measured through proactiveness and persistent commitment to innovation. Related to this, the interviewees expressed that CampX offers valuable opportunities to leverage external knowledge and technology that may not be core competencies within Volvo Group. This collaboration expands Volvo's competencies and reduces path dependency. However, it is worth noting that the interviewees at CampX differed from those at other innovation platforms in terms of their approach. The CampX interviewees revealed that CampX adopts a relatively less flexible "pull" strategy. This means that they prioritize innovation projects that align with Volvo's internal needs right from the start, limiting their exploration of a broad range of options. Consequently, their selection of startup and project collaborations is more focused and targeted compared to other platforms that use a more "push" approach when selecting the partners. This illustrates that some innovation platforms innovate broadly to have many options and secure many future paths, while others choose to be more selective when choosing which innovation project to pursue, and hence becoming more narrow and deep. These outcomes of the study contribute to the literature by demonstrating that both strategies are crucial for staying at the forefront of innovation and should be

properly considered. Additionally, the study adds on by highlighting the selection of pull- or push strategy is highly dependent on factors such as available resources and target markets.

Moreover, another way that the examination of CampX has contributed to existing literature by Adams et al. (2008), Smith et al. (2008), and Grant (2021) is when interviewees emphasize the importance of industry convergence in discussing strategy, as it aims to reflect the desired balance of such as areas, projects, or nationalities within an organization, showcasing the diverse range of knowledge. Efficient monitoring of industry convergence can, according to interviewees, be achieved by implementing robust metrics that encompass the diversity of projects, areas, and nationalities within the platform. Hence, while sector convergence is regarded as crucial based on the interviews, it is not discussed in the existing literature by Adams et al. (2008), Smith et al. (2008), and Grant (2021).

The innovation theory proposed by Grant (2021) and Smith et al. (2008) underscores the significant influence of corporate strategy on the innovation strategy of firms. Corporate strategy, which pertains to a firm's competitive positioning in terms of geographical, vertical, and product scope, plays a pivotal role (Smith et al, 2008). The interviews have revealed the substantial benefits of considering the placement and positioning of oneself, as emphasized by the aforementioned theories. This aligns with the insights shared by the interviewees regarding CampX's strategy being predominantly network-based. The underlying foundation of this approach lies in the ability to access the right individuals and competencies. Consequently, the findings from these interviews make a noteworthy contribution to the scholarly work of Grant (2021) and Smith et al. (2008) by providing empirical evidence and real-world perspectives that support their theories.

Schilling, (2019) and Adams et al. (2008) suggest indicators related to the innovation process such as the number of new product or service launches. However, these metrics are suggested for more traditional organizations and not to innovation platforms aiming to accelerate and develop technologies. According to numerous interviews, the innovation platform instead offers other advantages, including its ability to create an attractive work environment in addition to facilitating knowledge exchange with startup companies.

6.1.2. Innovation structure

The interviews conducted at CampX provide valuable insights into the organization's unique approach to innovation structure. Interviewees emphasize the importance of a flexible and loose structure that fosters effective collaboration and experimentation. This approach aligns with existing literature on innovation structure, specifically the work of Smith et al. (2008) and Adams et al. (2006), which highlights the need for

organizations to be flexible to foster innovation. Analyzing the interview findings enhances our understanding of CampX's innovation strategy and how it enriches the theory presented by Smith et al. (2008). The key takeaway is that CampX's "learning by doing" approach aligns with the argument by Adams et al. (2008) and Smith et al. (2008) that an iterative and flexible structure promotes innovation, which seems to be crucial for innovation platforms such as CampX.

According to the literature proposed by Adams et al. (2008) and supported by Saunila et al. (2014), the degree of centralization or decentralization within an organization can serve as an indicator of its structure. In the case of CampX, it was revealed through interviews that the organization has a highly decentralized setup, characterized by locally anchored innovation platforms led by a network-based leadership structure. This decentralized structure has proven to be highly advantageous for the innovation platform, as it fosters a decision-making process with less hierarchy, granting employees greater independence to make contextually appropriate decisions. Furthermore, this aspect has played a crucial role in the successful establishment and motivation of individuals working within the innovation platform. Consequently, the examination of CampX contributes to the existing literature by highlighting the importance of investigating decision-making authority when evaluating the innovation structure of innovation platforms, where decentralization emerges as a preferred approach.

Although the interviewees prefer the decentralized setup, they also acknowledge the potential complexities that can arise from such a structure, such as difficulties in maintaining consistent communication and coordination across the decentralized platform. With each innovation platform operating independently, there may be challenges in ensuring alignment with the overarching goals and strategies of CampX as a whole. Miscommunication or lack of coordination could lead to duplication of efforts, inefficient resource allocation, or conflicting priorities among the hubs (Melkas & Harmaakorpi, 2011; Daronco et al., 2022). Thus, the interviewee data contribute to the argument made by Melkas and Harmaakorpi (2011) and Daronco et al. (2022) by emphasizing the practical relevance and importance of addressing communication and coordination issues within decentralized innovation platforms like CampX.

Melkas and Harmaakorpi (2011) emphasize the significance of organizing employees based on geographic regions, highlighting the need for aligning organizational structure and design with goals and strategy to maximize performance and achieve success. In line with Melkas and Harmaakorpi’s (2011) perspective, the interviewees recognize the crucial role of location in driving performance, exemplified by CampX's strategic positioning at the heart of a knowledge hub, housing skilled engineers and valuable resources. By establishing itself in such an environment, CampX effectively attracts and retains top talent while capitalizing on the resources offered by the broader

innovation ecosystem. Thus, the case study reinforces the notion that innovation thrives in environments characterized by a concentrated presence of resources, expertise, and talent, enriching the theory presented by Melkas and Harmaakorpi (2011) regarding the importance of geography.

Melkas and Harmaakorpi (2011) highlight the importance of strategically grouping employees to optimize performance. Interviewees underscore the crucial role of physical proximity in enhancing performance, as demonstrated by the CampX team's positioning at the center of knowledge, engineers, and other key resources. By co-locating individuals, CampX facilitates faster communication and enhances project efficiency. Thus, this argument, supported by the case study, contributes to enriching the theory that emphasizes the advantages of grouping people in specific ways (Melkas & Harmaakorpi, 2011).

Overall, the findings from the interviews suggest that CampX has developed a unique and effective approach to innovation structure that aligns with the latest thinking in the field. By maintaining a flexible and decentralized structure, selecting the right startups to work with, and positioning itself in a vibrant innovation ecosystem, CampX is able to drive innovation and create value for its stakeholders.

6.1.3 Leadership

After reviewing the theories proposed by Saunila et al. (2014), Melkas and Harmaakorpi (2011), Smith et al. (2008), and Adams et al. (2008) and analyzing the results, it is evident that leadership plays a crucial role in the success of an innovation platform. While all these references emphasize the importance of leadership, only Adams et al. (2008) provide actual measurement approaches. However, the measurement suggestions presented by Adams et al. (2008) are limited, which highlights the need for additional measurement proposals. Both the examination of the innovation platform CampX and other additional references have contributed to the above mentioned literature; Saunila et al. (2014), Melkas and Harmaakorpi (2011), Smith et al. (2008), and Adams et al. (2008) .

The case study of CampX, Bass and Riggio (2006) and Yukl (2006) all add that leadership could also be assessed through objective performance measurements such as organizational outcomes and team performance. Additionally, interviews are consistent with Swasy and Grove (2003) which revealed that network analysis could provide a comprehensive understanding of a leader's network and its effectiveness. Another method to address the gap in leadership measurement literature is self-report measurement (Judge & Piccolo, 2004). However, the literature raises concerns about the validity of leadership and performance predictions based solely on self-report measures while interviews with managers and employees at CampX provide evidence that the leader's self-image aligns with how the leadership is experienced.

There is an overlapping consensus between interviews and Adams et al. (2008) suggests that effective leadership entails breaking down barriers between people, ideas, and resources, while fostering cross-functional communication and collaboration. Both the literature by Melkas and Harmaakorpi (2011) and results show that collaboration and communication across different departments and firms have been instrumental in driving the development of new technical innovations.

Moreover, there are similarities that effective leadership should guide employees while giving them the freedom to explore new ideas and take risks, thereby giving them trust which promotes positive results (Melkas & Harmaakorpi, 2011). Giving employees this autonomy can lead to increased motivation and incentives to facilitate innovation (Smith et al. 2008). There is also a shared understanding that if the organization is open for change and encourages new ways of working, more innovation appears. Thereby, no clear concept or method needed to be set from the very first start, but can be developed during time to meet the demand and trends from the market (Melkas & Harmaakorpi, 2011).

6.1.4 Culture

It is found that organizational culture is the leading factor in an organization's capacity to handle innovation (Adams et al., 2008; Saunila et al., 2013; Melkas and Harmaakorpi, 2011; Smith et al., 2008; Daronco et al., 2022). This includes an organization's stance on collaboration, communication, and risk-taking. The interviewees describe CampX's culture as one that promotes open communication, support, and trust, enabling collaboration. Furthermore, interviewees note that the people at CampX are more open-minded, forward-thinking, and willing to share information and previous experience than in other departments at Volvo Group. Similarly, Adams et al. (2008) explain that innovative departments differ from traditional departments. However, this study provides insights to Adams et al. (2008) article since the interviews state that mismatches could appear and be challenging to overcome, as is the case when CampX creates collaborations with startups that are used to working faster than the departments at Volvo Group.

Saunila et al. (2014) and Melkas & Harmaakorpi (2011) explain that shared norms, beliefs, and values are crucial for creating a culture supportive of innovation. Furthermore, it is also described that change management is also critical, especially as the mobility industry undergoes a transformation. The interviewees agree that when an organization and its environment is under a transformation, it is crucial to approach it with humility and respect. However, the findings of this study underscore the importance of not only approaching the transformation process with humility and respect but also highlighting the critical value for stakeholders to actively understand, recognize, and participate in the value of the projects.

The importance of employee well-being is also highlighted by Saunila et al. (2014) and Melkas and Harmaakorpi (2011) along with the need to prioritize a culture that encourages individuals to question established norms and adopt an exploratory mindset. This is exemplified by exposing engineers to the mindset of startups at CampX. Lastly, Grant (2021) underscores the importance of employee satisfaction and branding for attracting talented individuals to the organization. This is an overlap with the interviews since the strong employee branding dimension at CampX attracts top talent, fueling curiosity and inspiration among employees. Furthermore, the examination of CampX offers valuable insights to the literature by highlighting the strength of talent attraction at CampX. It demonstrates that a platform can have the ability to attract individuals who may not have otherwise considered joining a company. This is particularly noteworthy as there is often a common perception that the Volvo Group is exclusively associated with a slow and monotonous work environment solely focused on truck manufacturing.

6.1.5 Knowledge management

The comparison between theory and interview results reveals that external knowledge acquisition is highly beneficial for organizations to generate innovations (Adams et al., 2008). The literature by Adams et al. (2008), Saunila et al. (2014), Melkas and Harmaakorpi (2011) and Smith et al. (2008), all describe knowledge management and innovation strategies as two separate important factors that impact a firm's ability to manage innovation. However, this study makes a valuable contribution to the literature by highlighting the potential connection between knowledge management and innovation strategy. Specifically, it emphasizes that knowledge about the competitive environment, as well as the firm's strengths and weaknesses, are often embedded in the firm's strategies.

Smith et al. (2008) and the interviews overlap in terms that organizations that frequently leverage their knowledge resources are more likely to develop innovations, with high-performing organizations being particularly adept at learning from mistakes and generating new knowledge and ideas. However, there is a discrepancy in the importance of generating a sufficient number of ideas; while Adams et al (2008) emphasize idea quantity as the raw material for innovation, the results and analysis suggest that innovation collaborations should have a clear need from the start. In that way, this study contributes to the literature by offering a nuanced perspective that a high number of generated ideas does not guarantee success for a company, just as only establishing collaborations fulfilling a specific need does not either automatically result in success.

Additionally, Adams et al. (2008) and interviewees agree that cultivating a learning culture that encourages learning from both successful and failed innovation projects is

crucial. Interviewees emphasize that organizations should shift their mindset from viewing failed projects as failures to considering them as opportunities to learn. Saunila et al. (2014) underscore the significance of knowledge generation for organizational performance, emphasizing that networks can serve as a pivotal facilitator of effective knowledge flows, as exemplified by the network-based setting of CampX. In both literature by Saunila et al. (2014) and interviews, there exists an ongoing debate surrounding the capturing and measurement of knowledge within networks, lacking an official method for measuring the transferred knowledge among stakeholders. However, by executing this study one provided approach could be to analyze the network by dissecting it and determining the sources of knowledge inflow from different stakeholders. Furthermore, Adams et al. (2008) discuss that patents can serve as a form of measuring codified knowledge. However, interviews conducted in this study reveal contradictions regarding the effectiveness of using patents as a measure of knowledge, particularly in the context of CampX where patents do not necessarily indicate success. These findings provide valuable insights to the literature, suggesting that measurements based on patents may be more applicable to certain industries (e.g., pharmaceuticals) or platforms where patents are significant rather than universally applicable across all contexts.

6.2 Development of KPIs

In the following section, KPIs will be developed through a structured approach comprising four subsections. Firstly, categories of KPIs will be generated based on the five factors that influence an organization's ability to manage innovation. In the second subsection, the factors and KPI categories identified earlier will be condensed, by carefully considering interdependencies, into three final factors. Once the final factors have been established, the next subsection will proceed to present hard and soft KPIs that are directly aligned with each category. Lastly, to conclude this section, key considerations for designing effective KPIs are discussed.

6.2.1 Development of KPI categories based on the factors

Based on our understanding of CampX and relevant theories, we have carefully selected KPI categories for each factor. To provide a holistic view of the selected KPI categories, a comprehensive overview is presented in Table 6.1. Subsequently, we will proceed to delve into detailed descriptions of these KPI categories and why they were chosen.

Table 6.1: KPI categories for each factor

Innovation strategy	Innovation structure	Leadership	Culture	Knowledge management
Degree of flexibility	Decentralization	Collaborations across borders	Collaborations across borders	Generation of ideas
Progression	Degree of hierarchy	Level of autonomy	Support and trust	Knowledge transfer
Attractiveness	Positioning within the organization	Support and trust	Change management	Network inflows • Corporate inflows • SMEs inflows • Academic inflows
Convergence		Openness for change	Employee satisfaction	
Geographical scope			Talent attraction	

In terms of the innovation strategy, the relevant theories underscored the significance of flexibility in driving innovation. Therefore, we have selected the degree of flexibility as a KPI category for this factor. Additionally, the overall progression of organization was not specifically discussed by the literature but based on insights from CampX, measuring the progression of the organization is crucial to ensure forward movement in the right direction. Hence, the progression of the organization has been chosen as a KPI category to demonstrate its development and entry into new phases. Considering the important impact on the innovation strategy, the attractiveness of the organization has also been included as a KPI category. Furthermore, due to the importance of broadening knowledge generation, the KPI category of convergence has been selected. Lastly, the geographical scope of innovation platforms has been chosen as a KPI category, recognizing the significance of their network-based setup and location.

For the innovation structure factor, collaborations across borders have been identified as the initial KPI category, as they were found to be highly valued in both interviews and theories. The degree of organizational hierarchy has also been selected as a KPI category, as it has been proven to be a crucial factor in fostering creativity and innovation. The positioning within the organization has been chosen as the final KPI category, referring to the proximity or distance of the innovation platform from other parts of the organization.

Within the culture factor, collaborations across borders have been designated as the first KPI category, as they facilitate diverse perspectives and foster an innovative culture. Support and trust have also emerged as important aspects for innovation, thus becoming the second KPI category under this factor. Furthermore, change management

has been chosen as a KPI category, considering the strategies required to manage the impact of change on individuals, processes, systems, and the overall organizational structure. The last two KPIs categories are employee satisfaction and talent attraction. The former was chosen due to its impact on employee engagement, productivity, and overall well-being, all of which are crucial for fostering a positive and innovative work environment. The latter was selected because attracting top talent is essential for bringing in fresh ideas, diverse expertise, and enhancing the organization's innovation capabilities. It enables the organization to tap into a pool of skilled individuals who can contribute to driving innovation forward and staying competitive in the market.

Under the knowledge management factor, the generation of ideas has been chosen as the first KPI category, as it has been identified as a key factor influencing organizational innovation. Knowledge transfer has also been included as a KPI category, recognizing its critical role in this domain. Finally, the network inflows that the innovation platform is exposed to have been selected as a KPI category, as they serve as the main channel for incorporating external knowledge into the platform.

6.2.2 Final factors when taking interdependencies into considerations

From the discussion in 6.2.1 the role of culture, it is clear that culture is the main factor affecting the other synthesized factors and permeates the entire organization. Since, innovation strategy, innovation structure and leadership are at the foundation of the innovation output, they are crucial for its success, however they might be possible to measure through the other factors. As shown in 5.2.2 the hierarchy of the other factors, knowledge management is influenced by these three factors, so by measuring the knowledge management, the other factors could be measured indirectly.

During the development of KPIs for innovation structure and leadership, it became apparent that the KPIs overlapped with KPIs under other factors. Hence, the KPIs under innovation structure and leadership could therefore be categorized under culture or knowledge management. Conversely, while constructing KPIs categories for innovation strategy, it lacked the same amount of overlap with the other factor KPIs categories. Hence, it proved challenging to measure innovation strategy KPIs categories through the other factors. However, certain KPIs for innovation structure could be placed under innovation strategy.

Based on this justification, the innovation strategy factor was considered to be measured and assessed in connection with culture and knowledge management. Therefore, an adjusted set of factors was created which was reduced to innovation strategy, culture and knowledge management with distinct KPIs categories to evaluate them. The final three factors are presented in Table 6.2, and this condensation of the factors and overlapping KPIs categories is also visualized in Figure 6.1.

Table 6.2: Synthesized KPI categories for the three final factor

Innovation strategy	Culture	Knowledge management
Progression	Collaborations across borders	Generation of ideas
Diversification	Support and trust	Knowledge transfer
Positioning scope	Change management/openness to change	Network inflows • Corporate inflows • SMEs inflows • Academic inflows
	Employee satisfaction	Organizational structure
	Talent attraction	

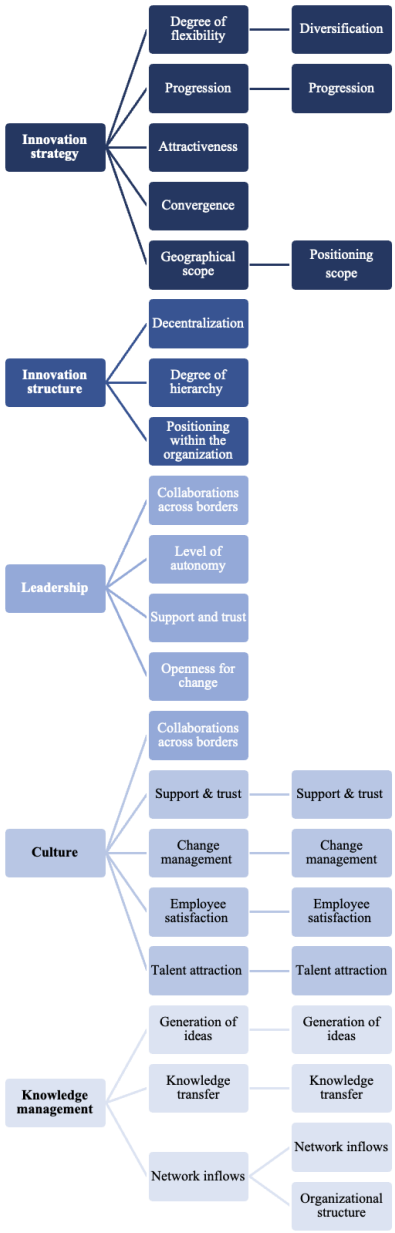

Figure 6.1: KPI categories for the factors, taking interdependencies into consideration.

The KPI category convergence has been redefined to diversification to include a measure of the degree of flexibility. Additionally, attractiveness has been included as a component of progression, as it can be considered a form of progression by creating an appealing organization. The level of autonomy can be assessed within employee satisfaction, as it provides employees with incentives and motivation, making them more satisfied. The organizational structure, encompassing decentralization and hierarchy, has been placed under the purview of knowledge management, as it impacts how knowledge is managed within the organization.

6.2.3 Development of hard- and soft KPIs

Table 6.2: Examples of hard and soft KPIs that can be employed to measure the suggested KPIs across the factors: innovation strategy, culture and knowledge management.

Factors	KPI categories	Hard KPIs	Soft KPIs
Innovation strategy	Progression	• No. new SMEs • No. of projects • Size of projects • No. of project deadlines met • Speed of project completion • No. of new partnerships • Growth by working with the platform • Amount of raised funding • Amount office space in use • No. of lab space in use • No. of launches • No. of publications on Violin/Linkedin/press mentions • No. of nomination in competitions • No. of internal events • No. of employees at events • No. of unique participants at events • Number of workshops organized • Number of external meetings and pitches	• Satisfaction index of Product Owners • Satisfaction index of SMEs • Perception of recommending working with the platform • Perception of growth by working with the platform • Reputation enhancement of startups through the innovation platform
	Diversification	• No. of technical areas • No. of projects in each area • No. of nationalities of collaboration partners • No. of projects covering a specific need • No. of project not covering a specific need	
	Positioning scope	•Strength of cluster geographically -No. of universities located close to the platform -No. of startups located close to the platform -No. of other operations by Volvo Group located close to the platform -How many countries the platform are located in •Strength of cluster within the organization -No. of other departments located close to the platform -Amount. of resources located close to the platform	
Culture	Collaboration across borders	•No. of collaborations between departments •No. of collaborations between corporates/industries •No. collaborations between SMEs	• Perception how much the culture of SME has influenced the organization • Perception how much the culture of organization has influenced the SEM • Open communication (surveys and feedback) • Network analysis (register who is collaborating/networking with who and information flows)
	Support and trust	•Frequency and quality of communication between the team and top management: -No. of regular meetings	• How open is the corporation to share information to the SMEs? • How much trust did you have in this project? (Then map out the trends, correlation between trust/success/learnings)

			•Level of decision-making authority: -Where is the decision made? -Do the team think that they could make decisions themselves without permission from top management?
	Change management/openness to change	• How often processes change	• Employee Surveys - Tracking Employees' perception of change, their willingness to embrace it, and their level of satisfaction with the change management process. • Feedback and Suggestions - Encouraging employees to provide feedback and suggestions during and after the change process. Monitoring the volume and nature of suggestions received can provide insights into the level of openness and engagement.
	Employee satisfaction		• Questionnaire with a likert scale • Survey with: - Employee engagement - Employee retention rate - How inspired are the employees - Team satisfaction - How high is the culture and innovation valued by the employees •How would you rate your week? (Rate on fridays and then on mondays see the average result of weeks, then you can compare good weeks and bad weeks to analyze circumstances and find trends) • Satisfaction based on smiles, to get a fast signal of the experience - temperature check. - Compare with project outcomes
	Talent attraction	• No. of applications • No. of recruitments • Internal FTEs • External FTEs • Retention rate • Profile data - diversity - demographics - age - how are people moving in and out of the organization	• How well known is the platform? -For universities? -For other departments at Volvo Group? -Within the industry?
Knowledge management	Generation of ideas	• No. of ideas of push character (the ideas are • No. of ideas of pull character (the ideas are coming from inside the organization)	
	Knowledge transfer	• No. of job rotations within the company • No. of weekly/monthly/daily meetings with SMEs • Documentation of lessons learned: - No. of documented lessons learned from the project	• Quick go/no-go gates as a ”fail fast" approach in filtering ideas and projects • Self-reflection moment with the engineers: what will you bring with you? • Gather feedback from startups what they learned • Documentation of lessons learned: - Quality of documented lessons learned from the project

	Network inflows	*Corporate inflows:* • No. workshops • No. of recruitments • No. of events • No. collaborations with corporates within same industry • No. collaborations with corporates within different industry (cross-sector) *SMEs inflows:* • No. of mentorships • Regular meetings with the startups • Number of startups on the platform and their sizes • Number continued collaborations with startups • Number of startups leading to commercialization *Academic inflows:* • Number of Master Theses • Number of graduates • Number of doctors etc. • Collaboration with universities	• Perception of value added by having three different inflow sources (network KPIs)
	Organizational structure	• Decentralization - Number of business units engaged in innovation projects • Decision-making authority (concentrated at the top or distributed across different levels) • Coordination between platform • Hierarchy • How many layers of management (hierarchy)	

6.2.4 Key considerations for effective KPIs

KPIs serve multiple purposes in organizations. They drive performance improvement by identifying areas for enhancement and enabling corrective actions. KPIs simplify communication and reporting, providing a common language to share progress, achievements, and challenges. Additionally, KPIs foster motivation and engagement by setting clear targets, giving employees a sense of purpose and accomplishment.

Regularly reviewing and evaluating KPIs is vital for maintaining their relevance and effectiveness over time. This practice ensures that KPIs stay aligned with evolving business objectives and adaptable to changing market conditions. Without periodic evaluation, KPIs may lose alignment with strategic priorities, leading to a discrepancy between performance measurement and desired outcomes. Moreover, as market conditions, customer expectations, and industry trends evolve, KPIs need to adapt accordingly. Outdated KPIs risk becoming irrelevant and incapable of providing meaningful insights or addressing emerging challenges. This can distort the understanding of performance and hinder effective decision-making. Furthermore, if the KPIs are not updated it can result in wasted resources spent on tracking and analyzing irrelevant metrics, diverting attention from more critical areas.

To maintain the effectiveness of KPIs, several key steps should be taken into consideration. First, analyzing KPI performance trends is crucial for identifying gaps, variations, or unexpected results that require action. Second, gathering input from relevant stakeholders helps assess the effectiveness and usefulness of KPIs for performance and decision-making. Third, ensuring stakeholders understand the purpose, relevance, and expectations associated with KPIs and their targets is essential for clarity and alignment. Lastly, comparing KPIs to industry standards allows for adjustments to align or surpass benchmarks, driving continuous improvement. By following these steps, organizations can enhance the effectiveness of their KPIs and drive performance towards desired outcomes.

6.3 Managerial implications

In this section, the managerial implications of the case study on CampX are explored, examining the key findings and insights that emerge from the study. The purpose of this section is to provide practical recommendations and guidance to the organization's management, based on the interviews conducted and the conclusions drawn throughout the study. Furthermore, the managerial implications outlined in this section are not only relevant to CampX but may also be applicable to other organizations facing similar challenges or operating in the same context. Therefore, our recommendations and insights have the potential to provide broader value to the field and serve as a point of reference for professionals and researchers alike.

6.3.1 Stakeholder views on the innovation platform's value

Through interviews, it has become evident that the value in innovation platforms is a subject of intense debate. In the context of CampX it is crucial to consider five stakeholder perspectives in which value is created: for CampX, SMEs, other innovation platforms, society and lastly management stakeholders. To demonstrate this value, the use of KPIs becomes essential. Consequently, we have synthesized the stakeholders perspectives of the value created through innovation platforms and made a visual compilation in Table 6.3. This visual representation aims to aid CampX in understanding the specific values needed to showcase with KPIs.

Table 6.3: Compilation of stakeholders perception of the main value of innovation platforms

CampX	SMEs	Other innovation platforms	Society	Management
Mobility network	Mobility network		Mobility network	
Competence exchange	Competence exchange		Disruptive innovations appears	Competence exchange

Access to new technologies	Access to resources, financing, expertise	Access to new technologies		
Cultural influence	Cultural influence	Cultural influence		
Talent attraction	Recognition	Talent attraction	Reputation of the region: - Job opportunities -Attract national/international companies to the region	Talent attraction
Competitiveness	Growth	Competitiveness	Industry transformation	

The mobility network created by CampX has proven highly valuable for various stakeholders. The presence of a robust mobility network has attracted new companies, both national and international, to the region. This network also facilitates the growth of existing companies, driving the industry's transformation forward. CampX continued growth is beneficial for the society as it supports the survival of new technologies and companies in Sweden.

One of the platform's primary strengths lies in its ability to facilitate competence exchange. CampX gains rapid access to new technologies that address specific needs in the mobility industry, making Volvo Group increase their competitiveness compared to other big players in the industry. At the same time, startups benefit from partnerships with established corporations, enabling their growth. Startups also have the opportunity to leverage CampX's infrastructure, including resources, financing, and expertise. This vibrant exchange of knowledge and expertise can lead to the emergence of disruptive innovations, which promotes the transformation of the society.

In addition to attracting attention and fostering collaborations, CampX and Volvo Group have gained a positive reputation as innovative and collaborative partners. This visibility has resulted in increased visits and interest from diverse organizations. The involvement of SMEs in CampX ensures they derive benefits from their participation on the platform. Startups, on the other hand, can leverage CampX's platform to build networks and establish a reputable presence in the industry. Furthermore, CampX's success has served as an inspiration for other companies and sectors to create similar environments, which is considered a favorable outcome. The platform's ability to attract talent is particularly notable, as it offers an innovative and cutting-edge alternative compared to other departments within Volvo Group. CampX provides an environment that is seen as modern, forward-thinking, and appealing to individuals

seeking dynamic and progressive opportunities. Its reputation as a platform for innovation and collaboration sets it apart and makes it an attractive choice for talented individuals looking to contribute to transformative projects in the mobility industry. Lastly, as CampX contributes to job creation and the overall strengthening of the regional cluster, benefiting the society as a whole.

6.3.3 Factor to consider for CampX

In this section, the developed Key Performance Indicators (KPIs) will be tailored to fit the specific context of CampX. This adjustment is based on interviews conducted to gather insights on the value of the innovation platform, as discussed in the preceding section, combined with critical aspects highlighted in IPM literature.

Currently, CampX primarily relies on two KPIs: the number of projects and the duration of it. This narrowed focus is mainly due to CampX having recently been in its initial start-up phase, where prioritizing these aspects has been crucial for early-stage progress. However, now when the concept is well-established it may be opportune to explore additional KPIs or alternative methods to monitor and guide the business's development. The selection of variables for performance measurement and progress tracking can significantly influence how the organization is directed and how it is perceived.

This study has revealed that there is no one-size-fits-all approach to IPM; instead, it is essential to consider the unique characteristics of each organization. It is equally important to acknowledge that all organizations undergo continuous transformations, influenced by both internal and external environmental factors. Consequently, it is imperative to regularly revisit and reassess your KPIs, adapting and enhancing them to align with your current circumstances. Therefore, the collection of KPIs should not be viewed as static but rather as a dynamic process. Furthermore, it is even possible that conventional KPIs may not be suitable for measuring performance in innovative contexts.

Utilizing KPIs in innovation-driven organizations carries both advantages and disadvantages. On the positive side, KPIs provide a means of measurement and accountability, helping to focus efforts and align teams toward shared objectives. They aid in decision-making and resource allocation, facilitating continuous improvement. However, KPIs can oversimplify the intricate nature of innovation, prioritize short-term outcomes over transformative ideas, and foster a culture that prioritizes meeting metrics rather than nurturing genuine innovation. There is a risk of individuals manipulating the system, and excessive rigidity in KPIs can stifle creativity. Striking a balance between meaningful KPIs, long-term goals, and a supportive culture is paramount for effective innovation management.

This study has identified various factors deemed important when evaluating the performance of an organization. Based on these findings, a selection of KPIs has been developed, taking into account the critical factors. The suggested KPIs for an innovation platform like CampX are presented in Table 6.4, with the most suitable and beneficial choices highlighted in bold.

Table 6.4: Compilation of the developed KPIs (recommended KPIs for CampX is marked in bold)

Innovation strategy	Culture	Knowledge management
Progression	**Collaboration across borders**	Generation of ideas
Diversification	**Support and trust**	**Knowledge transfer**
Positioning scope	Change management/openness to change	**Network inflows** ● **Corporate inflows** ● **SMEs inflows** ● Academic inflows
	Employee satisfaction	Organizational structure
	Talent attraction	

Regarding evaluating the innovation strategy of CampX, we suggest that the most important KPIs are progression and diversification. Progression is recommended as a KPI since it is crucial for every organization performing innovation to measure the progression of an innovation strategy, organizations can assess their performance and determine whether they are on track to achieve their objectives. It allows them to evaluate the effectiveness of their efforts and identify areas of improvement. Without measurement, it becomes challenging to gauge the success or failure of innovation initiatives. Moreover, measuring the progression of the innovation strategy also provides:

- accountability and transparency within the organization,
- effective resources allocation,
- effective communication with stakeholders, and
- a means to engage in continuous improvement, recognizing the significance of innovation as an ongoing and evolving process.

Measuring the diversification of innovation activities could bring different benefits. First, it could help mitigate risks by avoiding overreliance on a single project or narrow initiatives. Second, it could aid in identifying new opportunities and untapped markets. Third, it could encourage engagement with external innovation ecosystems, fostering knowledge exchange and resource access. Fourth, it promotes long-term sustainability by balancing incremental and disruptive innovation. Lastly, it ensures alignment with strategic goals, enabling organizations to make informed decisions. By measuring the diversification KPI, CampX can identify the optimal way of managing the innovation

activities in order to obtain the linked benefits. Manage risks, identify opportunities, engage with ecosystems, sustain growth, and align innovation with strategic objectives, is essential to ultimately driving success in a dynamic business landscape.

The positioning scope of the innovation strategy refers to how the innovation platform of the has chosen to be located geographically, and thereby which type of innovation cluster the innovation platform is exposed to. Hence, measuring the strength of that cluster and positioning strategy can be of great importance for these types of network based organizations. It also refers to how the innovation platform has been positioned within the organization. However, considering that CampX has already successfully established global and organizational platform locations, we believe that this assessment has already been conducted and may not be the most interesting aspect to evaluate at this stage.

In terms of measuring the culture of the innovation platform CampX, the KPIs we recommend are collaboration across borders, support and trust, employee satisfaction, and talent attraction. Firstly, incorporating the measurement of cross-border collaborations as a KPI holds significant importance. This particular KPI allows organizations to evaluate their internal interdepartmental interactions as well as their external engagement with other organizational entities. By monitoring metrics such as CampX's global reach, promotion of knowledge exchange, and utilization of diverse strengths, the organization can derive substantial value and insights. Secondly, tracking the trust and support is of importance since collaborating with startups involves an element of risk, especially for corporates. Trust helps mitigate this risk by building confidence in the startup's capabilities, reliability, and commitment.

Thirdly, measuring employee satisfaction helps CampX to create a positive work environment, encouraging innovation and creativity within the organization. Satisfied employees are more motivated, productive, and willing to take risks. It also boosts employee retention, fosters a culture of open communication, and allows proactive problem-solving. One suggestion for measuring employee satisfaction is to implement weekly ratings where employees rate their experience for that week. By collecting these ratings and calculating the average results over time, it becomes possible to compare the ratings of good weeks and bad weeks, analyze the circumstances surrounding each, and identify trends that may affect employee satisfaction. One way to measure this could be to implement digital platforms or suggestion systems where employees can anonymously provide ongoing feedback on their satisfaction levels, concerns, or suggestions for improvement. Analyze the data from these platforms to identify recurring themes or trends. Another way to assess employee satisfaction could be to compare it to the performance outcome, for instance productivity and turnover rates. By analyzing correlation of the employee satisfaction and performance over time,

CampX can gain insights into overall employee satisfaction trends and how it affects the performance.

Fourth, using talent attraction as a KPI is of value for CampX since it can help indicate how good CampX are at attracting top talent, fostering a diverse workforce and ensuring a competitive edge. It allows for evaluating and improving employer branding, attracting candidates with innovative mindsets, and promoting diversity for a range of perspectives. However, we do not recommend change management/openness to change as a KPI since an environment such as CampX will be in continuous change and tracking and monitoring every change will take a lot of resources. However, at the same time, it can be beneficial to assess the changes that take place to determine whether they are good or not, to find which changes were improvements and which were not. Additionally, when measuring change management and openness to change, CampX can assess the effectiveness of their change management strategies. This involves evaluating how well they manage and implement changes within the organization, as well as gauging the overall receptiveness and adaptability of employees to those changes. By gathering feedback and insights on these aspects, CampX can gain valuable information to further improve their approach to change management and foster a culture of openness to change. But in the end, it will depend on if the effort of measuring these changes will be worth these learnings.

Regarding the knowledge management factor, the KPIs we recommend for this innovation platform to use is knowledge transfer and network inflows. The reason for not suggesting generation of ideas as KPIs is mainly due to that CampX's strategy is clearly implemented and gives good results. Instead of pursuing a large quantity of ideas, they prioritize aligning those ideas with the purpose and needs of the business. Therefore, it is recommended that CampX continues to concentrate on maintaining a purpose-driven approach rather than making the generation of ideas explicit KPIs. Furthermore, the reason for not using organizational structure as a KPI is that CampX already has a well-established decentralized structure and effective coordination between the platforms. At present, there is no immediate need for further improvement in this aspect. However, if CampX were to expand significantly or undergo substantial restructurings, it could be valuable to measure the impact of organizational structure on the overall success and outcomes. Assessing the benefits and effectiveness of the organizational structure in such scenarios can provide insights for future decision-making and guide any necessary adjustments to support the continued growth and evolution of CampX.

Regarding knowledge transfer it is important since we could identify a need to codify tacit knowledge, which encompasses the implicit, intuitive understanding and practical expertise that individuals possess, shaped by their personal experiences and domain knowledge. There was a lack of an established way to capture the knowledge generated

from past projects, workshops, events, and similar. Hence, having a KPI that monitors the knowledge generated from innovation activities could be of great value for CampX. Similarly, a KPI related to the knowledge inflow from CampX network including other corporates, SEMs and academic organizations could also be of great value. By measuring the different inflows, CampX could identify where the most knowledge is captured. Other corporates and SEMs are considered as the main inflow actors to consider. However, it is important to consider the academic inflow, even if CampX may not currently be the most active participant there, as it is crucial for staying at the forefront of innovation. Academic institutions serve as valuable sources of knowledge, and tapping into their resources can help maintain a competitive edge in innovation.

7. Conclusion

The primary objective of this study is to explore and identify KPIs that effectively evaluate innovation platforms, with a specific focus on CampX, a platform developed by the Volvo Group. To achieve this aim, a main research question is formulated: "What type of KPIs could be employed to evaluate the performance of an innovation platform?". By addressing this research question, the study aims to shed light on the KPIs that offer valuable insights into the evaluation of innovation platforms with collaborative projects. Thus, also contribute to literature around IPM by adding insights from the case study where the theories in this field were lacking.

As a result, five factors are identified as crucial for measuring performance within the context of innovation platforms. Based on these factors, a set of 20 KPIs are established with associated metrics. However, it was discovered that certain KPIs overlap, allowing for indirect measurement of some factors through others. Consequently, the five factors are consolidated into three, resulting in a total of 12 KPIs. This consolidation simplifies the measurement process for assessing an innovation platform's performance.

While the study primarily focuses on soft values, we recognize the importance of measuring performance innovation by combining both hard quantitative values and soft qualitative ones. This approach enabled us to capture a broader spectrum of feelings and perceptions. Therefore, we propose both soft and hard metrics to measure the 12 identified KPIs. Furthermore, our perspective diverges from Neely et al. (2002) regarding the inclusion of both financial and non-financial measures for innovation platforms. While we acknowledge the significance of non-financial measurements in an innovation platform like CampX, we assign lesser importance to assessing financial performance as the primary determinant of success. Given that CampX's primary objective is not immediate revenue generation and that the financial value of innovation might not manifest itself in the short term, we consider other aspects to be more crucial in evaluating its success.

When recommending KPIs for CampX, it is emphasized that they should be tailored to the specific characteristics of the organization and account for the dynamic nature of performance measurement. Regular reassessment and adaptation of KPIs are necessary to align with evolving internal and external factors. Moreover, it is essential to acknowledge that conventional KPIs may not be sufficient for measuring performance in innovative contexts. Therefore, organizations should adopt a flexible and customized approach to IPM, considering alternative metrics that capture the unique aspects of innovation. Based on the analysis of the 12 KPIs, eight of them are identified as particularly important for CampX to measure.

7.1 Further Research

This study builds upon existing literature in this field and contributes to our understanding of the value that stakeholders of CampX, an innovation platform, derive from their participation. The study also identifies the measurement variables suitable for evaluating the value within the specific context of CampX. However, further research is necessary, and the following suggestions are proposed:

Given the time constraints, we provided a comprehensive set of suggestions for metrics related to each presented KPI. However, determining the most appropriate metrics for specific organizations requires further research. Conducting evaluations, such as workshops or a second round of interviews, would be beneficial in refining and validating the identified KPIs and metrics.

While the authors have provided a set of measurement variables for assessing the captured value within the CampX context, there was insufficient time to implement and refine the framework. The next step involves specifying how to measure each KPI and determining whether to incorporate a weighing system. To ensure the framework's applicability in similar contexts, it should be implemented and tested in other environments where a mobility actor collaborates with SMEs.

In conclusion, this research has developed appropriate measurement variables for the specific context of CampX. An intriguing area for future investigation using these KPIs would be to assess and compare the value generated by CampX for companies on the innovation platform, as compared to companies operating in different environments or no environment at all.

Furthermore, an interesting follow-up study would involve applying this framework to various contexts similar to CampX, encompassing other platforms and business accelerators, to enable a comprehensive comparison. By understanding the similarities and differences between these environments, we can learn from each other and maximize societal value creation.

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Appendix

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