STRATEGIC MANAGEMENT OF OPEN INNOVATION THROUGH A KPI FRAMEWORK: A CASE STUDY TO COMBINE CORPORATE EXPECTATIONS WITH STARTUP METHODOLOGIES

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ABSTRACT

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Corporations need open innovation to survive in today's fast phased markets. In collaboration with small and agile startups, corporations can innovate in a more effective manner. However, startup-corporate collaboration is difficult to manage and benefit from for multiple reasons, such as bureaucratic processes, incapability to recognise open innovation value, poor expectation management, and inefficient closed communications. Consequently, the possibilities for high profits are as big as the possibilities for high losses. Thus, it is of great importance to be able to identify the objectives and supporting strategies to manage the open innovation activities. Furthermore, being able to measure the value and development of the open innovation activities helps in communicating the potential and importance of these high-risk, high-profit collaborations both internally and externally.

This is a qualitative content analysis case study performed in an inductive manner to study the possibilities for the case company to strategically manage its open innovation activities and effectively communicate on the strategic and business value of open innovation. The primary data is from interviews conducted for case company representatives and startup CEO's. Secondary data is from previous academic research and larger studies done on managing open innovation. The key finding is a set of KPI's to manage the new technology opportunities, innovative individuals, and effective processes, making it easier to operate, measure, and communicate on the development and value of the open innovation activities.

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Modernit korporaatiot tarvitsevat avointa innovaatiota selviytyäkseen nopeasti kehittyvillä markkinoilla. Yhteistyö pienten, ketterien startup-yritysten kanssa mahdollistaa tehokkaamman innovaatiotoiminnan. Startup-korporaatio yhteistyön hallinnoiminen ei kuitenkaan ole yksinkertaista johtuen useasta syystä, kuten byrokraattisista prosesseista, vaikeudesta tunnistaa avoimen innovaation arvo, huonosta odotusten hallinnasta ja tehottomasta, varautuneesta kommunikoinnista. Näin ollen mahdollisuudet suuriin voittoihin on yhtä isot kuin mahdollisuudet suuriin tappioihin. Täten on tärkeää pystyä tunnistamaan innovaatiotoimintaa ohjaavat tavoitteet, ja niitä tukevat strategiat avoimen innovaation hallinnoimiseksi. Lisäksi kyky mitata avoimen innovaatiotoiminnan arvoa ja kehitystä auttaa kommuunikoimaan näiden korkean riskin ja korkean potentiaalin yhteistöiden mahdollisuuksista ja tärkeydestä sekä sisäisesti että ulkoisesti.

Tämä case tutkimus on induktiivinen, laadullinen sisällönanlayysi joka tutkii case yrityksen mahdollisuuksia avoimen innovaation strategiseen johtamiseen ja sen arvon kommunikoimisen tehostamiseen. Tutkimuksen primääridata on kerätty haastattelemalla case yrityksen edustajia, sekä startup toimitusjohtajia. Sekundääridata on tuotu aikaisemmista akateemisista tutkimuksista ja julkaisuista avoimen innovaation johtamiseen liittyen. Tutkimustulos on strateginen KPI-mittaristo uusien teknologiamahdollisuuksien, innovatiivisten yksilöiden sekä tehokkaiden prosessien helpompaan mittaamiseen ja hallinnoimiseen, sekä avoimen innovaation toimintojen arvon ja kehityksen kommunikoimiseen.

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ABBREVIATIONS

OI	Open innovation
KPI	Key Performance Indicator
R&D	Research and Development
EO	Entrepreneurial orientation
IP	Intellectual property

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1 Introduction to open innovation and the research case

Our way of innovating new ideas and bringing them to market has been changing fundamentally (Chesbrough, Henry, 2003, 33), and is only getting more sizeable, collaborative, and engaging as ever before (Chesbrough, Henry, 2017, 35). Today it is no longer about why to innovate, but how (Grönlund et al., 2010, 106), and collaborative, open-source business models, and constant growth are rather "must haves" than "nice to haves" (Docherty, 2006, 14). One of the main factors in growing national and global competitiveness for organizations are their technological resources to create product, process, and (Filipescu et al., 2013, 23) service innovations (Barlatier et al., 2020, 1). Lately, as technologies have grown more complex and the market needs are dynamically changing, R&D management has got increasingly interested in *open innovation*. Chesbrough, Vanhaverbeke & West (2006, 1) describe open innovation as the purposive use of internal and external knowledge to create innovation for expanded external and internal use. Thus, technological collaboration can be considered as the main process in obtaining additional technological capabilities (Yoon & Song, 2014, 1088). A successful innovation process is dependent on the development and integration of new knowledge to the processes, which is partly accessed from external resources (Cassiman & Veugelers, 2002, 1169). The input of external knowledge and commercialization opportunities have a great possibility of improving internal innovation processes and expanding the use of own capabilities with complementary resources (Miotti & Sachwald, 2003, 1496; Yoon & Song, 2014, 1069). Because of that potential of maximizing value through utilization of available resources from both parties of collaboration, it can be seen critical for successful R&D (Yoon & Song, 2014, 1069) to sustain the competitive edge and further, the long-term business growth (Fetterhoff & Voelkel, 2006, 14). Thus, it is important to be able to recognize the best partners to complement your own technological weak spots (Yoon & Song, 2014, 1069).

Ever since the 1980's, partnerships in technology have become a vital way for corporations to match the quickly developing technology markets. Where it was first handled with mergers and joint ventures, in the 2000's cooperative research in technology networks is preferred as a more flexible and quicker way of meeting the needs in rapid technology development. (Nijssen et al., 2001, 221-222) Where Corporations have resources startups can only dream of, startups overshadow corporations in agility. Lately, large corporations in

tech have realised the potential in combining their abilities with entrepreneurial ways of acting and working and are thus in the search of ways to reach some of that entrepreneurial orientation from collaborating with startups. (Weiblen & Chesbrough, 2015, 66) Following the Internet economy, we have created a network economy where access and connections are needed for quick launches, traffic, and diffusion of new technologies (Hansen et al., 2000). It has been forecasted through examples such as Tesla Motors and Facebook, that it will be startups and not corporations building the "next big things" disrupting and creating entire industries (Weiblen & Chesbrough, 2015, 67). Organizations have realised that their success is dependent on a well-tailored balance of interdependencies inside a network of potential partners larger than ever (Docherty, 2006, 14).

For being so highly potential and complementary, effective startup-corporate partnerships are equally difficult; the risks and the differences of the collaboration partners (Prashantham & Birkinshaw, 2008, 8-10) typically cause corporations to stress and struggle identifying the potential startups to engage with, whereas startups struggle identifying and reaching the relevant people inside corporations (Prashantham & Yip, 2017, 51). Corporations need to face significant internal barriers when bringing in open innovation, as they often face the fear of losing knowledge and control, and not finding sufficient time and money for the complex coordination of the processes (Enkel et al., 2009, 312). Then again, many startups end up disappointed with corporate collaboration, as they feel corporations lack respect for their intellectual property, have aggressive negotiations tactics, and as they face huge risks for the immense use of time and effort in comparison to corporations' risks should the collaboration go awry (Prashantham & Birkinshaw, 2008, 6-7). Taken all the fears and risks of open innovation, there is a need to better manage the collaboration and to be more efficient in communicating the needs and opportunities both internally and externally.

Despite the quickly growing interest of academia in open innovation, the actual practice of it has got much less attention. And although open innovation today has all the buzz, in reality, organizations use the large partnership-based knowledge pools only limitedly as they often see the costs and risks of open innovation much greater than the expected benefits (Brunswicker & Chesbrough, 2018, 44). However, to understand startups, there is a need to understand entrepreneurs and entrepreneurship as the two go hand-in-hand. From the early 2000's, boosting entrepreneurship has been one of the main appeals among the EU Member States (Flash Eurobarometer, 2010, 4). In recent years, we have seen an outbreak of

entrepreneurs supported by lower costs of bringing out new ideas (Miller, P. & Bound, 2011, 21-22), a surge of supporting institutions, angel investors, and venture capitalists (Hansen et al., 2000; Weiblen & Chesbrough, 2015, 67), and access to new methodologies and tools such as the lean-movement (Ries, 2011, 11). There is also a growing number of ideas coming through schools, universities, and research agencies (Weiblen & Chesbrough, 2015, 67-68).

This is a case study for a global corporation working in the manufacturing industry. The company is headquartered in Finland and currently serves as the leader in its industry. Although the industry has been rather slow-moving and traditional it is now under rising technological requirements. Thus, the Case company's interest and need for open innovation has quickly risen during the last few years. For the high potential of open innovation, but the equally high requirements and risks startup collaboration holds, this study is focused on setting a strategic KPI framework for the Case company's open innovation activities. The framework is expected to work as an expectation management tool, in understanding the open innovation requirements, and giving chances to conduct open innovation in a more coherent, measurable, and easily communicable manner. This research will provide a comprehensive KPI framework for the Case company's open innovation team (from now on called as the OI team) to better succeed in delivering value for both the corporate shareholders and the collaboration partners. Despite the existing studies on open innovation strategies and measures, which are not many, they were not found very practical. Furthermore, for being a fairly new topic in corporate environment, there are not many peer examples available to learn from. The case study was set to form new theory precisely for the case purpose on how the company's OI team can strategically measure and validate open innovation work. The objectives and strategies were found with the help of previous research and interviews, but the KPI's had a big research gap between the academia and practical use.

1.1 Theoretical and methodological premises of the research

An inductive qualitative content analysis is used to build theories for operational management (Barrat et al., 2011, 331) of open innovation for the OI team of the Case company. This is a case study based on semi-structured interviews conducted for startup entrepreneurs and CEO's, as well as the Case company's Business owners accountable for innovation budgeting, and Case company Innovation managers. Furthermore, this research

will use previous studies on the matter and the researcher's and OI team's own experiences working in the field. As shown in the Figure 1, the aim is to study how to best manage the Case company's open innovation activities with a comprehensive, strategic set of KPI's at the use of the OI team. To give support and background for the research, previously conducted studies on open innovation management, entrepreneurial orientation, and startup methodologies will be presented. Furthermore, the research takes into consideration studies on the strategic KPI's and measures for innovation management. Theory is mostly retrieved from academic books, studies, and articles in the business premises, taking support from e.g., psychological and social sciences.

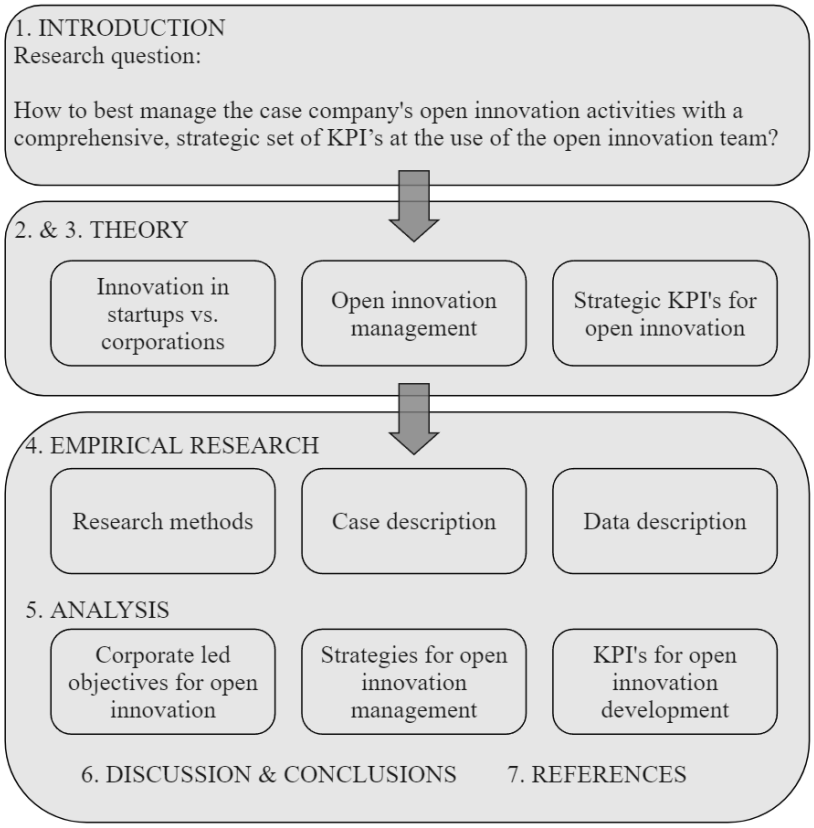

Figure 1: Research outline with the main contents

As the study is on innovation and entrepreneurial people and activities, research methods from entrepreneurship research will be utilised in generating the objectives and research questions for this research paper. Gartner (2001, 34-35) suggests the articles of Shane &

Venkataraman (2000) and Low & MacMillan (1988) as guidelines in conducting research on entrepreneurship. In organizational entrepreneurship research, the question is often about why, when, and how 1) opportunities come into existence, 2) some individuals discover and exploit the opportunities and some not, and 3) different action modes are used in opportunity exploitation (Shane & Venkataraman, 2000, 218). This research is focused on how opportunities come to existence and more importantly, how different action modes can be used to explore and exploit opportunities in the case setting. According to Low & MacMillan (1988, 156-157), when starting to assemble research on entrepreneurship, the researcher must address six interrelated key specification decisions: purpose, focus, theoretical perspective, methodology, level of analysis, and time frame of the study.

Building this research in line with Low & MacMillan's (1988, 156-157) research specification, the *purpose* of this research is to create a strategic set of KPI's for the Case company's OI team to measure, develop, and communicate their open innovation activities. The *focus* is on quantitative and qualitative strategic KPI's that are measurable and actionable for the OI team's use, with a *time frame* from Fall 2022 to Summer 2023. As the study is focusing on both startups and corporations, the study is conducted from a mixture of *strategic adaptation* and *population ecology perspectives* (Low & MacMillan, 1988, 142-146). The *level of analysis* is set on the Case company's OI team and Business owners, and potential startup partners. *Methodology* of the research is an inductive qualitative content analysis, which will be further discussed in chapter 4.

When the academia speaks about taking in open innovation, the strategic process often contains Strategy and Goals, Integrating and/or Outsourcing management, Metrics and Organizing of the activities (Chesbrough, Henry & Crowther, 2006, 231). Because of the need to further grow and strengthen the open innovation activities, there is a need to create goals, strategies, and measures for improved organizing of the OI team's activities. Deriving from the suggestions of Shane & Venkataraman (2000, 218), the question is about the most suitable action modes for managing open innovation and exploiting the found external opportunities inside the case environment. The research aims to understand how to best combine the Case company's expectations with startups' innovation methodologies, and qualitative and quantitative measures suggested by the previous literature to create a strategic set of KPI's for the Case company's use. Thus, accordingly, the main research question is:

How to best manage the Case company's open innovation activities with a comprehensive, strategic set of KPI's at the use of the open innovation team?

To support the main research question, the sub-questions are:

What are the open innovation strategies that best complement the Case company's objectives?

What are the most valuable long-term KPI's to evaluate the Case company's open innovation activities?

What are the most valuable progress KPI's to support the development of the Case company's open innovation activities?

1.2 Confidentiality and delimitations of the research

The anonymity of the Case company and of the interviewees will be secured. In the research, the Case company will only be addressed as the "Case company", and the interviewees will only be differentiated by the role of Innovation managers (referred to as the R&D) or Business owners (referred to as the Businesses), and the individuals' work experience in the Case company. As the case is done for an organization, the company data falling under the confidentiality agreement must be kept outside of this research paper. The startup CEO's will be only identified by a generalization of the line of their businesses, the startup's time in the markets, experiences about Open innovation, and CEO's startup experience. The anonymity of all parties will be secured by keeping the names of the people, their organizations, and demographics in secret. The city of residence will only be stated at the country level. All personal data will be collected, stored, treated, and disposed of in accordance with the latest guidelines of the Finnish National Board on Research Integrity TENK (2019), and of the facilitating Case company's Data Protection requirements. Same guidelines will define the ethical principles of the interviews, and the treatment and rights of the interviewees. (TENK, 2019). The study is delimited to the Case company's open innovation team and their realities in open innovation management, enhanced by the data from Nordic technology startups, internal company stakeholders, and open innovation literature.

1.3 Structure of the study

As was shown in Figure 1, the study will start with a literature review on the themes of the research. Chapter two will be presenting theories on open innovation, and how it differs in the corporate and startup worlds. There will be discussion about innovativeness and the meaning of innovation culture, as well as managing open innovation. The third chapter will share theories on setting measurements for open innovation practises through innovation objectives, strategies, and KPI's. The research will then introduce the used research methods, give a short case description, and an introduction to the interview data. On the fifth chapter, the research will go deeper into the research results, combining the literature review with the interview findings finally leading up to the strategic KPI framework for the Case company. In the last chapter, the main contributions and findings of the research will be summarized with managerial implications, limitations of the research, and suggestion for future research.

2 Key concepts and terminology on open innovation

During the 2000-century organizations and academia have grown to understand the value of bringing in and monetizing ideas from outside your own organization (Enkel et al., 2009, 311; Grönlund et al., 2010, 106). Today, open innovation is a popular stream of research among innovation studies and practises, as many researchers have studied the aspects, motives, and impacts of innovation partnerships (Huizingh, 2011, 7; Hung & Chiang, 2010, 259; Solesvik & Gulbrandsen, 2013, 11). Only in 2020, there were hundreds of academic papers published over open innovation, not forgetting the dedicated conferences, PhD courses, and top journals maturating the field (Dahlander et al., 2021, 1). Open innovation has been described as "the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively" (Chesbrough, Henry William et al., 2006, 1). Thus, it requires inside-out work, like supporting your intrapreneurs innovation, and outside-in work, like collaboration with external parties such as universities, startups, and government agencies (Prashantham, 2021, 123). Internal and external ideas and paths to market maximise the value of developing new products (Grönlund et al., 2010, 106).

This chapter will present the literature behind the key concepts and terminology of open innovation. First, we will walk through the meaning of startups and entrepreneurship, as well as the organizational vocabulary used in the research. Chapter 2.2 will focus on the open innovation theory, how it has formed to this day and what is the baseline needed for open innovation. In the last chapter, the research will shortly present theories on managing the open innovation process.

2.1 Startups and Corporations

“Startup” is a much-used term today from academia to governments, often coming up with adjectives like entrepreneurial, creative, disruptive, and innovative. However, it is very difficult to define as an empirical phenomenon, and even people working in startups struggle to define it in a consistent manner. (Cockayne, 2019, 77-78) Starup is a small new

organization exploring new business opportunities in markets and technologies that have no or only little history, but high volatility (Giardino et al., 2014, 28). Prashantham & Birkinshaw (2008, 6-7) describe startup as an ambitious and growth-oriented small enterprise. Grant (2022) describes startups as organizations in their first stages of operation founded by one or more entrepreneurs, on a lookout for capital due to their high costs but limited revenues. Then again, Baldridge & Curry (2022) describe startups as businesses reaching to disrupt industries and make a change in the world on a scale. Startups are major players in today's economy (Giardino et al., 2014, 28) accounting for 2 105,56 thousand new ventures established in Europe in 2020, and 15,54 thousand of them coming from Finland (Statista, 2021). Today, startups have easier routes to revenue through e-commerce, app-stores, and subscription models, more effortless ways to reach new customers through social media and search engine enhanced advertising, and as costs for both hardware and software tend to be less than before (Miller, P. & Bound, 2011, 21-22).

Startup as a word became a description of typical working practice or an organization in the 1980s, and although it was already used before that, you could only rarely come across it and it typically used to mean the more general early stages of activity of any organization at the start of their being (Cockayne, 2019, 80). Low and MacMillan (1988, 153) reference to Stevenson, Roberts and Grousback (1985) who have identified steps in the timeframe of a startup as follows: opportunity evaluation, business concept development, assessment of required resources, acquisition of required resources, and management and harvest of the business. Meanwhile Gartner (1985, 702) identified six steps taken in an entrepreneurial process: business opportunity location, resource accumulation, marketing, production, organization building, and government and society responding.

New venture creation means the organizing and development of new organizations in the Weickian sense (Gartner, 1985, 697-698). "To organize is to assemble ongoing interdependent actions into sensible sequences that generate sensible outcomes" (Weick, 1979, 3). A framework to describe new venture creation can be pictured in four dimensions: the individual(s) involved in the new venture creation, the kind of organization started, the environment surrounding and influencing the new venture, and the process undertaken in starting the new venture (Gartner, 1985, 698). As starting up a new startup has proven to be highly risky, the methodology of "lean-startup" was taken up to lessen the risks by experimenting rather than doing intricate planning, valuing customer feedback in

development over intuition, and favouring iterative design rather than the traditional up-front style (Blank, 2013, 66). Startups often seek commercial partners at the very early stages of developing their products and services, as they face higher barriers for supporting venture capital (Fetterhoff & Voelkel, 2006, 17).

Corporation is described as a legal entity that has separate shareholders as owners of the organization, not liable for the depts but entitled to a share of the revenue. A corporation elects a board responsible for hiring and overseeing the senior management, which is responsible for the daily operations. (Investopedia, 2022) The lates fashion of corporate business models of decreasing costs is no more enough to ensure the survival and growth, but the corporations need to continually innovate to deal with increasing external threats and create a new business model with new skills and organizational structures (Blank, 2013, 71-72). A corporation's goal is to execute a business model, where a startup is trying to discover one (Blank, 2013, 67). Some of the most prominent differences between a startup and an established organisations are not only the age difference of the organizations, but more distinctly the high uncertainty and brisk evolution arc of the startups (Giardino et al., 2014, 28). The corporations too have a higher chance for a big payoff should they start adopting the lean-startup methodologies of failing fast, continuous learning, constant customer feedback to quickly create a minimum viable product, and pivoting (Blank, 2013, 66). In this study, a term "corporation" will be used to describe large, established multinational enterprises, also, MNE's. The term "organization" will be used to generally refer to any startup, company, corporation, or similar entity. "Company" will be used mostly to refer to the Case company.

As startups are highly linked with entrepreneurs and entrepreneurship, this research will also address studies on entrepreneurship in describing startup ways of thinking and acting within innovations, as well as entrepreneurial behaviour inside organizations. The high unpredictability and dynamism in the startup environment force the entrepreneurs to act quick, fail fast, and learn even more faster in the search of a niche market and sustainable income (Giardino et al., 2014, 28). There are descriptions about entrepreneurs from governments, and different streams of study from psychological and sociological perspectives to economics, sociology, history, anthropology, finance, and psychology (Low & MacMillan, 1988, 141). The definition and view of an entrepreneur has changed throughout the years, and significantly only during the last 30 years (Carter & Jones-Evans,

2012, 1). The interest towards entrepreneurship grew as an outcome of 1980s stagflation and high unemployment rates as people got interested in economic growth, directing their focus on small businesses and entrepreneurs (Wennekers & Thurik, 1999, 27). Soon after that, along with the dot-com boom, came the interest and rise of startups (Miller, P. & Bound, 2011, 7). They are interwind with many adjacent and overlapping concepts, like innovation, new product development, industry evolution, small business management, and change management (Low & MacMillan, 1988, 141). Being an entrepreneur is ultimately about creating wealth (Kolvereid & Isaksen, 2006, 883). These days entrepreneurship is also demanded from corporate management, as the rapid technological change is demanding better sensing and understanding of opportunities, seizing them, and putting them together better and faster (Teece, 2007, 1346).

Open innovation with startups offers better capabilities for potential value creation through complementary differentiation, as where corporations can better leverage their exploitation of existing capabilities, startups can better build new one's through exploration (Prashantham, 2021, 124). Thus, it is often imperative for small startups' growth to figure out a way to engage with large corporations, as they offer complementary capabilities and resources to e.g., scaling the innovation globally, or getting a worldwide licensing agreement (Prashantham & Birkinshaw, 2008, 6-7). On top of the complementary capabilities, also the connectivity and contextuality should be considered, meaning the network dialog and orchestration, and spatial differences of the parties (Prashantham, 2021, 124). Building new innovations requires some luck, but also good networks, moving incrementally, seeking competitive niches, parsimonious investments, and continual monitoring of performance. This way of doing business conserves resources, creates ability to find new trends and flexibility to quickly react to new opportunities. (Low & MacMillan, 1988, 156) Compared to other possible open innovation partners, like universities, other corporations or licensors, startups possess nimbleness at the cutting edge of the digital markets, spurred with an appetite for scaling up (Prashantham, 2021, 124). Thus, one of the main motives for startup-corporate collaboration is for the startups to scale up with the help of the corporation, where the corporate interest is to get the startup to detail the idea to its needs in change.

2.2 Open innovation

The information explosion and globalisations have changed the ways of competition in our economy (Horibe, 2016, 6). Only focusing on incremental improvements while your competition is reinventing the industry is like digging an early grave (Hamel, 1996). Innovation, research, and development are constantly needed to provide growth and profit in technology and manufacturing (Yu et al., 2012, 933). Thus, the key component for an industrial organization's success is the scope of their innovativeness (Hult et al., 2004, 429). Harnessing the deregulation, globalization, technology turmoil, and social transformation is the strategy many newcomers use to overturn the industrial order as industry revolutionaries (Hamel, 1996). Innovativeness of an organization can be defined generically as the intention to be innovative or more specifically as the capacity to introduce new ideas, products, or services (Hult et al., 2004, 429) through set processes and systems that can lead to stronger business performance (Dobni, 2008, 543). As many critically important innovations started occurring from seemingly unlikely places (Chesbrough, Henry, 2003, 38-39) organizations started to increasingly understand the value of innovation in creating long-lasting advantages and significant push for competitive positioning (Dobni, 2008, 555). Furthermore, innovativeness is one of the factors that the management has substantial control over and an important determinant of organizations' business performance (Hult et al., 2004, 429, 436).

Open innovation became a necessity for many organizations as the need to explore and exploit new technologies faster and cheaper became a necessary requirement to survive in the fast-moving markets (Pinkow & Iversen, 2020, 2). Open innovation means the usage of external sources of knowledge to create internal growth, and the configurations needed in order to manage innovation processes with external orientation. It is a more holistic and detailed perspective on collaboration and commercialization with external parties. (Grönlund et al., 2010, 108) In open innovation, organizations look for sources of innovation inside-out and outside-in throughout the innovation delivery chain from the fuzzy front end to the commercialization. This creates and realizes a lot greater value throughout the process. With open innovation, organizations are looking for startups, inventors, and any sources capable for internal or joint development. (Docherty, 2006, 14) The idea of open innovation is usually not to replace corporations' own R&D activities, but to better leverage them by

taking some or all of the innovation through them rather than from them (Huston & Sakkab, 2006, 60-61) with shared budgets (Docherty, 2006, 14).

Take for example Procter and Gamble. Changing their R&D innovation strategy to C&D, connect and develop, in 2000 when taking in open innovation practices. By 2006, this had led the percentage of new product innovations with external origins from 15% to 35%, having 45% of the new product development initiatives with key elements from external sources. Furthermore, they claim to have their innovation success rate doubled, R&D productivity risen by 60%, and innovation costs and investments sunken (Huston & Sakkab, 2006, 61). Then again, taking the example of IBM, since they shifted to an open business model during the 1990's, by 2007 they had been managed to turn their semiconductor business that was losing tens of millions of dollars every year into a profitable business. They were also generating remarkable new revenues by starting to license IPR instead of keeping it at secret. (Chesbrough, Henry W., 2007, 25)

2.2.1 Open innovation with startup partners

Big corporations often pursue open innovation by partnering with startups. However, whether the market is emerging or advanced, or clustered or non-clustered defines the strategy needed for partnering. (Prashantham, 2021, 121) Startups and corporations complement each other's on what the other party lacks (Weiblen & Chesbrough, 2015, 66) and the complementary qualities are most often the reason for co-operated innovation (Miotti & Sachwald, 2003, 1497). Corporations have the scale, routines, and resources (Weiblen & Chesbrough, 2015, 66) to power small startups in sourcing sales revenue through their clientele and marketplaces, brand-power, and technological competencies (Prashantham & Birkinshaw, 2008, 8). Then again, corporations can tap into startups' ideas, agility, risk-taking, and rapidly growing nature (Weiblen & Chesbrough, 2015, 66), have access to local markets, complementary assets, and image of a good corporate citizen (Prashantham & Birkinshaw, 2008, 8), but also, to get an access to external innovation and knowledge (Prashantham, 2021, 121). The goal is to seek and commercialize technology more effectively as a joint effort than they could do alone (Miotti & Sachwald, 2003, 1496; Slowinski et al., 1993, 22).

However, collaboration between smaller startups and huge corporations is not simple, (Weiblen & Chesbrough, 2015, 66-67), and the joint efforts do not often make it through (Slowinski et al., 1993, 22). Finding and getting access to the right people with enough decision-making power is difficult, cultural differences cause misunderstandings, there is clear asymmetry in resources, and the long-term objectives can differ greatly (Prashantham & Birkinshaw, 2008, 8-9; Weiblen & Chesbrough, 2015, 66-67). Where multinational corporations strategize explicitly for long periods of time, smaller organizations tend to plan for months as their future has ambiguity. This leads to a different approach in collaborations, as well as criteria and agenda for the outcomes (Prashantham & Birkinshaw, 2008, 8-9). The starting point for innovation between large corporations and startups is not equal: larger firms have more favourable ratios of expected returns to risk and furthermore, are more risk averse, whereas smaller firms are more R&D efficient and when conducting R&D tend to spend more on it in relation to corporations (Vossen, 1998, 7-8). A poor partner choice can have damaging impact for both technology and organization image as well as loss of money and time (Nijssen et al., 2001, 222). Thus, choosing strategic partners needs to be handled as a process rather than an event (Slowinski et al., 1993, 22).

Despite the difficulties and many collaborations ending unlike expected, lately the efforts of corporations to reach out to startups have increased, especially in tech. In tech, the need for disruptive innovations and speed to compete in today's economy has risen corporations interest towards startups. (Weiblen & Chesbrough, 2015, 67) As a result of new strategic realities, organizations today focus on their core competencies and technologies (Nijssen et al., 2001, 223) rather than trying to do everything by themselves. Furthermore, dividing the risks and resources among OI parties gives an ability to do strategic testing to e.g., see if there is a chance to extend your core business and find new sources of growth (Docherty, 2006, 14). Most organizations use internal development to defend and keep ahead on their own competitive advantages, (Nijssen et al., 2001, 223) all while external development has three significant motives: faster innovation, reciprocity of technologies, and access to market and market restructuring (Hagedoorn, 1993, 378). Corporations have for long been trying to bring in entrepreneurial ways of thinking and acting through mechanisms like joint ventures, internal incubators, and venture client models, but now the boom and increasing viability of startups has created a need to engage with them in a more agile and quick manner (Weiblen & Chesbrough, 2015, 68).

Knowing the reasons and importance of open innovation, it is fair to say that the Case company needs open innovation should it want to stay as the technology leader in its industry. However, as the risks and difficulties of open innovation were also discussed, the Case company needs a more defined strategy as it is looking to scale and grow its open innovation activities. To be able to do that, this research proposes to form a strategic set of KPI's to track the open innovation initiatives, to be able to measure, develop, and communicate on the success of their actions. As was discussed, to be able to do that the strategy must cover both inside-out and outside-in realities of successful open innovation.

2.2.2 Open innovation research to this day

As innovation processes have always been risky due to most of them failing dismally, in the early 1990s organizations started combining forces to better identify customers' wishes and to increase their innovation potential (Miotti & Sachwald, 2003, 1481-1485). At the same time, organizations got increasingly interested in commercializing both their own ideas as well as external ideas and taking in internal R&D processes from other organizations (Enkel et al., 2005, 204). Eventually already in 1995, the amount of external knowledge in innovative products accounted for 34-65% of the inputs needed in successful development of innovation (Conway, 1995, 327). To make this happen, organizations needed to go through a tremendous change in innovation policies as the walls between the organizations and outside-world had to be taken down to enable at least limited information flows (Enkel et al., 2005, 204). This opening up of the innovation process due to the erosion of the closed innovation environment eventually led up to Chesbrough's definition of the Open Innovation Paradigm (Chesbrough, Henry, 2003, 33-37). However, in the precise industrial context there is no need for consistent linear change from the "closed innovation" to open innovation. (Christensen et al., 2005, 1535)

"Closed innovation", which was the dominant innovation management approach in the late 20th century, means that everything from development of a new product to marketing is done inside the organization (Chesbrough, Henry, 2003, 33; Grönlund et al., 2010, 107). Open innovation is a looking at innovation management in a much more dynamic and less linear fashion (Docherty, 2006, 14). However, there will always be "closedness" in the organizations' innovation to some extent, depending on the level of value they seek to

acquire (Christensen et al., 2005, 1535). It has been a growing trend in the early 2000's that the important innovations are coming from entrepreneurial small- and medium sized organizations, SME's (Huston & Sakkab, 2006, 60). Where the traditional self-reliant "closed innovation" was the way of doing R&D for most of the twentieth century, during the last few decades several factors combined started to erode it making it less sustainable approach for innovation: people got more and more experienced, skilled, and educated with enhanced mobility which led to growing knowledge spillovers (Chesbrough, Henry, 2003, 33-36). Furthermore, the Internet opened the access to these global talents (Huston & Sakkab, 2006, 60). Thus, multinational corporations should build global startup collaboration capabilities, as integrating knowledge from multiple locations strengthens innovation activities in a global scale (Prashantham, 2021, 135).

Furthermore, as the number of startups started to grow through the growing presence of private venture capitals, skilled people from big corporations took their ideas out to seek a startup career should the corporate way of innovating and processing innovation not suit their needs. The time-to-market time increased by a lot and customers and suppliers globally got more knowledgeable. (Chesbrough, Henry, 2003, 33-36) This is supported by individuals' growing interest in selling and licensing their intellectual property, IP, as well as government laboratories and universities being more and more interested in industrial collaboration and monetization of research (Huston & Sakkab, 2006, 60) which might not pay back otherwise (Docherty, 2006, 14). The value of traded goods and services increasingly depends on the organization's technology, their intellectual content, R&D, and creativity, often protected by IPR, intellectual property rights (Chadha, 2009, 1478). When the markets were still less competitive and organizations were smaller, internal R&D was enough to drive the needed growth (Huston & Sakkab, 2006, 60). Due to the ever-growing intensity of competition in the markets, leading organizations are in a search for low-cost solutions and new competitive advantages (Docherty, 2006, 13). Innovation is the way to create solutions to business problems and challenges providing the basis for survival and success for future (Hult et al., 2004, 429). The yearly organic growth for most mature organizations must be around 4-6% (Huston & Sakkab, 2006, 60). For the Case company it means to grow the revenue by 136-204 million euros in 2023 alone. This is such a large number, that the organizations that do not take in and adapt open innovation practices to their strategy will not survive in the competition (Huston & Sakkab, 2006, 66).

Although many industries are moving towards opening up their innovation processes, there are differences between the industries on the level of open innovation, as some, such as banking and film industry, have been doing open innovation for many years, and some, such as nuclear and aircraft industries are more traditionally focusing on closed innovation (Chesbrough, Henry, 2003, 38-39). Furthermore, whether the startup is located in an emerging or an advanced market has an effect on the mode of open innovation (Prashantham, 2021, 127) as the dynamics of the collaboration are dependent on the position of the corporation in respect to the startup (Paulose & Nair, 2015, 2). When partnering with a startup in advanced markets, corporations' approach is more facilitative as it leverages the ecosystem conditions and concentrate less on micromanaging the collaboration process (Prashantham, 2021, 127). Thus, it could be as well the case in more open innovation - oriented industries. However, the planning of open innovation is much more complex in emerging markets, as on top of the high level of uncertainty in their markets (Paulose & Nair, 2015, 2), they are in more need of collaborative networks due to their reach for additional recourses to fulfil the consumer needs (Prahalad & Ramaswamy, 2004, 12). Thus, when partnering with a startup from an emerging market, corporations often adjust their open innovation strategies to be more directive, which involves more detailed guidelines to help the startups with the uncertainty in their business environment, more explicit inputs in know-how to compensate on perceived shortcomings and help in networking with third parties and stakeholders. (Prashantham, 2021, 127) This could also be taken into consideration when working in industries that are less familiar with open innovation, or under many uncertainties.

2.2.3 The difficulties of open innovation

Open innovation activities are not easy to take in. It is not only the risks of losing knowledge and control, and the higher coordination costs and complexity, but also the significant internal barriers such as not finding sufficient time, money, and right partner, as well as the finding balance between open innovation activities and daily business (Enkel et al., 2009, 312). Taking in the ideal of open innovation requires change management, as innovations "not invented here" have a possibility to create resistance where it should be turned into enthusiasm and proudness – it needs changes in the definition and perception of the current

R&D organization (Huston & Sakkab, 2006, 61). For example, Procter and Gamble made their change into the open innovation model successful, as they changed the R&D innovation model into a more customer centric C&D -model, meaning *connect and develop*. With C&D, good ideas are looked for and brought in to enhance and capitalize internal R&D capabilities – not just outsourcing innovations. (Huston & Sakkab, 2006, 61). Furthermore, to be able to co-create value, there needs to be the infrastructure for accessible, transparent dialog with the external parties (Paulose & Nair, 2015, 13). Even despite the quickly growing interest towards open innovation, organizations should still remember the importance of balancing the open innovation and internal R&D, as too much openness can have a negative effect on the organization's long term innovation success, as well as losing control and core competencies (Enkel et al., 2009, 312).

Human capital is the most important resource in every organization's innovative development (Bilichenko et al., 2022, 1). Thus, people resistance is one of the major issues to consider when taking in open innovation practices, as the "not invented here" mentality can cause the employees to fear losing their jobs, the organization losing its capabilities, reward structure changes, and a need for developing new skills (Huston & Sakkab, 2006, 66). However, giving the people responsibility and control over their destinies will make it easier to bring in change (Hamel, 1996). As taking in open innovation demands a strategic change, it requires communications from the managers at every step from introduction to implementation (Bilichenko et al., 2022, 2). Clear articulation of what open innovation is, why it is needed and how internal R&D can be leveraged in it for further value creates better organizational alignment and commitment to the change (Chesbrough, Henry & Crowther, 2006, 235). However, often the resistance is coming the senior management level even though we often speak about the middle management and the employees under them resisting change (Hamel, 1996).

Involving external partners to the innovation process can cause the organization to become dependent on the partner, only get in incremental innovations, and misunderstandings that may further lead into a range of troubles, such as financial disaster due to investing in wrong products or losing know-how to competitors due to a disloyalty (Enkel et al., 2005, 203). Furthermore, the internal and external demand to make quick evaluations of early-stage technologies to proceed with open innovation activities creates higher risks and a possibility to deficient data that can limit the estimated utility of the solution (Fetterhoff & Voelkel,

2006, 17). Collaboration between smaller technology startups and bigger corporations are often suffering from high costs of coordination that can make the alliances ineffective. At least three reasons have been proposed for this inefficiency: the asymmetric information and differences in bargaining power can cause issues in the more difficult negotiations, economic incentive conflicts and thus, opportunistic behaviour in economic decision making, and the communication and trust issues rising from the parties' differences in traditions, norms, procedures, and language with each other's. (Christensen et al., 2005, 1546) As startups often develop ideas much more closely with the customers, they offer a way for the corporation to get closer to the customer as well. Enkel et al. (2005, 211) bring out the need to have customers, whether the end-customer or not, involved in innovation development. They highlight, that these risks of opening up innovation are not as great as the risks from not integrating stakeholders, or customers, into innovation at all, as this might lead into non-market-driven products and products with non-valuable features, increased R&D costs, and unnecessary limits on the innovation power This doesn't mean that the risks of customer integrated innovation should be ignored, but managed efficiently (Enkel et al., 2005, 211)

2.3 Innovation culture

As human capital is the most important source for innovation, organizations must focus on finding the right innovation conscious people and support them with the right motivative structures to thrive (Bilichenko et al., 2022, 1). Innovation culture is a multi-dimensional context relating to the innovative intentions, innovation infrastructure, the behaviour in the operational level needed to influence the value orientation and the market, and in innovation implementation environment (Dobni, 2008, 540). Furthermore, as the open innovation culture has brought continuous external exposure and relationships, over time it leads to a more innovative culture (Docherty, 2006, 14).

2.3.1 Entrepreneurial orientation

There is a need for a fundamental change in the corporation culture in order to increase the external thinking (Dobni, 2008, 544; Grönlund et al., 2010, 108). Thus, on top of the change

in innovation systems when taking in open innovation, the internal culture change must be addressed as well. For this to happen, the organization must open the doors for external ideas as well as to promote internal idea exchange (Huston & Sakkab, 2006, 66). When evaluating the open innovation in organizations, we need to evaluate the organization's proclivity to open innovation, meaning the inclinations to take in external ideas in order to reinforce the organization's business model in pursuing successful innovation, and the organization's entrepreneurial orientation (Hung & Chiang, 2010, 258). Entrepreneurial orientation, EO, refers to the firms' innovativeness, risk-taking, and proactiveness in its strategic intention, undertaking, and pursuit of open innovation (Hung & Chiang, 2010, 268-269; Miller, D. & Friesen, 1982) as well as aggressiveness in exploitation of opportunities (Hult et al., 2004, 436-437). Hung and Chiang (2010, 268-269) propose, that as open innovation benefits firms' performance, being entrepreneurially oriented helps to benefit from it the most. It has great meaning in the innovativeness development and maintenance regardless of the market turbulence, and thus an important thing to foster for the managers (Hult et al., 2004, 436-437). Organizations with high EO are generally better in accessing external technology and are more likely to incorporate external technologies into their business models (Hung & Chiang, 2010, 268-269).

A multi-dimensional approach to organizational innovation considers innovativeness to be derived from different inter-related activities tied together by the innovation culture (Dobni, 2008, 543). EO is likely to be an embedded construct of organizational culture, meaning the norms, beliefs, and values inside the organization reinforcing the behaviour which ultimately related to the business performance (Hult et al., 2004, 430). Organizational culture means the deeply seated, often unconscious beliefs and values that the employees share through the organization and are manifested in the organization's characteristics (Dobni, 2008, 544). An innovation supportive culture engages behaviour valuing creativity, freedom, risk taking, teamwork, communication, trust and respect, quick decision making, and being value seeking and solution oriented (Dobni, 2008, 544). Creativity means the ability to come up with ideas with imagination and originality, innovation is the way to use creativity into usable products or practices (Papaleontiou-Louca et al., 2014, 131) As the capacity to creative thinking is divided across the organization, it is important to involve many different people in deciding about the organization's future as the next million-dollar idea has many times come from unexpected sources, like a young secretary or a forklift driver (Hamel, 1996).

An entrepreneurial individual drives for achievement and locus of control, has propensity for risk-taking, has grown-up in an environment with entrepreneurial role-models and is often one of the people reacting in their dissatisfaction at their job (Gartner, 1985, 702). Entrepreneurs inside existing organizations are called *intrapreneurs*, or corporate entrepreneurs (Antoncic & Hisrich, 2003, 9-10). Intrapreneurs are people capable of turning ideas into viable projects by reaching over their job description to make their project work, be realistic but devoted over their goals, can build a strong, mixed team fairly, and act on their opportunities (Kirschbaum, 2005, 27). Thus, reaching out to the intrapreneurs and involving them is important. However, intrapreneurs resemble an employee more than entrepreneurs due to their higher risk-aversity, act with lower but more certain rewards, are not as good as recognizing opportunities and less confident in their skills. All intrapreneurs might not react similarly to profit-based contracts, but it could attract them to take more riskier projects. (Martiarena, 2013, 37)

2.3.2 Fostering opportunity exploitation through innovation networks

Opportunity exploitation requires resources: capital, information on technics and marketing, human resources, and sales (Low & MacMillan, 1988, 155), but also entrepreneurial management in the recognition of problems, trends, and customer needs, directing and redirecting of resources and reforming interorganizational systems and structures (Teece, 2007, 1346-1347). The networks needed in opportunity identification are also needed in obtaining the resources required in opportunity exploitation (Low & MacMillan, 1988, 155). Open innovation requires internal resources, and it should not be underestimated: there needs to be full-time employees with enough decision power and organization-wide knowledge to run the open innovation activities (Huston & Sakkab, 2006, 66). As the open innovation literature has largely focused on comparing open and closed innovation, which does help in communicating the importance of open innovation across organizations, there is still a need for studies to show how resources are spent in managing open innovation, how open innovation changes the organizing of organizations, and how people are rewarded and motivated (Dahlander et al., 2021, 9).

Opportunities are created inside and between organizations through relationships and exchanges in networks (Low & MacMillan, 1988, 155). To best profit from open innovation,

the networks should cover entrepreneurs, and suppliers, plus different open networks globally (Huston & Sakkab, 2006, 63). It is an increasing trend that innovation is taking place within organization networks, where open innovation is fostering the creation and acquisition of market and technology understanding as well as novel capabilities (Köhler et al., 2022, 2701). The network in open innovation should be part of the strategy, with a plan on how it is built and used. That way, it can serve as the platform for the open innovation strategy. (Huston & Sakkab, 2006, 62-63) Furthermore, the benefits from involving customers from along the value chain into the innovation processes have been described both necessary and advantageous (Enkel et al., 2005, 203). The network should be built open in a way where sharing ideas is easy. Building relationships with e.g., supplier through top-to-top meetings helps to increase the flow of ideas and innovations by better mutual understanding of each other's capabilities. (Huston & Sakkab, 2006, 63)

The people located in advantageous positions in these open innovation networks are most often the ones discovering the opportunities (Low & MacMillan, 1988, 155). Innovation comes from people who are dissenters – people who go against the stream from what is generally accepted inside the organization. Thus, the organizations need to encourage the expressions of dissent rather than suppress them as innovation by nature is disruptive to general patterns. (Horibe, 2016, 19) Wherever the idea comes from, the employees involved must be recognized in the reward system as it will encourage and assure the employees of the new open innovation strategy and make the change more smooth. (Huston & Sakkab, 2006, 66) Dissenters can be divided into two different types: the people who speak up when things are not going to the right direction, and those who are born dissenters, more persistent and asking questions that others would rather keep buried (Horibe, 2016, 58).

2.4 Open innovation management

Managing open innovation demands different modes of innovation management and sets of routines in the different stages of the startup technology cycle (Christensen et al., 2005, 1546). Successful open innovation requires a top-down organization-wide strategy, where the CEO is giving the mandate for launch - only working inside the R&D will not allow the strategy to work (Huston & Sakkab, 2006, 66). To be able to effectively integrate both internal and external ideas into the organisation's innovation processes, the processes need

to be revised (Edenius & Yakhlef, 2013, 53). Furthermore, there needs to be a set flow of open innovation that will guide the process through the most important steps of taking the idea from discovery to market launch (Huston & Sakkab, 2006, 64-66). Gatekeepers are a cross-functional team of senior managers evaluating the innovation projects by the execution quality, business rationale, and action plan quality with the power to either cancel or redefine projects that are not meeting the set objectives (Grönlund et al., 2010,109). To be able to manage the change towards open innovation, the internal culture and values must be paid attention to as well (Godbout, 2000, 76). In order for the open innovation practices to have possibilities to pay off, the organization must be internally behind the new strategy. To get through the funnel from screening to the markets, the idea must be taken through R&D, marketing, market research, and manufacturing just to name a few (Huston & Sakkab, 2006, 66). The entire innovation ecosystem across the organization must be aligned (Docherty, 2006, 15-17).

Brunswicker & Chesbrough (2018, 44) point out the need to selectively create a purposive design of openness in open innovation processes: how to manage open innovation through knowledge sharing, IP control, process formalizations, and top management involvement. The successfulness of cooperation in R&D depends on the level of appreciation and amount of knowledge spill overs, and the firms' capability of appropriating the value from the innovation process (Cassiman & Veugelers, 2002, 1169-1170). Thus, organizations should create purposeful and selective knowledge flow management as well as open innovation process and measures for the outcomes rather than getting stuck with high legal IP control. (Brunswicker & Chesbrough, 2018, 44) In open innovation, the ratio of expected risks and returns is not as favourable for the startup as it is for the bigger organization, which can be to some extent explained by the fixed and sunk entry costs (Vossen, 1998, 9). This should be taken into account when planning the knowledge flow management both in time and weight.

There are two different ways to approach the partner selection when looking for an open innovation project: effectuation and causation (Sarasvathy, 2001, 244; Solesvik & Gulbrandsen, 2013, 11). *Causation*, which lies on the logic of prediction, has a set or given effect, and the decision maker only seeks for the best means to reach the given effect. (Sarasvathy, 2001, 244-245) Organizations often use the causation logic in open innovation: management gives goal, e.g., to develop a new service, and the organization screens for the

best partner to fulfil the goal (Solesvik & Gulbrandsen, 2013, 11). Before considering to start an open innovation project for a new product or a service, the screening process should always start by first checking the ongoing internal projects and then the existing solutions in external markets to make sure there is no available projects solving the same issue (Huston & Sakkab, 2006, 66). *Effectuation*, that lies on the logic of control, has a set of means that the decision maker will use selectively to create the effect that best fits them (Sarasvathy, 2001, 244-245). Entrepreneurial firms tend to use the effectuation model by asking themselves, who do we know and what could we do with them. (Solesvik & Gulbrandsen, 2013, 11) However the project is selected, in the screening for the right partners to innovate with, there needs to be a set screening process with e.g., a standardized screening template or a catalogue that is then taken to the next internal stakeholders, such as the general managers and R&D teams worldwide for further evaluation (Huston & Sakkab, 2006, 64-66).

Open innovation has three archetypes of innovation processes: outside-in, inside-out, and coupled process. In the outside-in process, external knowledge, suppliers, or customers are integrated in, whereas in the inside-out process ideas are sold or licenced outside the organization. The coupled process is a combination of the earlier two, where the process is mostly a cooperation between competitive or complementary organizations (Gassmann & Enkel, 2004, 6). How ever the open innovation is executed, the organization must broaden the view of where to look for the opportunities and the ability to see what's really there to not miss the opportunity (Docherty, 2006, 15-17). Managing innovations can be divided into process stages where each stage can provide unique value creation opportunities, but also represent the different challenges, responsibilities, and required skills of the stage (Fetterhoff & Voelkel, 2006, 16). Stage gate methodologies are widely recognized and used methods to bring order into innovation processes, that consist of several activity stages of development and gates of achievement evaluation. The stage gate process usually begins by opportunity discovery and idea generation, and ends on developing the concept, testing and commercialization. (Grönlund et al., 2010,109) Creating more details to previous, Fetterhoff and Voelkel (2006, 16) divide the value chain of external innovation into five stages: opportunity recognition, market potential and opportunity inventiveness evaluation, partner recruitment, commercialization for value capture, and extension of the offering.

Core capabilities mean the unique competencies of the organization acquired through time (Godbout, 2000, 76). They are about the technologies and services, processes, communications, commitment, involvement, and value delivery (Prahalad & Hamel, 1990, 5). An effectively used know-how is the major competitive advantage in the organization's business environment (Godbout, 2000, 76). Open innovation gives a chance to extend your own reach and capabilities to new ideas and technologies, and to refocus your internal resources in a new way concentrating on the scouting, screening, and managing implementation of the innovations (Docherty, 2006, 14). However, neither core capabilities nor business models should be viewed as static entities, but to be considered for a redefinition when evaluating new ideas' alignment with them opposed to exporting and importing know-how and technologies (Grönlund et al., 2010, 119-200). The importance paid to organizations' and employee's competencies has an impact on how these competencies are drawn, cared for, and further developed (Godbout, 2000, 85).

To minimize the risks in customer integrated innovation, certain steps should be followed: selection of the right customer, methods of integration, time and place of the integration, provision of prevailing conditions and right projects with genuine value through open innovation (Enkel et al., 2005, 212). This is even more important when the acquired technology is at the early stages of development, as testing the product in the markets requires specialised engineering and design from both the implementing organization and the test customer, supported by the right strategies and willingness to pay more for the trials (Christensen et al., 2005, 1535). When planning on the risk minimization, it is necessary to start by clarifying the most important risks in need of substantial attention and the risks which are not important in regards to the organization, their industry, and product (Enkel et al., 2005, 205). Integrating a more mature technology, the focus will be more shifted towards calibration for the mainstream markets including the changes in the manufacturing for a more attractive performance-cost ratio (Christensen et al., 2005, 1535).

3 Measuring and strategizing open innovation

To make open innovation practice work, it must be seen more than just a R&D strategy, or an isolated experiment (Huston & Sakkab, 2006, 66). It is not about creating many good ideas, but about being able to turn them into value (Horibe, 2016, 6). Furthermore, to get resources for any new ideas or innovation, the people responsible for sharing the money are the ones that need to believe to the goals (Hamel, 1996). Being able to build new innovations, the performance requires continuous monitoring (Low & MacMillan, 1988, 156). Thus, this research is set to understand how open innovation should be executed and how the Case company can lead it with better strategies and KPI's. This chapter will present the idea behind the strategic KPI framework that is to be the key outcome of this research. As the idea for this precise model of a KPI framework came from a study by Olvera, Piqué, Cortés & Nemirovsky (2021), the original framework will first be presented. This will be followed by an introduction to each part of the framework, meaning the objectives, strategies, KPI's, and measures for open innovation.

3.1 Creating a KPI framework for open innovation

Although partnerships between organizations are built to leverage the complementary strengths of the parties, it can be very complex to manage. How to agree on the project, exit strategies, goals, and IPR ownerships to best match the resources, strengths, and weaknesses of both parties in a way that creates mutual trust, respect, and a win-win outcome? (Slowinski et al., 1993, 22) One way to make sure these things are considered and discussed before the partnership, is by setting goals and measures for the collaboration, and open innovation more generally, from the beginning. Selecting the right, encompassing set of KPI's for open innovation is important to direct the activities and collaborations to the right direction, and helps with communications. This is not a simple task, as there is not much research on measuring nor goal setting for innovation, let alone open innovation between these two very different parties. Following Olvera et al. (2021, 459-460) who created a framework to help in the knowledge and technology transfer as well as the evaluation of the open innovation accomplishments and goal setting, this research will be created with a similar focus to an

open innovation framework comprised of open innovation objectives, strategies, long-term KPI's, and progress KPI's. Open innovation practices need more systematization (Grönlund et al., 2010, 117). A framework is a less rigorous form of a model abstracting from reality to identify classes of applicable variables and their relationships to one another (Teece, 2007, 1320). Thus, a framework is an encompassing manner to create systematization to open innovation.

The outcome of the research is expected to be similar to the framework pictured in Figure 2 adapted from the study by Olvera et. al (2021, 461) which resulted into a "Framework of Company Key Performance Indicators" to evaluate collaboration between corporation and universities in a business perspective. The study was done to help the open innovation parties to transfer know-how and technologies more efficiently through the process of developing new activities, tools, and strategies (Olvera et al., 2021, 459). This process can be seen in Figure 2, that is led by three objectives, leading to supporting open innovation strategies, main long-term KPI's, and progress KPI's.

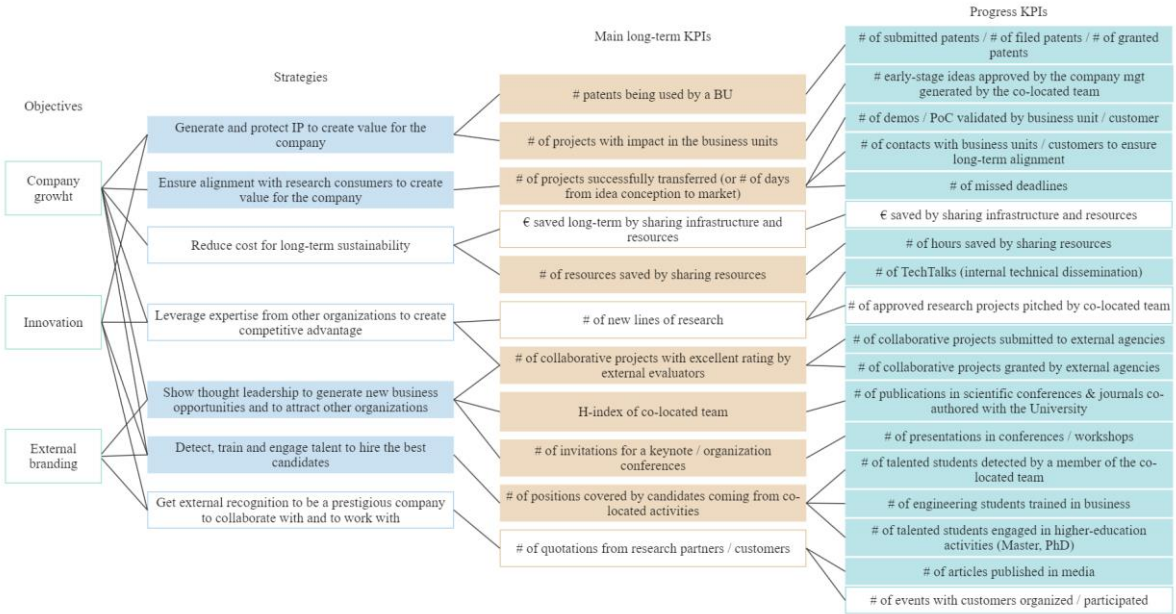

Figure 2: Framework of company key performance indicators (Olvera et al., 2021)

Figure 2 was adjusted to the Case company's environment as is pictured in Figure 3. This figure shows the reason behind a KPI framework, and the role of the open innovation team

in relation to the Business owners, who are responsible for sharing the budget. Thus, the Business owners are the one's setting the objectives for innovation work. The OI team's role is to support these objectives, and the better it's done, the bigger budget the team receives. Being able to generate value with the given budget, the OI team needs to have a strategy. And to make sure that the strategies are followed, there needs to be long-term KPI's to prove the development. Furthermore, a set of progress KPI's takes it to the action level, and makes it easier to follow the development of the every-day activities. The research questions and focus of the study were shaped as to give a proposal to the process pictured in Figure 3. Busenitz, West III, Sheperd, Nelson, Chandler & Zacharakis (2003, 303) highlight the focus on the intersection of entrepreneurial individuals and opportunities, mode of organizing, and the context of environments, which are all considered in the creation of this framework.

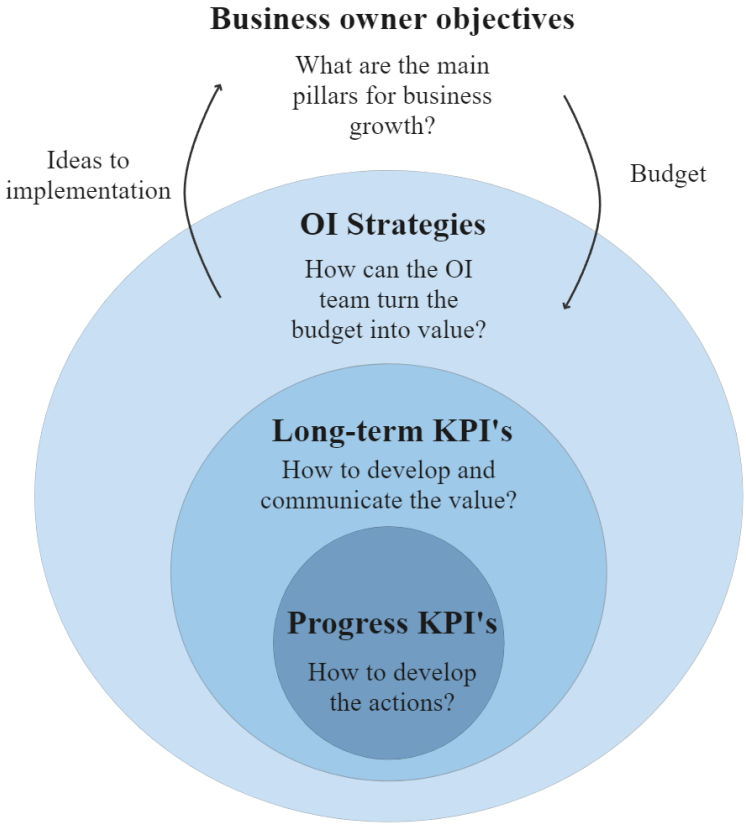

Figure 3: Organizing the KPI framework and open innovation management

3.2 Open innovation objectives

Carefully selected strategic objectives have an important role in determining the direction, breadth, and success of innovation performance (Leiponen & Helfat, 2010, 224-225; Srinivasan et al., 2021, 2105). To have better chances to moving forward to development, new suggestions of ideas must provide for the organizations' objectives (Velamuri et al., 2017, 502). In average, organizations have 5-6 set objectives for innovation work, that go hand in hand with the amount of knowledge sources aimed at these objectives (Leiponen & Helfat, 2010, 230). However, Srinivasan et al. (2021, 2105) argue, that as the search for the external knowledge sources grow, the objectives should be more narrowly selected. In accordance, Olvera et al. (2021) only created three objectives for the example framework presented above. Also, P&G, for example, has divided their focus intro three main environments of surveillance: Top ten consumer needs, Adjacencies, and Technology game boards. (Huston & Sakkab, 2006, 62)

In their study about strategic objectives for investment based open innovation, Pinkow & Iversen (2020, 13) suggest to setting the open innovation objectives to be strengthening the ongoing strategy, complementing the ecosystems around the corporation, and expanding the technologies and markets of the corporation. Then again, De la Fuente et al (2021, 17) have listed objectives for open innovation, including responding to partner, customer, and public demands, identifying new opportunities, exploring new trends, increasing the technological readiness at the core, avoiding doing overlapping development, improving technology transfer and surveillance, and reducing R&D development times, risks, and costs. Leiponen & Helfat (2010, 288) proved the correlation between multiple parallel innovation objectives and innovation success, with objectives such as improving quality, new market entries or increased market share, flexibility of production, expanding and updating the offering, reducing labour costs and the use of energy and materials, fulfilment of regulation and standards, and mitigation of environmental damage. Then again, Chiesa, Frattini, Lazzarotti & Manzini (2009, 493-494) identified six major objectives for R&D performance: motivating the R&D people and improving their performance, R&D progress considering targets on resource consumption, milestones, and requirements, supporting the project selection in the initiation, continuation and discontinuation, coordination, and

communication inside and outside the team, organizational learning, and reducing uncertainties around R&D and individuals.

3.3 Open innovation strategies

A good strategy is an enabler for revolutionary innovation work (Hamel, 1996). However, traditionally, rather than promoting openness strategies were to guide organizations to build a defensible position to create barriers to competition and power inside the value chains (Chesbrough, Henry W. & Appleyard, 2007, 57). Today the question is no more whether to have open or closed innovation, but what is the degree, and not whether to use open innovation or not, but when to use it (Dahlander et al., 2021, 9). Strategy should be a quest to explore potential rather than a time bound planning ritual, and looking at the future and industry boundaries from a new angle harnessing a bigger proportion of the organization's creative potential (Hamel, 1996). A comprehensive, accurate, and efficient innovation strategy requires understanding of the value built through innovation, and recognition of the most important areas and the areas in need of improvement (Vicente et al., 2015, 41-44). Furthermore, there has been issues with e.g., capturing value, business model sustainability and open initiative co-option potential when adapting the strategies to more open models (Chesbrough, Henry W. & Appleyard, 2007, 57). To be able to facilitate in- and outflow of ideas and knowledge, the strategies must support some level of organizational permeability (Saebi & Foss, 2015, 210). The level and mode of openness in open innovation with the partner must be decided upon before the collaboration (Christensen et al., 2005, 1547). Furthermore, the governance mechanisms and practices inside the organization must positively affect the integration of external knowledge (Saebi & Foss, 2015, 210).

An open strategy is a strategy approach taking innovation networks, ecosystems and communities and their relevance for competitive advantage into consideration (Chesbrough, Henry W. & Appleyard, 2007, 58), and it must align with the organization's business model (Saebi & Foss, 2015, 210). It is important for organizations pursuing to lead through innovation, as it brings in business models that root to invention and community coordination, as well as balancing value capture and creation (Chesbrough, Henry W. & Appleyard, 2007, 58). Flexible planning of open innovation projects focus on the creation of predictive and conceptual models describing the business model, value creation process and

the likely interaction of spending and revenue. Table 1 is showing the differences in the planning and setting metrics for a startup versus the (Docherty, 2006, 16-17; citing Govindarajan & Trimble, 2005). The figure shows how the corporation is strategizing with the numbers, long-term planning, and details, where the startup focuses on more short-term, the market trends, and learning. These differences should be taken into account when planning an open innovation project. Prashantham and Birkinshaw (2020, 1163) highlight the importance of intent compatibility in evaluating open innovation cooperation, as it will shed light into how the relationship might evolve with time as the equilibrium of the parties depends on the compatibility of the intent of the organizations. The compatibility of intent is on the SME's international vs. domestic orientation and corporation's exploration vs exploitation in building the relationship. (Prashantham & Birkinshaw, 2020, 1164,1167)

Table 1: Differences of corporate and startup metrics (Docherty, 2006, 16-17; citing Govindarajan & Trimble, 2005)

Proven, mature business	**New, unproven business**
Accountable for results	Accountable for learning
Details	Critical unknowns
Prediction	Underlying logic
Numbers	Trends
Annual planning cycle	Monthly or quarterly
Focus on financial measures	Focus on leading indicators

There are no magic spells for success, but each organization has their success factors, which also have the possibility to kill the organization if being overlooked. Thus, when evaluating new opportunities, it needs to be considered if there is an established market for the new idea, if the market if defensible, and if the strategy is suitable for the industry. (Low & MacMillan, 1988, 156) To devise an effective innovation strategy, it is crucial to try to understand the innovation system, and the stage and nature of the technology, and any particular requirements for coordination (Christensen et al., 2005, 1547). Some of the key antecedents of innovation are said to be the following three organizational orientations:

market, learning, and entrepreneurial orientation (Hult et al., 2004, 429), while the key competencies in producing innovation outcomes and superior performance are the strategic, technological, and product development capabilities, as well as innovativeness (Vicente et al., 2015, 30). Innovativeness is an important antecedent of business performance, and thus important for industrial organization's success in the creation of sustainable competitive advantages (Hult et al., 2004, 436). Furthermore, market orientation and entrepreneurial orientation have an impact on the innovativeness of the organization meaning that the managers should be creating an internal business environment valuing innovativeness of employees and of the culture (Hult et al., 2004, 436). The most successful open innovation strategies seem to be more than just the firm-specific technical and managerial input of skills: a well-made opportunity analysis of the innovation, entrepreneurial vision, and the cooperative and competitive context. It is also the ability or luck in exploiting more or less coincidental opportunities outside the innovation parties. (Christensen et al., 2005, 1547)

3.4 Open innovation KPI's

Key performance indicators, KPI's, tell what must be done in order to increase the performance level of the organization (AlRababah, 2017, 80) and help to keep focus on the important outputs and outcomes (Sutanto et al., 2021, 14). Innovation outputs mean the direct results coming from the innovation efforts, where innovation outcomes mean the consequences of introducing the innovation outputs (Janger et al., 2017, 31). KPI's are set to monitor the effectiveness and efficiency of services to determine potential improvements based on past and current data (Meier et al., 2013, 99). In the business environment KPI's are most often quantitative information illustrating the structures and processes of the organization (AlRababah, 2017, 80). KPI's are important management tools as they help in separating the important information from unimportant, simplifying complex topics, and creating transparency for communications (Meier et al., 2013, 100). They are supporting the organisation to estimate misleading business processes with financial and non-financial measures and tracking how the long-term goals have been met (AlRababah, 2017, 80).

There is no common consensus on how to set KPI's efficiently and comprehensively for open innovation. Many research on innovation measurements are based on country level comparisons (e.g., Edquist & Zabala-Iturriagagoitia, 2015; European Commission, 2013) or

university driven open innovation (e.g., Olvera et al., 2021). However, as these studies have created qualitative and quantitative KPI's and measurements for innovation outputs and outcomes as described above, they will be used as a base framework for creating the KPI's for this case, mended with the knowledge gained from further interviews on the matter.

A normal way to set KPI's is to relate them to the constraints of costs and time, as oftentimes projects are run with a set budget (Sutanto et al., 2021, 16-17). Another typical way is to do it with the step gate method, where the gates inside the innovation processes are evaluated based on deliverables, criteria, and outputs (Grönlund et al., 2010,109). Deliverables define the inputs needed for each gate review, are defined in advance, and show the results of activities executed in each stage. This is often a standardized set of deliverables defined for each gate. The criteria are set to evaluate each project, divided into must-criteria and should-criteria. Often the criteria are organized as a scorecard and have both qualitative and quantitative criteria. (Grönlund et al., 2010,109) Measurements of a development project should be divided and weighted in value as follows: cost with 40% weight, timing with 20%, productivity with 20%, and rest being quality measures with time to failure 13%, time to repair 5%, and operating cost 2% (Brown, M. G. & Svenson, 1998, 35).

3.5 Measuring and setting goals for open innovation

As KPI's for open innovation are a less researched topic, this research will use research on innovation measures and goals to form the KPI's for the Case company. Knowing what can be measured and what should be measured in order to know if the set goals have been met can be used to create classifications of said measurements, and eventually be directed into the key performance indicators.

While the academia has had attempts to measure innovation, for the early 2000' most attempts to measure innovation were ad-hoc at best (Dobni, 2008, 543), not conforming systematic manners to develop scale and focusing on certain perspective instead of a general innovativeness (Wang & Ahmed, 2004, 303). The first multi-dimensional conceptualization of innovation construct came from Wang and Ahmed in 2004 (Dobni, 2008, 543). Wang and Ahmed (2004, 303) recognized, that there are not much empirical studies on developing and validating innovativeness scale for organizations. They identified five innovativeness areas

determining organizations: product -, market -, process -. behavioural -, and strategic innovativeness. Out of these determinants, strategic innovativeness is the prime factor in organization's innovation capability. This way of measuring assesses the innovation capability potential and future orientation. (Wang & Ahmed, 2004, 305, 311-312)

In 2013, the European Commission created an innovation indicator to capture outputs and outcomes of innovation in order to support policy makers to remove bottlenecks preventing innovators from converting ideas into products and services (European Commission, 2013). It was created as the result of strong critique towards the earlier R&D intensity indicator taken to use in 2002 Barcelona summit (Janger et al., 2017, 30). The critique was partly about not taking into account R&D structure being strongly determined by the industry structure (Mathieu & van Pottelsberghe de la Potterie, 2010, 59-60), and that EU has a tendency to rely on input factors of innovation which can lead to unproductive R&D investments (Edquist & Zabala-Iturriagagoitia, 2015, 22). Thus, Edquist & Zabala-Iturriagagoitia (2015, 2, 37) suggest to discuss innovation inputs and outputs separately and to measure the productivity or efficiency of the innovation system on top of the production of innovation outputs when talking about innovation performance. However, Janger et al. (2017, 30) describe the new 2020 Innovation Indicator to be biased towards a narrow definition of high-tech conception of innovation outcomes. The EU indicator divides innovation outputs into four components: 1) patents, 2) no. of people working in innovation related positions, 3) competitiveness of innovative goods and services, and 4) employment inside innovative sectors & fast-growing firms (European Commission, 2013).

Janger et al. (2017, 38-40) highlight the need to find ways to measure innovation outputs and outcomes with quantity and quality. Similarly, Stephan, Andries and Daou (2019, 721) suggest, that only focusing on economic goals might be one of the reasons for firms to struggle in implementing open innovation and benefitting from it fully. On top of measuring the number of patents, measuring "throughputs" would mean the capability to create new knowledge, as it is needed in creating commercially successful products or economic benefits with the knowledge. Furthermore, there is a need to distinguish between the innovation outcomes into structural change and structural upgrading. (Janger et al., 2017, 38-40) Innovation output means the production of innovation, whereas the innovation input means the efforts and resources devoted for innovation. If the input is much larger than the output, it means that the efficiency of the innovation performance is low. (Edquist & Zabala-

Iturriagagoitia, 2015, 7) The innovation outputs should be measured in quantity, quality, and costs, and outcomes with the added measure of return on investment (Brown, M. G. & Svenson, 1998, 34).

The two mostly used measure of open innovation are openness-breadth, meaning the number of accessed sources, and depth, meaning the intensity interaction (Brunswicker & Chesbrough, 2018, 36). Armbruster, Bikfalvi, Kinkel and Lay (2008, 654-655) suggest four measurements for organizational innovation: 1) Complexity of innovation, 2) Lifecycle of innovation, 3) Extent of use of innovation, and 4) Quality of innovation. Brunswicker & Chesbrough (2018, 37-42) studied open innovation measures through Strategic support for open innovation with devoted total expenditures and no. of dedicated full-time employees and the percentage of outbound and inbound knowledge flow whether it had IP control or not, and costs or not. Furthermore, the organizations they surveyed were asked to evaluate some metrics of project performance for open innovation, which were rated in the following order: project investments, no. of introduced opportunities, customer satisfaction, market reputation, revenue, and cost of project in relation to an average project cost. (Brunswicker & Chesbrough, 2018, 42) Dodni (2008, 546-549) highlights the importance of culture in measuring organizations' innovativeness. Measurement for the culture scale consist of seven factors, being the innovation propensity, organizational learning, value orientation, market orientation, implementation context, organizational constituency, and creativity and empowerment (Dobni, 2008, 546-549).

Brown & Svenson (1998, 33-34) list out six things to consider in creating an effective system to measure R&D performance: considering the external measurements on top of internal ones, focusing on outputs and outcomes rather than the activities of the innovators, focusing only on the accomplishments that are valuable, making the measurements easy enough to follow, objective, and having separate evaluations for the research part and development part. Then again, Chiesa et al. (2009, 501-502) divide performance measures into four perspectives measured by input, process, and output: financial -, customer -, innovation and learning -, and business process perspectives. Furthermore, Vicente, Abrantes, and Teixeira (2015, 41-44) created the INNOVSCALE to measure the innovation capability consisting of the dimensions of innovativeness, and capabilities in product development, strategy, and technology. These capabilities must be created and developed in the organizational routines

in order for the organization to respond and overcome the competition. (Vicente et al., 2015, 41-44)

It is crucial to have carefully set targets in open innovation (Huston & Sakkab, 2006, 62). The firm-specific strategic choices and business model in open innovation matter and have to be drafted in an environment with many unknown factors (Christensen et al., 2005, 1547). Often in scientific debates, innovation as a term is linked to R&D with a focus on new product development. However, there is a need to differentiate product (let it be a product or a service) and process innovations, as well as technical and non-technical innovations. (Armbruster et al., 2008, 644). Setting social goals in addition to the economic goals potentially yields unique advantages for organization's competitive advantage and open innovation. Furthermore, it creates closer and better collaboration with external partners giving an access to more external knowledge and boosting the innovation performance. (Stephan et al., 2019, 721)

4 Research methods and data

This is a qualitative case study researching how the Case company's open innovation objectives, strategies, and KPI's should be set to best accommodate to the Business owners needs and interests, and to the open innovation partners, the startups', way of innovating. As the nature of the research demands in-depth answers on the Case company's and the startup entrepreneurs' behaviour and ideals, the data was collected with interviews (Ghauri et al., 1995, 65). A case study as a research method allows to identify the key concepts and the circumstances, as well as to grow the understanding of how things work (Huizingh, 2011, 7). A qualitative case study is an empirical research investigating a focused phenomenon in a bounded real-life setting with rich, contextual data (Barrat et al., 2011, 229). A single case study helps the research to build theory with new theoretical relationships, to question the old theories and to get a deeper understanding of the of the underlying dynamics of the case (Dyer & Wilkins, 1991, 613-615).

This chapter will start by introducing the qualitative content analysis methodology used in the research. Next, there will be a short description of the Case company, and finally a description of each interview data set.

4.1 Qualitative research methods

As there was a need to a deeper understanding of the open innovation objectives, strategies, and practices at the level of human experiences complexities in the implementation, the research was done in a qualitative manner (Vaismoradi et al., 2016, 108). Interviews have been suggested as the most suitable data unit for content analysis (Graneheim & Lundman, 2004, 106). Thus, this research has been conducted through 10 semi-structured interviews with the Case company's Innovation managers, Business owners, and external Startup CEOs from the Nordics. In this study, Innovation managers are case company's R&D representatives responsible for managing or directing a stream of research or a stage/stages of the product development funnel. Furthermore, Business owners are VP's and directors of business development representing the main business segments in the case company. The

interviews were conducted in early 2023 from February till March as separate online and offline meetings. This is the time of the year where the interviewees were in the process of forming their yearly strategies and objectives, meaning that the research topics were fresh on the interviewees' minds. The interview frame was designed to cover three main categories: 1) innovation objectives, 2) innovation strategies, and 3) innovation KPI's, measures, and goals. After the transcription of the interview recordings, qualitative content analysis was used in forming analysis of the collected data. Content analysis is a method used in research analysing communication messages in spoken, written, or visual form (Cole, 1988, 53). It allows the researcher to distil the data into content categories through analysing the meanings, themes, and patterns of the words and phrases, and finally into an enhanced understanding of the data (Cavanagh, 1997, 5; Zhang & Wildemuth, 2009, 1). The goal is to describe the phenomenon through concepts and categories, usually building to a model or conceptual map (Elo & Kyngäs, 2008, 107). The idea is to illustrate a range of meanings around the chosen phenomena, not to show statistical significance of the occurrence of the theme as a quantitative content analysis would (Zhang & Wildemuth, 2009, 2). An inductive analysis is recommended instead of the deductive method in cases where the knowledge about the topic is fragmented, or there are not many studies addressing the phenomenon (Elo & Kyngäs, 2008, 113). As there were no earlier theories to derive the analysis from or to retest, this analysis was made with an inductive analysis.

Content analysis starts by the selection of the units to be analysed, the level of required details, and sampling (Cavanagh, 1997, 8-9; Graneheim & Lundman, 2004, 106). A unit of meaning is words, sentences, or paragraphs relating to each other by content or context (Graneheim & Lundman, 2004, 106) and have multiple meanings (Elo & Kyngäs, 2008, 109). In this research, the unit of analysis is mostly sentences, and towards the end also individual words. The analysis was done only on manifested content, meaning that the depth and level of interpretative abstraction was only on the level of what was said and not on gestures, faces etc. (Elo & Kyngäs, 2008, 109; Graneheim & Lundman, 2004, 106).

The first phase of the analysis, the initialization was done by carefully, and iteratively going through the collected data to get an overall understanding of the data and phenomenon (Vaismoradi et al., 2016, 103). Next step was to develop categories and a coding scheme, which can be derived from previous theories, studies, and the collected data (Zhang & Wildemuth, 2009, 3), in this study meaning the interviews and academic literature, research,

and articles on the related topics. Using different types of references brings out diverse opinions and issues related to the concepts, processes, and interpretations of interest (Graneheim & Lundman, 2004, 105). As this research was done with inductive method, the coding scheme was done with an open manner, which meant taking notes to the data while reading it and finally bringing the notes to a coding sheet and starting to group them (Elo & Kyngäs, 2008, 109-110). A code can be assigned to a piece of text of any size, a word, sentence, or a paragraph, for as long as the piece is relevant to a theme or issue in the research questions (Zhang & Wildemuth, 2009, 3). After collecting codes for potential themes and subthemes, it was time to start the construction phase by comparing the discovered code clusters to one another, and to the entire data set in regards to the research questions, labelling, and eventually defining the created classifications into themes (Vaismoradi et al., 2016, 101, 105). Categories are named according to words characterized by the content (Elo & Kyngäs, 2008, 111), and are the first product derived from the analytical coding process as descriptive step towards theme development and classification of the findings in a comprehensive and mutually exclusive manner (Vaismoradi et al., 2016, 102, 105).

Next step as portrayed by Vaismoradi (2016, 106), is to rectify the themes as to check and confirm the relative certainty of them. When the first version of the result framework was drafted, it was validated with the OI managers to make sure, that the outcomes made sense, there was no researcher bias, and all of the KPI's were actionable for the theme. Furthermore, throughout the research the reliability and validity of the research were taken care of by frequent revisions of the stability of the data collection and coding methods over time, as well as the relationship between investigated concept and emerging categories (Cavanagh, 1997, 11-12). The last part of the content analysis is the finalization, developing the narrative storyline that connects the themes and answers to the research questions, creating a holistic view over the phenomenon (Vaismoradi et al., 2016, 107).

This content analysis was done three times, first with the objectives, then with strategies, and lastly with the KPI's. Lastly, the discovered themes were related to one another to create a framework combining all three levels of interest.

4.2 Case description

The Case company is an industry leader in the B2B manufacturing markets. It is an established global corporation with a bit over 15 000 employees in 50 countries, and a turnover of 3+ billion euros. The Case company recognized the need for faster, more agile innovation a few years back, as many corporations were moving into having a separate unit in charge of startup interactions as to buffer the startups' interactions with slower corporate world (Weiblen & Chesbrough, 2015, 85-86). Eventually a small team got separated from the R&D to focus on open innovation with scaleups and startups. This was also an opportunity to reach for knowledge and technologies that were not in the case organizations range of expertise. This would help to ensure the position of the market leader.

Organizations taking in open innovation activities oftentimes layer the new perspective on top of existing processes, and do not create new processes or metrics (Chesbrough, Henry & Crowther, 2006, 234). For some years the open innovation activities were running smoothly like that, as the OI team was introducing the idea of open innovation and partnership collaboration to internal stakeholders as well as taking up first partnerships with startups and startup networks. However, as the OI team is now more established, the team is under pressure to bring up the scale and phase to the open innovation projects. While the struggles of open innovation are very similar to the Case company as any other corporation, and as the literature review has discussed earlier, the solution must be built for the case precisely. To scale up, the OI team must move from the ad-hoc practices towards a defined process with set systems, roles, incentives, and metrics to ensure an improved internal adoption internally and among the senior management (Chesbrough, Henry & Crowther, 2006, 235). Because of the internal pressure for the change, the team must also build ways to communicate on their value and strengths. Continuously building and supplying evidence supporting the open innovation transformation helps in proving that the initiative is going to the right direction (Chesbrough, Henry W., 2007, 27). As the team was struggling with understanding the internal stakeholders needs and requirements for innovation, they noticed that the internal stakeholders were not clear and aligned with their requirements for innovation. Furthermore, communicating and organizing open innovation projects with individual partners was difficult due the missing structure of processes and unclear objectives. It was noticed that there was a need to create better understanding to both

directions – as the orchestrator between startup solutions and internal needs, the team needed to be able to connect these two, the Businesses and the Startups, better and more efficiently.

At the Case company, the open innovation activities are run by the OI team, but the needs and budget come from the Business owners. Thus, to start an open innovation project, there needs to be support from the business functions. Therefore, it is crucial for the OI team to understand the needs and requirements coming from the businesses, to be able to get any open innovation project past the first phase. Afterall, sustaining internal commitment in adequate time is one of most common issues in bringing in open innovation processes (Chesbrough, Henry & Crowther, 2006, 235). Furthermore, as the team and startup actions are still fairly new and unknown for the internal stakeholders, one of the important missions is to be able to improve the communications towards them; what is the value of the team's activities and of the proposed innovation projects, why should the internal stakeholders contact the team when needs arise, and how can the team help with the needs. Currently most of the open innovation projects are still done with push instead of pull model, meaning that the startups contact the team pitching their ideas rather than the team reaching out for startups directly to a recognized need. The focus of the OI team is on a *coupled process*, meaning the co-creation of knowledge and ideas with complementary partners and on an *outside-in process* also called as *inbound process*, meaning the enrichment of own knowledge through integration of external partners (Enkel et al., 2009, 312-313). The Case company has made a strategic decision to execute venture-client model, meaning that the Case company acts as a buying customer or a partner in testing and developing the startup technologies. Making investments with a venture-capital model would require a reasonable capital fund and commitment in boards of invested ventures.

As is widely recognized and discussed above, communications let alone open innovation between corporation and startup is not an easy task for multiple reasons. To be able to better understand the startup point of view, their needs, and goals but also their language and ways of working, it is important for the Case company's OI team to ask these questions from the startups themselves. In order to create more successful open innovation projects with improved satisfaction levels, communications and project management needs to be created closer to the startups. This will improve the expectation management, as it would minimize the risks of misunderstandings on the collaboration needs, goals, timelines and so on.

To bring clarification to the Case company's needs described above, this research aims to build a KPI framework for easier communications, improved expectation management, and better open innovation management. As the start of any open innovation project is dependent on the Business owner interest, the first task is to understand the Business owner objectives for open innovation activities. This would not only help with improved hit-rates with new project proposals, but also to communicate the values and problems both ways. To be able to bring these Business owner objectives to action, there needs to be actionable strategies for open innovation. As the facilitating party, the open innovation team needs to be able to build strategies that combine the Business owner's and startup's needs and wants to a one strategy, benefitting both parties to reach the set objectives. Having set strategies helps in creating new open innovation projects and communicating to both directions. Lastly, to make sure that the set strategies and objectives are followed, a set of KPI is needed to direct the work to right tracks. Creating more general long-term KPI's will help in proving the value of the open innovation activities and the team's work, where project related KPI's help to mutually stay on track with each project and shorter term activities.

4.3 Data description

To build the KPI framework as discussed, the research was facilitated with three sets of interviews: internal Business owners, internal Innovation managers and Startup CEO's. The interviews were held as semi-structured interviews with predefined themes and few key questions of interest, which is a typical form of research in case studies where there is a need to also understand "why" on top of "what" and "how" (Saunders et al., 2016, 391-392). This interview method gives the possibility to ask the interviewees to specify and deepen the answers during the interview (Tuomi & Sarajärvi, 2018). Interview as a research method gives an opportunity to understand the motives and the subjects behind the realities, to redirect the initial assumptions of the researcher, and to create knowledge to a subject that does not have much previous research (Hirsjärvi & Hurme, 2022). The goal was to have a comparable set of interviews from the three different parties directly involved in open innovation. This was to get a more comprehensive understanding of the OI team's open innovation environment with related difficulties, wishes, and opportunities as well as the relations between the discussed topics. The reliability of the replies between the interview

sets was increased by having 3-4 different representatives inside each interview set. The interview themes for each interview set were designed similar to one another to make the answers between the interview sets more comparable to one another. However, there were few key questions unique to each set related to their position in the open innovation process.

The interviewees are all working in the tech industry, are located in the Nordics, and have been in a way or another involved with open innovation projects within the last few years. The interviews were conducted on Spring 2023. Although allowing storytelling and discussions, the interviewer kept the focus of the discussion on the themes of innovation development, objectives, strategies, and measures. The interviews lasted from forty minutes to one hour and were held either live or as Teams-meetings depending on the interviewees' locations. The interviews were recorded, excluding one that did not agree to be recorded, and transcribed for a further analysis. In qualitative research, especially when done with interviews, the amount of transcribed data easily reaches to hundreds of pages (Elo & Kyngäs, 2008, 113), which was also the case in this research. The transcribed text was coded, conceptualized, and put together in a positivistic manner to find out possibilities for categorization (Ghauri et al., 1995, 96). The narratives were analysed with a content analysis to find out the recurrent and abnormal themes in the stories.

In the next chapters, each interview set is presented with details on the interviewees and the process of the interviews. Every interview started with introductions of the people present and the research topic, and ended by giving the interviewees a chance to ask the interviewer questions or to give any comments that they might have gotten during the interview. The interview structure and plan were designed and validated together with the Case company's innovation experts and service designers and piloted with a rehearsal interview.

4.3.1 Business owner interviews

The first set of interviews was held to three Business Owners, each representing one of the business segments inside the Case company. The three businesses differ from each other greatly in the products and services, customers, and offer requirements, thus having quite different organizational structures behind them. Furthermore, this makes the requirements, needs, and interests to innovation quite different inside these businesses. All of the

interviewees had previously been involved in the open innovation activities but had different backgrounds in their years of working inside the Case company and in their time being on the Business owner's position.

The main goal of this set of interviews was to discover different objectives the Business owners follow at their work, and how they relate to innovation activities being presented to them. There was a need to understand what the Business owners look for when evaluating the innovations, and what it needs to have to get a budget for a project. The interviews were divided into three themes: innovation objectives, innovation requirements, and innovation goals. The interviews started with a warm-up, asking about the Business owners role and the part innovation plays in it, what is their role in the innovation management, and their main challenges in it. The first theme was set to understand the bigger scale objectives guiding their work, where do they come from, and the role of innovation in them. The second theme dug deeper into the innovation requirements by asking about their evaluation process when deciding on an innovation throughput, what is needed to grant a budget for an innovation, and the requirements for the startup team. The last theme was to see if the interviewees have set goals or KPI's for their work and innovation and what they might be. It was also questioned to see what their idea of a successful innovation is.

4.3.2 Innovation manager interviews

The second set of interviews was held to three Innovation managers, each representing one step gate in the typical R&D process. All of the three were responsible of their own innovation gate. The backgrounds of these interviewees were chosen to be different to one another to represent different experiences in years in the Case company and in years in innovation management. One of the Innovation managers was a person with decades of experience inside the Case company, and years in innovation management. One has years of experience in innovation but has only recently joined the Case company. The last one had some years of experience of the Case company and innovation management, but had during those few years built a reputable image in the innovation team.

The Innovation manager interviews were set to understand how innovations are managed inside the Case company. The questions were divided into three main themes: innovation

objectives, innovation strategies, and innovation management. The interview started with some warm-up questions of the interviewees' role, what is the Case company's innovation flow from opportunity recognition to innovation implementation, and what are 3 of the biggest challenges in this flow. The first theme started by digging deeper into the innovation objectives, where can they be linked to, and how the objectives are being fulfilled. This led to the second theme to gain understanding of the strategies supporting the set objectives, how the strategies are created, looked after, and communicated. The last theme was to understand the more concrete goals of innovation management, if there are any KPI's or measures on place, the three biggest issues in setting KPI's and how the Business owners are part of to the Innovation manager's work.

4.3.3 Startup interviews

The third set of interviews was held to four Startup CEO's with very different backgrounds. The requirements in choosing an interviewee were that the startup is Nordic for more reliable comparisons, the startup does not have experience of open innovation with the Case company, and is focusing on B2B markets and industrial customers. The four Startups selected were chosen to be very different from one another in products, CEO background, and time on the market. Two of the Startups were focused on software, and two in hardware. Two were on the early stages of finding investors or partners, while the other two were already scaling up their businesses. Two of the CEO's had longer background in the startup world and entrepreneurship as founders, meanwhile two were startup first-timers, the other also being the founder of the Startup. All of them had some level of experience from open innovation, one having background in corporate open innovation activities, one about to publish their first successful open innovation project, one trying to negotiate on their first open innovation project, and one having done it few times with few of their founded startups. Three of the interviewees had a strong corporate background, while one had always been working in small organizations only.

The Startup CEO interviews were set to understand how differently innovation is managed inside a startup in comparison to the Case company. The interview was divided into three themes, as the previous interviews: product development and innovation activities, product development goals and measure, and product development strategies and objectives. The

themes were in a different order than with other two interview groups, to make the themes more easily digestible and correlative starting with the more tangible themes. As the Case company's OI team had noticed that startups rarely use the term innovation as corporations do, "product development" was used as a synonym for innovation in explaining the themes and questions. Every interview started with a warm-up, asking the interviewees about their backgrounds and what led them to this position. The first theme was to find out how the innovation flow happens from opportunity recognition to implementation, how long it takes, who are involved, how often it happens, and how the risks and opportunities are evaluated throughout the flow. Last questions of the theme were related to main problems in the flow, and previous experiences from open innovation. The second theme was about understanding how product development flow was followed, if there were any KPI's and what were the main issues with setting goals and measures for product development or innovation. The last theme was to see if the actions are guided by any strategies or objectives, and what they might be either in written or as a word-to-mouth vision.

5 Analysing the interview findings and presenting the KPI framework

Innovation is about turning off-the-wall ideas into something of value, not about slight improvements in marginal products (Horibe, 2016, 6). This was also evident on how the Businesses thought about innovation, stating that in a corporation even the incremental improvements are wrongfully labelled as innovation which causes troubles in communications and evaluating the value of said "innovations". They discussed the need for more radical innovations and new business opportunities but were concerned by the company's tendency to focus on incremental advancements rather than solving real business problems. However, senior managers in corporations are often prudent and protective, and thus likely to shoot down radical innovations coming their way (Hamel, 1996). Even one of the Startups described senior corporate managers to be "old, territorial, risk avoidant men", which was not deemed ideal for introducing radical ideas. Of course, it is important to know when to say no to new innovations, but most important is to not judge prematurely (Hamel, 1996). As was also seen in the interviews, evaluating the value of an idea is impossible if you are not an expert on the matter, have a concrete description of the idea, or can test it. However, for an effective business model in open innovation, there needs to be a way to capture some the value created from the innovation (Chesbrough, Henry W. & Appleyard, 2007, 58).

Figure 4 is the framework created from the content analysis. In the following chapters, the framework will be introduced one part at a time. The attitude towards open innovation was seen generally positive and curious, but also with some level of caution. The goal of the framework is to capture the value created by the OI team, and to communicate it to the internal stakeholder in a more comprehensive and transparent manner. It is also a tool to create understanding to all the factors affecting open innovation success, to help the OI team focus on the right matters in creating an open innovation environment. The lighter blue colour in the framework is to highlight the most important KPI's suggested for the Case company to take to use immediately and use as the main value communication tools.

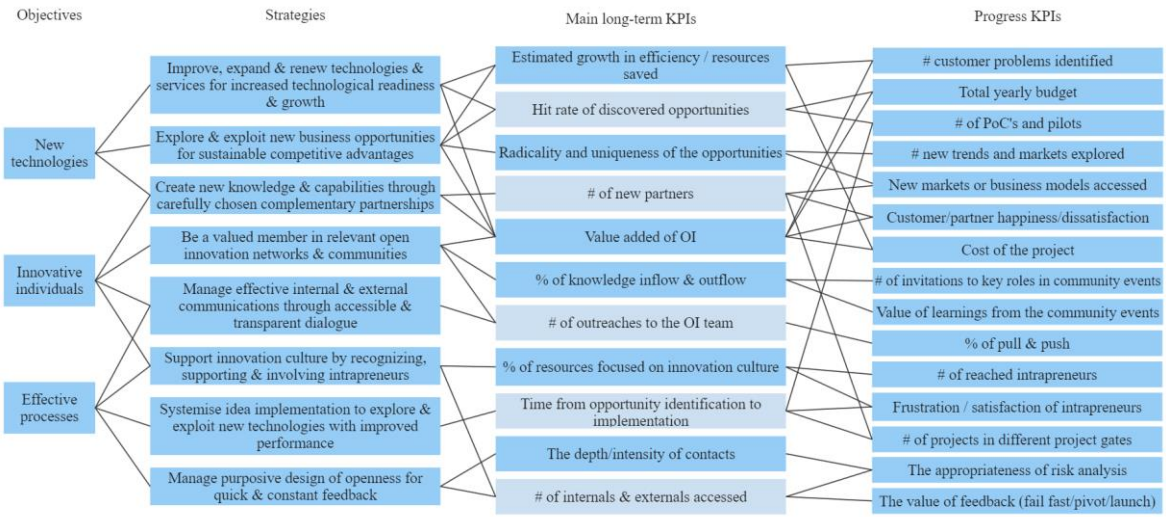

Figure 4: The open innovation framework

5.1 Open innovation objectives

On the first stages of open innovation practices, the organization must focus and align the activities with the overall objectives of the organization (Chesbrough, Henry & Crowther, 2006, 234). Even the internal interviewees reminded at many turns of the interview about the importance of alignment with businesses and organization. When looking for open innovation, it is crucial to know precisely what you're looking for, where you should play, and what are the areas of interest (Huston & Sakkab, 2006, 62). Instead of carefully thought through metrics and processes, having a defined set of target areas for anticipated growth areas is more helpful in scouting and focusing on more radical innovations (Chesbrough, Henry & Crowther, 2006, 234). Thus, the interviews were set to figure out the main long-term goals, drivers, and focus areas that the Case company has for innovation.

After carefully reading, coding, and categorizing the literature review and interview material, there were four clear themes to be identified: Business Development, New Technologies, Innovative Individuals and Effective Processes. These themes were constant throughout the collected data and could describe all of the codes that were found describing innovation objectives. However, even though Business Development was an occurring theme and objective in the interviews, it was soon discovered in the creation of the storyline, that rather than being a supporting theme, Business Development is the overall goal and result of the framework and open innovation activities. It was brought up often in the internal

interviews, and even described how the only goal for the organization is to make money for the shareholders. Thus, as it could be extended to cover all of the other themes as well, Business Development was dropped out and the related codes were addressed under the remaining themes as applicable. This left the research with three main objectives: *New Technologies*, *Innovative Individuals*, and *Effective Processes*. Each objective and what it entails will be further developed in the following chapter, discussing about the strategies.

Below in Figure 5, there is a comparison of the weights of each theme inside individual data sets. Looking at the weights of the found objectives, we can see that most close to the innovation literature were the Startups. This is particularly interesting, as the Startups were mostly working ad-hoc and not having set-to-stone objectives, strategies, nor KPI's. Accordingly, Blank (2013, 67) described five-year strategies unnecessary for the startups, calling them mostly guesses of the unknown and a waste of time. The Startups said to only do long-term planning with investments, relating to investors, exit, and the stock markets. In the interviews, the Startups told to be "living and breathing for the sales growth" and named the objectives to be mostly on growth and new opportunities. However, when talking about their strategies and values they mostly mentioned the importance of their innovative individuals and being nimble enough to effectively process the new opportunities. The competitiveness was achieved through giving their employees trust, opportunities to express their innovativeness, motivating them, and communicating openly with them and their networks. Their strength was seen to be in their people and being able to quickly and actively collect customer feedback to fail fast and pivot for the best outcomes. The importance of entrepreneurial orientation (e.g., Hult et al., 2004; Hung & Chiang, 2010; Miller, D. & Friesen, 1982), innovation culture (e.g., Dobni, 2008; Docherty, 2006), and lean startup processes (e.g., Blank, 2013; Ries, 2011) were also highlighted in the literature. It was also often noted in the Startup interviews, as well as by the R&D, that the lean process is what is needed to support the innovation culture, and the culture and processes are needed to support the creation of new technologies.

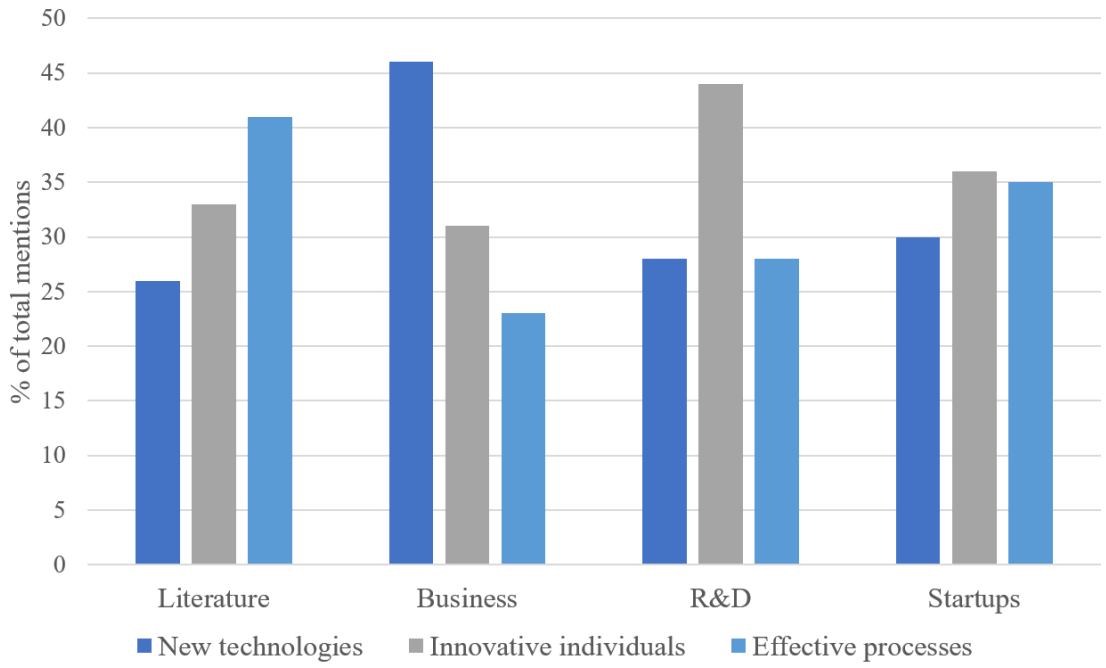

Figure 5: The weight of objectives between the data categories

The focus of the Business owners was mostly strictly on the technologies, and how these new ideas will create new, more effective services, products, and processes. Examples of the literature describing technology related objectives in line with the Businesses, included expanding the corporate's technologies and markets (Leiponen & Helfat, 2010, 288; Pinkow & Iversen, 2020, 13) by exploring new trends and finding new opportunities, increasing the technological readiness at the core (De la Fuente et al., 2021, 17), improving quality, and expanding and updating the offering (Leiponen & Helfat, 2010, 288). The Businesses also placed value on constant customer feedback, which made the weight of Innovative people - theme appear higher, but very rarely mentioned interest towards where the ideas come from and how. Then again, the R&D was much more focused on fostering innovation culture and human capabilities. Some examples of Innovative individuals in the literature include, e.g., complementing the ecosystems (Pinkow & Iversen, 2020, 13), motivating the individuals, improving their performance, and supporting their learning, communicating, and coordinating inside and outside the team, and reducing uncertainties (Chiesa et al., 2009, 493-494). The Businesses didn't mention too many times about the processes, but R&D was bringing out the need to find ways to process the ideas more effectively and accurately, bringing out the importance of processes as well. Interestingly, effective processes were the

most repetitive theme in the literature, showing up e.g., as reducing R&D development costs, times, and risks, minimizing overlapping development, improving technology transfer and surveillance (De la Fuente et al., 2021, 17), producing flexibly, reducing the use of materials and resources, fulfilling regulation and standards, (Leiponen & Helfat, 2010, 288), as well as process milestones and requirements (Chiesa et al., 2009, 493-494).

Generally, talking about objectives was deemed difficult and many of the responses were related to very topical trends that the interviewees are following rather than strategic objectives they have for their work. The differences between the interests of the Businesses and R&D were not very surprising considering the roles of Business owners and R&D managers in the innovation pipeline, as R&D people are responsible for the planning and execution, where Businesses are more involved when the idea is ready to be sold to the customers. However, the ultimate goal with the R&D as well as with the Business was on increasing market coverage, business growth, and improved offering. The literature also brough up the objectives of strengthening the ongoing strategy (Pinkow & Iversen, 2020, 13) and responding to demands of the customer, partner, and public (De la Fuente et al., 2021, 17). The found objectives were greatly hand in hand with the Case company's official strategy: the main strategic pillars in the strategy being the customer, improved efficiency, technology innovations, responsible business, and a winning culture.

5.2 Open innovation strategies

After setting the three objectives, the data was read through and coded again to form sub-themes for the discovered main themes, meaning the objectives. The discovered sub-themes will be presented under each main objective. The risks of open innovation Enkel et al. (2009, 312) list in their study go hand in hand with the risks mentioned in the interviews: loss of knowledge, loss of control, high coordination costs, and higher complexity. Furthermore, the listed internal barriers are seen in reality as well: it is difficult to find the right partners, balancing daily business and open innovation activities, and finding sufficient time and financial resources (Enkel et al., 2009, 312). Then again, some of the key structures for innovation are the learning, market, and entrepreneurial orientations (Hult et al., 2004, 429), where the key competencies in the realization of superior innovation performance are the innovativeness of the organization, and their technological, strategic, and product

development competencies (Vicente et al., 2015, 30). To foster innovativeness, the organization must have an environment valuing innovative individuals and culture, giving support for market orientation and entrepreneurial orientation (Hult et al., 2004, 436). These risks and needs were all recurrent themes in all the interviews. Revolving around finding solutions for the discovered issues, as well as leading the work towards the found needs and set objectives, accordingly, there were eight visible strategies to be derived:

1. Improve, expand & renew technologies & services for increased technological readiness & growth.
2. Explore & exploit new business opportunities for sustainable competitive advantages.
3. Create new knowledge & capabilities through carefully chosen complementary partnerships.
4. Be a valued member in relevant open innovation networks & communities.
5. Manage effective internal & external communications through accessible & transparent dialogue.
6. Support innovation culture by recognizing, supporting & involving intrapreneurs.
7. Systemise idea implementation to explore & exploit new technologies with improved performance.
8. Manage purposive design of openness for quick & constant feedback.

The following chapters are set according to the found objectives, detailing all of them with found sub-themes. Every strategy will be justified one at a time.

5.2.1 New technologies

Innovation, research, and development are requirements for growth and profit in today's technology and manufacturing (Yu et al., 2012, 933). And as growth and profit were the

ultimate objectives, there needs to be focus on the research and development of new innovative technologies. There were two main sub-themes discovered from the coded data for the New technologies. On the other hand, there was a need to constantly *improve, expand, and renew the existing technologies and services* the Case company has in order to keep up a steady growth and a certain level of technological readiness, which were also highlighted in the literature (e.g., De la Fuente et al., 2021; Leiponen & Helfat, 2010; Pinkow & Iversen, 2020). This was one of the most occurrent themes when asking about innovation goals and strategies, and also the easiest answer coming right from the shelf. Some of the replies include improving quality, cost efficiency, renewing and unifying the offering, scalability, performance guarantee as well as custom products and services. These were seen as the basic requirements in keeping up the competitiveness. However, it was labelled by one R&D interviewee, that one of the first steps needed to keep up the competitiveness, was to understand, communicate, and improve the company spearheads that differentiate the company from competition. Accordingly, Teece (2007, 1319-1320) discussed how sustainable advantages requires ownership of knowledge and assets that are difficult to replicate. Many were also highlighting the need to keep up the quantity and quality of the ideas, saying e.g., that "one good idea only lasts so far" bringing the focus to the need for constant innovation. Thus, the company also needs to be exploring and exploiting new business opportunities beyond their existing businesses. To keep up the competitiveness and market leader position, there was a largely recognized need to *bring in more radical and unique ideas in order to create more sustainable competitive advantages*.

Radical innovations are required to keep up with the constantly rising competition (Hamel, 1996; Weiblen & Chesbrough, 2015, 67), creating sustainable advantages and better competitive positioning (Dobni, 2008, 555). And sure enough, every interviewee did bring up the need for more radical innovations. The importance of corporate strategies and open innovation have been emphasized in the creation of radical innovations (Kennedy et al., 2017, 722), and the importance of startups in bringing in radical ideas was mostly acknowledged by the interviewees. Even researchers often struggle with distinguishing between incremental and radical innovation (Dangelico, 2016, 574), but in the Case company it was often said to involve changes in the existing business models, or entirely new ones, creating a transition in the markets and customer behaviour benefitting the company's own business, and being brave enough to go beyond the set corporate strategies. However, the interviewees did also identify how difficult it is to bring in radical innovations

into a corporate setting. As a precondition of business performance, innovativeness is needed in creating these successful sustainable competitive advantages (Hult et al., 2004, 436). Furthermore, it is the reality that in the rising need for radical innovations, organizations require external insights to enhance their innovativeness (Kennedy et al., 2017, 713), which brings us to the second objective, Innovative individuals.

5.2.2 Innovative individuals

In the end, people are the most crucial resource for ideas and innovation in every organization (Bilichenko et al., 2022, 1). Thus, to be able to bring in new technologies, there is a need for innovative, entrepreneurial individuals. This was acknowledged by every interviewee on some level. These individuals need to be found from inside the company, but as the need for innovation and radicality rises, the organization must also be looking for these innovative capabilities from outside their organization. To identify, reach, and benefit of these innovators, a good communication strategy is needed.

Collaboration with partners that complement your technological weak spots is critical for successful R&D (Prashantham, 2021, 124; Yoon & Song, 2014, 1069) and for sustaining competitive advantages and long-term growth (Fetterhoff & Voelkel, 2006, 14). It was recognized in the internal interviews that open innovation is beneficial when the company wants or needs to create something that they cannot, for a reason or another, create themselves. Thus, there was a need to find partners that are complementary to the company's own capabilities in creating new knowledge and ideas. Some of the most important reasons for startup collaboration that got mentioned were to get past the slowness and bureaucracy of internal idea development processes, and the need to get knowledge over the future technologies and new markets that the case company doesn't hold. However, it was especially important in the Business owners' opinions to make sure that the partners are carefully chosen to manage the risks of open innovation, and the risks they saw coming from the underlying differences of startups and corporations, such as the startups' capability to cover large markets in a quick phase, global service reliability, and continuation in their activities. Sure enough, the literature agrees that a poor partner selection can lead to great damage (Nijssen et al., 2001, 222), which is why selecting the partners must be a process rather than an event (Slowinski et al., 1993, 22). Thus, *creating new knowledge &*

capabilities through carefully chosen complementary partnerships was formed as one of the strategies. Furthermore, bringing in more startup partners to the ecosystem has been set as one of the two main requirements for the continuation of the OI team.

An open strategy is to create competitive advantages from innovation ecosystems, networks, and communities (Chesbrough, Henry W. & Appleyard, 2007, 58). Open innovation communities are a strategic motivation for organizations to benefit from the communities' role in creating, shaping, and disseminating innovations (West & Lakhani, 2008, 223-225). Participating in such communities is a decision of economics, leverage, and flexibility, but the strategy of participation depends on the community's technical edge and history (Germonprez & Warner, 2013, 49). To be able to innovate and work in such communities requires organizational learning to better understand the needs and the community (Brown, J. S. & Duguid, 1991, 54-55). When an organization engages with an open innovation community, it is necessary to show deference to the community as well as learned consideration on the participation (Germonprez & Warner, 2013, 49). The importance of networks and communities was brought up in the R&D interviews as a tool to prepare for upcoming, unforeseen problems and to gain knowledge. Building an innovation ecosystem was also one of the identified main goals for R&D for the coming years, but for example, the Businesses barely mentioned the importance ecosystems and communities. However, the importance of networks was largely highlighted by Startups, as they often brought up the community and network value in getting to know the right people, learning about the business environment, and getting new ideas to development. The open innovation strategy should contain the plan of the open innovation network and how it is built and used (Huston & Sakkab, 2006, 62-63). Thus, it is important to pay attention to finding the networks that are most relevant to the current needs, and to make sure that the *value is flowing both ways to get the most out of the chosen networks.*

To be able to create real value, the collaboration needs to be accessible and transparent, have the infrastructure for dialog, and understand the risks-benefits of the value creation (Paulose & Nair, 2015, 13). As there are many pitfalls for startup-corporate collaboration, (e.g., Prashantham & Birkinshaw, 2008; Vossen, 1998; Weiblen & Chesbrough, 2015) the importance of more open information flow between the parties is highlighted (Enkel et al., 2005, 204). Furthermore, communication and trust issues are some of the biggest reasons for inefficient startup-corporate collaboration, rising from the partners' differences in

procedures, norms, traditions, and language (Christensen et al., 2005, 1546). The importance of communications was deemed as one of the key issues in open innovation activities both in literature and in the interviews. Good, transparent communications was widely recognized as the baseline for fruitful collaborations, although not easy to organize. As the role of the OI team is to be the mediator between the businesses and startups, the communications was deemed as the baseline task for the team. In a big corporation, the communications were recognized to be hindered by bureaucracy and huge internal constructs. Furthermore, the Startups mentioned to struggle getting enough room to jointly negotiate about the needs, wants, and risks of the potential collaboration with corporations. Thus, there needs to be a set strategy for *effective internal & external communications, making the dialogues easily accessible and transparent*. The R&D interviews further highlighted the importance of exploratory, positive discussions, and being active towards the Businesses, where the Businesses highlighted the need to better stay on top of what is happening inside the R&D and OI team. Furthermore, the key for successful open innovation from the Startups point of view was to openly communicate on the demands for manageable co-operation, such as development resources, quick piloting, and commitment, on the main differences between the partners, and what counts as a successful result.

Entrepreneurship inside a corporation means the capability to better and faster to sense, understand, seize, and put together opportunities (Teece, 2007, 1346). Prashantham (2021, 123) highlights the importance of supporting organization's intrapreneurship in innovation work as compliment to the open innovation activities with external parties. The meaning of innovation culture was also brought up in the R&D interviews as one of the main goals for their work and is recognised as a big part of open innovation activities inside the Case company. Entrepreneurial orientation is needed in successful open innovation (Hung & Chiang, 2010, 268-269) meaning the proactiveness, innovativeness, and risk-taking abilities of the organization (Miller, D. & Friesen, 1982). Risk-taking ability was also mentioned in the interviews as something that corporations lack but is necessary for open innovation activities. It was also deemed crucial in the Startup interviews to foster the innovation culture, and to find, support, and encourage the employees, as well as to keep them satisfied with the possibilities to explore and test their ideas and ambitions because they might not be able to compensate with a very competitive salary. Although the Businesses didn't mention the innovation culture or innovative people per se, they did bring out the need for themselves to be "visionary, to see far ahead and challenge everything you know" to be able to evaluate

ideas presented to them. The OI team is already recognizing and supporting intrapreneurs to some extent, currently mostly by focusing on providing an intrapreneurial learning program. This internal asset, *the innovation culture, must be further recognized, supported, and involved in the open innovation activities* to create a more suitable environment for open innovation and entrepreneurial orientation.

5.2.3 Effective processes

Innovativeness needs effective processes and systems that can lead to stronger business performance (Dobni, 2008, 543). For the OI team to be able to bring in new technologies or use the innovative individuals' capabilities, there needs to be effective processes to get any ideas from the opportunity recognition phase to implementation. As it currently takes too much time, this is the second main requirement for the OI team's continuation: to *systemise idea implementation to explore & exploit new technologies with improved performance*. This requires building dynamic capabilities, which mean the company's processes and their ability to manipulate resources into value matching or changing the markets, as well as their evolvement through learning (Eisenhardt & Martin, 2000, 1107). It requires to enable the creation, deployment, and protection of the intangible and tangible assets supporting the long-term business performance, as well as having capacity to find and react to found opportunities and threats (Teece, 2007, 1319-1320). These capabilities have been proven to help with open innovation (Pihlajamaa, 2023, 3). This was also recognized as a clear cause of frustration inside all of the interview groups: Businesses want solutions quicker and more efficiently, bureaucratic and inefficient R&D processes have been noticed to discourage intrapreneurs all the way to leaving the company, and Startups were frustrated by the corporations not matching their time sensitivity, as well as incapability to get to prove their idea value because of complicated testing, unwillingness to match the required resources needed for idea development, and overcomplicated processes. The processes must be set to positively affect the integration of external knowledge (Saebi & Foss, 2015, 210). One of the Startups said that "if you struggle with productization, you radically reduce the possibility to come up with new ideas on top of the first one". Thus, there is a clear need to create structure for the idea implementation to be more agile in exploring and exploiting new opportunities.

As the involvement of customers from along the value chain in the innovation processes is both necessary and advantageous (Enkel et al., 2005, 203), the value of customer feedback must be taken into account. Direct customer demand and positive feedback were also widely recognized in the internal interviews as the best ways to get an idea to production. However, it was often brought up, that getting an access to customers is very difficult, which naturally creates more value for frontline feedback. Brunswicker & Chesbrough (2018, 44) suggest creating a purposive design of openness for the open innovation processes. Startups use an approach called customer development in testing out their hypotheses by going directly to the customers and other members of the value chain for feedback on their business model in the pricing, features, distribution etc (Blank, 2013, 67), which was also highlighted in the Startup interviews. The interviewed Startups largely based their idea development to quick and constant customer feedback. This allowed them to practice the agile startup ideal to be able to fail fast, do quick pivoting, and fast releases. Strategic open innovation is a largely methodical process enhancing learning by doing, which means having to keep focus on what works and discarding what doesn't (Huston & Sakkab, 2006, 66). The ability to learn quickly and fail fast helps in successful innovation as the environment is filled with unknowns (Docherty, 2006, 15-17). It was also brought up in both R&D and Startup interviews, that corporations should be better at recognizing failure as a learning point, as it will help the corporations to be more risk taking which is needed in open innovation and radical innovations. Thus, both negative and positive feedback is necessary for open innovation, to be able to catch mistakes early enough, notice the real value of the idea, and what still needs more work. This helps in creating more valuable innovations, lessens the risks, and helps to learn. Thus, the OI team must *create a purposive design of openness to have an access for quick & constant feedback* in the idea development process.

5.3 Open innovation KPI's

Forming the KPI's was proven to be more difficult than expected. There were many suggestions from the literature on what to measure and what kind of goals to set, but many of them were deemed unfit for the case due to being out of the OI team's hands or impossible to measure in reality. Thus, after re-coding all the data, the results had to be more heavily amended to the case reality. As an effective measurement system needs to consider the

objectiveness of the measures and be easy enough to follow (Brown, M. G. & Svenson, 1998, 33-34), the end-results were workshopped with the OI team to make sure that they are realistic and actionable. Brown and Svenson (1998, 35) suggest to set project measures to be weighted to have value of 40% to costs, 20% for productivity, 20% for timing, and 20% for quality. The progress KPI's are set close to this suggestion, but by replacing large part of the timing measurements with qualitative ones due to the nature of the projects.

Talking about the KPI's in the interviews often led to a talk about how to evaluate if an idea is good or not rather than evaluating the bigger picture of innovation. It was also noticed that many of the existing KPI's were project based goals, mostly regarding time. Furthermore, the value of KPI's in innovation was even questioned by the interviewees. R&D interviewees were in dispute of qualitative KPI's, some saying that qualitative KPI's are unacceptable, while some said that quantitative KPI's make no sense with innovation due to the intangible, indefinite nature. It was questioned whether it even makes sense to set measures for innovation and if the KPI's should only focus on measuring processes. Businesses, however, wanted to hear KPI's to better evaluate the value added of the budget they are providing, but merely focused on KPI's of the created monetary value which is not realistic for the OI team to execute as at the point of making revenue the innovation is already out of the OI team's hands and at the Businesses responsibility. Startup CEO's with corporate backgrounds had brought some KPI's to the startups with them, eventually discarding them from use as "a waste of time". They provided basic KPI's for investors and the Board if requested (or existing), but mostly relied on transparently communicating on investments, milestones, business growth, product functionality, and customer satisfaction in evaluating their success. Next, all the created KPI's will be presented and reasoned under own chapters for long-term and progress KPI's. There will be KPI's set for both inputs and outputs of innovation (Edquist & Zabala-Iturriagagoitia, 2015, 37), and costs, outcomes, quality, and quantity of the inputs (Brown, M. G. & Svenson, 1998, 34).

5.3.1 Long-term KPI's

Estimated growth in efficiency / resources saved. The first KPI was set to follow how the new technologies have throughout time grown the efficiency of the company or the customers or helped in saving resources. This tells about the value of the found opportunities

and new technologies, and thus also about the value of the open innovation work. It is in line with Businesses' requirement of knowing how the idea is working, as well as the profitability and growth that the idea is creating. The KPI is focused on the efficiency and saved resources as they are more realistic to estimate than measuring the amount of money that the idea has made. Even though the "created revenue" is requested in the Business interviews and in literature, it was not deemed as a reliable measure as most often the idea is only part of enhancing, expanding, or renewing an existing product or a service, making the estimated monetary value of the idea realized only after some years of development and sales.

Hit rate of discovered opportunities. The number of introduced opportunities is one of the most usual KPI's for open innovation performance (Brunswicker & Chesbrough, 2018, 42), but as measuring a number can be directing motivation and interest to quantity over quality, it was deemed more important to measure the quality of the found opportunities. This means measuring the number of the ideas that got a budget, and/or eventually got implemented in relation to all the opportunities introduced to the businesses. This is of course to prove how well the real business problems were identified, and how well the opportunities were brought up to the businesses. This tool is mostly to prove the effectiveness of the OI team but is of course affected by matters that are out of the team's hands, such as tighter budgeting for the ideas due to e.g., bigger organizational changes, economic events, or turbulence in the environment.

Radicality and uniqueness of the opportunities. Horibe (2016, 7) describes, that an idea must be creative and implemented to be an innovation, and that for the innovation to be competitive, it must be non-obvious and non-incremental. Furthermore, as the radical innovations were identified by all interviewees as critical in keeping the market leader position and gaining sustainable competitive advantages, it is important to try to evaluate the radicality or uniqueness of the opportunities recognized and/or brought in for testing and use. As the interviewees deemed radical innovations to be changing the business models, creating market transitions, and going beyond corporate strategies, this KPI is set to evaluate these aspects in the creation of business opportunities. Another way to evaluate uniqueness is by evaluating if the idea is leading to a structural change, or a structural upgrade (Janger et al., 2017, 38-40).

# of new partners. It was one of the main requirements from the CTO to the OI team to grow the amount of open innovation partners brought in. Thus, it was taken as one of the long-

term measures. It is a good way to prove how much the open innovation activities have grown through time, also implicating about the effectiveness of the OI activities. Of course, only the amount of partners does not tell anything about the quality of the projects, which is why it must be considered in relation to the qualitative measures of open innovation.

Value added of OI. Horibe (2016, 6) points out that evaluating open innovation success is not about the number of good ideas but being able to make value out of them. This was mentioned in every interview set by saying how the number of ideas has never been an issue but knowing what to do with them and having the resources and knowhow to turn the ideas into value. Furthermore, showing value orientation is a good way to enhance the organization's innovation culture (Dobni, 2008, 546-549). This KPI is not only important in showcasing the value of the new technologies, but also the value of found partnerships and networks. The R&D said to be following it by evaluating the investments into innovation activities in relation to the company growth. Naturally, if the innovation input is much higher than the output, it means that there is a low efficiency in the innovation performance (Edquist & Zabala-Iturriagagoitia, 2015, 7). It is a good way to answer to the Businesses ask about the profitability and cost reductions through time.

% of knowledge inflow & outflow. The knowledge flow should be managed in a purposeful and selective manner (Brunswicker & Chesbrough, 2018, 44). Measuring the capability to create knowledge, also called as the open innovation throughput, is suggested as a measure on top of the innovation outcomes (Janger et al., 2017, 38-40). The percentage of outflow and inflow of knowledge is a strategic measure supporting open innovation (Brunswicker & Chesbrough, 2018, 37-42). Following the knowledge flows to and from the networks helps to make sure that the value received keeps being higher or equal to the costs. Thus, estimating the % of knowledge inflow and outflow can help in recognizing the most valuable networks. Of course, evaluation of knowledge flows is dependent on the person doing the evaluation, but if it is done systematically by sharing the learned knowledge within the OI team and making the evaluation as a team, the reliability of the evaluations can be increased.

# of outreaches to the OI team. As one of the main goals of the OI team is still to get better recognition inside and outside the company, and to improve their communications strategy, following up the outreaches towards the team is an easy way to measure the communications impact. It tells how many people have been reached, and how valuable the message has been. Startups often find identifying and reaching the relevant people inside corporations difficult

(Prashantham & Yip, 2017, 51), which further highlights the need for good communications and following its success. Of course, all the outreaches might not count as directly valuable, but it is always an opportunity to evaluate if the message has been misunderstood or not reaching the right people, but also a chance to spread the message to the "right people" through word-of-mouth references if done well.

% of resources focused on innovation culture. The internal idea exchange is equally important for open innovation as external (Huston & Sakkab, 2006, 66), which is why the internal innovation culture must be supported. The innovation culture is already measured by the R&D team by following the number of people submitting new ideas, taking part in different innovation programs, the location of the participants etc. However, as the OI team is its separate entity, it also fosters the innovation culture and intrapreneurship on its own account. Developing and educating the intrapreneurs was deemed important goals for innovation culture, and currently, it is fostered by the OI team through a learning program. However, as there has been active talk about other possibilities for it as well, at this point, it would be most suitable to measure the % of resources that the team is using to foster the innovation culture, let it be money or time. Of course, it does not alone tell about the value of the activities, but with the support of some qualitative progress KPI's described later, it can give room to evaluate the costs versus value of the executed actions towards intrapreneurs.

Time from opportunity identification to implementation. Measuring the efficiency of the innovation system is a good way to evaluate innovation performance (Edquist & Zabala-Iturriagagoitia, 2015, 37), and reducing the innovation development time is an important open innovation objective (De la Fuente et al., 2021, 17). As the second requirement for the OI team's continuation was to shorten the time of the open innovation projects, there needs to be a measure to showcase the time from opportunity identification to implementation. It is to prove that there is value over internal innovation by being able to bring in innovations faster, and to show that the processes have been made leaner. Following project times with a KPI is also a usual way to prove how the set budgets are met (Sutanto et al., 2021, 16-17).

The depth/intensity of contacts. Following the suggestion of Brunswicker and Chesbrough (2018, 36) over the two most used measures of open innovation, the two last long-term KPI's will be accordingly the number of accessed sources, and depth or the intensity of interaction. As startups recognized the value of feedback, they quickly changed their strategy from a

more closed and secretive stealth-mode to a more open one (Blank, 2013, 68). This value of feedback was also largely evident in the Startup interviews and the R&D said to use internal people to challenge their ideas and ways of working every now and then to see if they still make sense. The value of openness and feedback must also be brought more intensively to the OI team's strategy. By better recognizing the intensity of the partnerships and other connections could help to create a more efficient and qualitative way of collecting valuable feedback throughout the idea development process. Understanding the intensity of the contact would also help in deciding about the level of sharing and way of communications. However, there needs to be a jointly agreed way of evaluating and agreeing on the intensity inside the team, with for example, a levelled stakeholder map.

# of internals & externals accessed. One of the key requirements for innovation is to have people who have rigorous understanding of the solution and technology to understand how it fits to problem, contributes to the wanted outcome, and is available for the user (Fetterhoff & Voelkel, 2006, 15). Thus, it is important to have feedback from a wide range of professionals when bringing in ideas. To have an access and connection with different internal and external people is a great source for valuable feedback, and directly in line with Brunswicker's and Chesbrough's (2018, 36) measure to recognize the value of openness. This "network" of internals and externals provides different channels capture new ideas, and identify new customer needs and requirements by giving a voice to different, valuable stakeholders, which was also highlighted by both Businesses and the R&D.

5.3.2 Progress KPI's

Evaluating the efficiency and effectiveness is a classical way to prove value, showing the quality, time, and cost of projects (Meier et al., 2013, 99). These are all taken into account in the progress KPI's, to help in communicating the team's value, and seeing what has worked and what has not worked over time. These are also the basic measures demanded by the Businesses when providing idea suggestions and updates, but also supporting the set long-term KPI's.

 # customer problems identified. A customer need is the first requirement for innovation (Fetterhoff & Voelkel, 2006, 15). As a part of the customer development approach startups

use in testing out their hypotheses, (Blank, 2013, 67), they need to constantly optimize the fit of the solution to the problem (Giardino et al., 2014, 29). It was also widely recognized in the internal interviews, that things get done faster in regards to innovation if there is a clear customer problem identified, no matter if it was an internal or external customer. Although getting an access to the end-customers was deemed difficult inside the Case company, they were collecting customer problems and values from the internal front-line workers. Understanding the customer problems helps in creating clear business challenges and focusing the ideas to right, valuable things. Working in close contact with the customer was also the primary way for the Startups to develop their ideas.

# of PoC's and pilots, *Total yearly budget* & *Cost of the project.* To get validation for an idea, there needs to be a PoC or a pilot to prove the value of it. This was mentioned by almost every interviewee internally and externally, highlighting the need for quick piloting to have a chance to quickly move forward or fail fast with the proven results. However, as the OI team cannot continue to PoC's and piloting without getting a budget from the Businesses, it is also important to measure the total yearly budget. The granted budget helps to evaluate how much value the Businesses evaluated for the opportunities by taking them to PoC's and pilots, and finally to agreement creation. As projects are usually run with a defined budget, project cost is a usual KPI to follow (Sutanto et al., 2021, 16-17). If the budget shows the value of the idea predicted by Businesses, measuring the project costs in relation to the given value helps in evaluating the total added value of the OI team's work. Furthermore, evaluating the costs of the projects over time can indicate about the growth in efficiency of the projects and project management. Measuring the total expenditures and project investments is a good strategic measure of open innovation (Brunswicker & Chesbrough, 2018, 37-42). These three KPI's were also identified as the basic things required by the Businesses in reporting about the created value for their money.

New markets or business models accessed & *# new trends and markets explored.* Exploring new trends and market demands (De la Fuente et al., 2021, 17), as well as entering new markets and increasing the market share are typical open innovation objectives (Leiponen & Helfat, 2010, 288). As evaluating the radicalness and uniqueness of ideas was deemed difficult, and actually getting them through to a launch even much more difficult, the most suitable measure for the OI team was to keep a look on the activities that can lead to finding radical innovations. This means the new learnings, partners, and networks leading to the

access of new markets or business models and to the number of new trends and markets explored. This helps to show how much resources have been used to look out for new radical or unique ideas, even though they might not have led all the way to implementation as such. Furthermore, as an indication of market orientation, these KPI's are also good way measure the innovation culture (Dobni, 2008, 546-549).

Customer/partner satisfaction/dissatisfaction. Customer satisfaction is one of the most used metrics in evaluating open innovation performance (Brunswicker & Chesbrough, 2018, 42). Furthermore, as startups often end up disappointed in corporate collaboration (Prashantham & Birkinshaw, 2008, 6-7), evaluating the startup partners' and customers' satisfaction tells a lot about the success of the communications, openness, expectation management, and processes. However, as was noticed from the Startup interviews, you should also involve the evaluations of the feelings you or your frontline have noticed from the partner/customer behaviour and communications. It was notified in the interviews, that being happy with your provider or partner makes it much easier to co-create value and bounce back from minor mistakes, whereas noticing dissatisfaction helps to make a correction to your activities and improve. The startups noted, that often it is enough to sit down with the partner or the customer, and to ask what they need and promise to act on it way or another.

The appropriateness of risk analysis & *The value of feedback (fail fast/pivot/launch).* It was noted by a Startup, that people with less risk tolerance tend to apply to corporations. This was visible in the way the interviewees talked about risk: Startups talked about risk as something that is part of creating success, whereas the corporate interviewees merely talked about avoiding risks. Thus, evaluating the appropriateness of the risks analysis helps to evaluate what is acceptable risk, what is the real loss from the evaluated risks, and how many of the risks actually come to reality. This would help in communicating about the risks of open innovation to the Businesses, who were very cautious about these risks. Accordingly, Brunswicker & Chesbrough (2018, 44) discussed that the corporations' view the costs and risks of open innovation much greater than the anticipated value. The Startups highlighted the need to hold higher value for the learnings from a failure rather than only looking at the risks of it. Docherty (2006, 15-17) also discussed about the need to adapt to the organization's risk tolerance level and focus on learnings rather than just the results. By adopting the lean-startup methodologies of failing fast, continuous learning, and constant customer feedback to quickly pivot, if necessary, and create the minimum viable product,

the corporations can better stay on top of the innovation environment (Blank, 2013, 66). This can be done if the OI team can get enough valuable feedback from the internal and external sources. Thus, as a way to lessen the risks, there needs to be a way to evaluate where the received feedback is leading to; was it valuable enough to make a faster launch as such or through a pivot, or was it cut short to allow the time allocation to more potential ideas and projects. This enhances the meaning of learning from failure rather than the risks from it.

# of invitations to key roles in community events & *Value of learnings from the community events*. Open innovation is about creating network synergies by crossing boundaries in and across various communities of collaboration, which are all about conversations (de Moor & Aakhus, 2013, 17-18). Accordingly, Prashantham (2021, 124) recognises the need to evaluate the networks' collaborative potential through the orchestration and dialog of the networks. Thus, in evaluating the network synergies and the knowledge flows, there should be an attempt to measure the value of the conversations even deeper. It is suggested, that after each event had within the network, the OI team should take a moment to evaluate the value of the event: did the team get valuable new connections, did it lead to a new discovered opportunity, did the team figure out something that made the processes or communications easier for them etc. If there seems to be no or little value from the events, the importance of the network should be reconsidered to see if those resources should be used towards another network or the strategy inside the network changed. As a subjective measure, it brings more reliability to the KPI to make the evaluations as a team. A good way to measure the team's value in the networks would be by comparing the number of invitations to key roles in these events, which shows trust and appreciation towards the team as a member of the network. It also gives value to the team as they have been given a chance to get more visibility, and thus adds to the value evaluation of the network. It also shows whether the team's communications, openness, and activeness are paying off or if it needs some improvements.

# of reached intrapreneurs & *frustration/satisfaction of intrapreneurs.* To better get value from the human capital inside organization, the right innovation conscious people must be found, supported, and motivative to allow them to thrive (Bilichenko et al., 2022, 1). As the capacity to creative thinking is divided across the organization, it is important to involve many different people in the development (Hamel, 1996). Furthermore, empowerment of the intrapreneurs is a good measure of innovation culture (Dobni, 2008, 546-549). The success of internal communications and of the actions towards the innovation culture can be

measured by the number of intrapreneurs that have been identified and reached out. This can, at easiest, mean the number of people graduating from the intrapreneurial learning program mentioned earlier, but also the number of internal creative and passionate people who are identified as part of the network when looking for the internal experts' help in validating, testing, and developing new ideas. Being able to evaluate the frustration and satisfaction of the reached intrapreneurs also helps to estimate how much the OI team has managed to support and recognize them and how the team managed to make the processes and environment easier for their idea development as well. This is to show the success of the innovation culture strategy and communications, but also a way to communicate about the value of said actions.

# of projects in different project gates & *% of pull & push*. To address the market uncertainties and fast changes in the customer needs, startups need opportunistically tailored minimal processes to cut the lead-times for short-term objectives and fast-paced learning (Giardino et al., 2014, 29). This agile development eliminates waste of time and resources (Blank, 2013, 68) and gives flexibility to the product development to quick releases and results (Coleman & O'Connor, 2008, 645). This was also evident in the Startup interviews, as they were doing idea development very ad-hoc, getting the ideas out to customers' use in as short time as only few days. Setting a flow of open innovation will help in recognizing and guiding the projects through the most important process steps from discovery to market launch (Huston & Sakkab, 2006, 64-66). Identifying these steps helps to follow the process criteria, outputs, and the deliverables, or inputs, each gate requires (Grönlund et al., 2010,109). Each stage of an innovation process can create unique value in the opportunity creation, but also shows the responsibilities and challenges of each stage (Fetterhoff & Voelkel, 2006, 16). The OI team has identified the main step gates in their open innovation flow and uses a tool to follow all the found opportunities at each gate. This data helps to identify the bottlenecks of the innovation flow and the stages in need of more attention. This same tool is used to track the amount of projects brought in by a Business owner request, meaning the pull method, or by more randomly coming across an interesting startup and presenting the opportunity to the Businesses, meaning the push method. Currently, most of the traffic is still coming in with the push method. However, as the goal is to improve communications and start getting more outreaches from Businesses directly, following the level of push and pull helps to see how well the communications have worked.

6 Discussion and Conclusions

In today's fast-moving markets, open innovation has become a necessity to faster and cheaper exploration and exploitation of new technologies for many organizations (Pinkow & Iversen, 2020, 2) As innovative activities are crucial for organizations' success, the managers are advised to improve and maintain continuous innovativeness in seeking for superior business performance (Hult et al., 2004, 436). However, despite living in the era of open innovation, there are still gaps in the understanding of the internal and external mechanisms on how organizations can fully profit from the open innovation concept (Enkel et al., 2009, 312). The academia has struggled with developing comparable measures for innovation outputs and outcomes, and there is a clear need for more research on them (Janger et al., 2017, 40) This complexity can also be seen in practice, not just with open innovation between two very different parties, but also with any innovation activities. As the Case company currently has close to no means of measuring nor communicating the value and development of their open innovation activities and processes, it is difficult to create a strategy for the coming years, let alone prove the value of their work. Thus, an encompassing set of carefully selected and justified KPI's for the Case company's open innovation processes would not only help in internal management and communications, but it would also help in negotiations and expectation management with the startups.

The people responsible for allocating the budget are the ones that need to be convinced about the idea's potential in order to get resources to develop the idea (Hamel, 1996). In the Case company, it means the Business owners who are not yet fully aware or convinced about the value of open innovation. Open innovation needs systematization (Grönlund et al., 2010, 117), which is still a work on progress for the OI team that has this far worked in a more ad-hoc manner. Constantly monitoring the performance of the open innovation activities is a baseline for building new innovations (Low & MacMillan, 1988, 156), and it is almost completely missing from the OI team. With a KPI framework, the research aimed to build a less rigorous model of managing, monitoring and communicating over the open innovation activities, using the reality of the case environment to identify the applicable variables and their interrelations (Teece, 2007, 1320) affecting the open innovation work. Inspired by an open innovation study by Olvera et. al (2021) the research aimed to form a KPI framework for startup collaboration in the Case company by finding and creating the objectives,

strategies, long-term KPI's and progress KPI's for the OI team's strategic management. Due to the need to have a deeper understanding of the open innovation objectives, strategies, and KPI's a qualitative content analysis was performed on the literature review and collected interview data (Cole, 1988, 53; Graneheim & Lundman, 2004, 106; Vaismoradi et al., 2016, 108). The interview data was collected by interviewing internal Business owners and Innovation managers, as well as potential Startup partners representing the three parties involved in the open innovation activities. The goal was to create a conceptual framework of the phenomenon inside the case environment (Elo & Kyngäs, 2008, 107) by creating content categories through analysing the themes and patterns found from the data (Cavanagh, 1997, 5; Zhang & Wildemuth, 2009, 1).

Objectives were set to determine the direction, success, and breadth of the OI activities performance (Leiponen & Helfat, 2010, 224-225; Srinivasan et al., 2021, 2105) and to set a baseline to what the OI activities must provide for (Velamuri et al., 2017, 502). The found objectives were New technologies, Innovative individuals, and Effective processes. A set of comprehensive strategies (Vicente et al., 2015, 41-44) were then created to enable the strategy work towards the set objectives (Hamel, 1996). The strategies were to foster openness of the activities (Christensen et al., 2005, 1547) and to explore the potential of the OI team in relation to the future and industry boundaries to harness the creative potential of the organization (Hamel, 1996). The strategies for New technologies were to keep up steady growth by improving the existing technologies (e.g., De la Fuente et al., 2021; Leiponen & Helfat, 2010; Pinkow & Iversen, 2020), and to bring in completely new unique opportunities for competitive advantages (e.g., Dobni, 2008). Innovative individuals needed strategies to create new knowledge from complementary partners (e.g., Prashantham, 2021; Yoon & Song, 2014) and valuable networks (e.g., Chesbrough, Henry W. & Appleyard, 2007), as well as enhancing the innovation culture (e.g., Hult et al., 2004) and openness of communications (e.g., Paulose & Nair, 2015). Strategizing the process effectiveness requires constant feedback (e.g., Brunswicker & Chesbrough, 2018) and systemized processes to get the ideas implemented quicker and with better quality (e.g., Dobni, 2008; Edquist & Zabala-Iturriagagoitia, 2015).

Lastly, KPI's were set to put focus on the most valuable outputs and outcomes of the activities (Sutanto et al., 2021, 14), here to see that the set strategies were executed. Based on comparison of past and current data, the KPI's help in monitoring the efficiency and

effectiveness of activities (Meier et al., 2013, 99) and to further see what must be done to improve the OI team's performance (AlRababah, 2017, 80). Altogether eleven qualitative and quantitative long-term KPI's were set to follow the execution of the strategies, supported by fifteen KPI's following the progress of the activities leading to the efficiency and effectiveness of the long-term KPI's. However, as an effective measurement system needs to be easy enough to follow (Brown, M. G. & Svenson, 1998, 33-34), the OI team was advised to only use five most valuable metrics as management KPI's for a quick overlook of the situation and easy communications of value. The other KPI's are better for the team's own operational monitoring and be taken to use once the strategies and processes have been set up and running. The KPI's are good at illustrating the processes and structures of the OI activities (AlRababah, 2017, 80), as well as simplifying the complexities of it and helping to communicate more transparently (Meier et al., 2013, 100).

6.1 Discussion

Although having the goal of forming KPI's, the greatest value of the research was deemed to be the improved understanding of the main functionalities of open innovation inside the Case company, and what is needed for the comprehensive management of it. Although realizing the importance of networks, communications, and processes, the OI team was still thinking about startup collaboration as their core functionality. The framework makes it easier to understand all that is needed from the OI team to support effective open innovation processes and makes it easier to present the value of all the open innovation activities to the stakeholders. Furthermore, the interviews and literature review helped to understand some of the underlying issues and contradictions in the Case company's open innovation environment and has given ideas on how to start addressing them. It also helped to understand the startup point of view in collaboration, and how to organize those projects more effectively both internally and externally.

One of the discovered issues was that the idea development inside the case company relied so heavily on the customer demand. Although the importance of solving customer issues, whether internal or external customers, is widely recognized and agreed as the starting point for idea development, fulfilling it is quite challenging when the access to the customers is made nearly impossible. Furthermore, as was brought up in the interviews, creating value

for customer problems is not easy as the customers do not always know what they want. Furthermore, the Businesses as the intermediators between customer needs and Innovation managers do not either always know what they want. This brings out the necessity of being able to demonstrate the value of the idea with a PoC or a pilot, but as the demo itself requires a budget from Businesses, and a budget requires customer pull, we come back to the same issue. All of this brings out a question, of how the innovation teams can bring out radical ideas, if they cannot get an access to customer feedback, and cannot test out the value of the idea due to the lack of budget, which is again due to the lack of customer request. However, Businesses did bring out the same issue, understanding the system's difficulties and noting how acting on customer requests usually only leads to incremental innovations.

This brings us to another contradiction. The Businesses stated the need for radical innovations, furthermore they also understood the value of startups in being able to provide business opportunities for these unique, possibly radical innovations. However, the evaluation criteria for startups were not very permissive of more radical startup partnerships. The Businesses were evaluating, e.g., the struggle of needing to make changes to the business model as well the partner's capability to provide global reliability of delivery. Furthermore, they wanted the partnerships to be valid for several years after starting the collaboration and brought up the fear of the partner making an exit and so cutting the partnership short. However, considering the technology fluctuation in today's fast phased market as well as the lifecycle of today's modern technologies, it should not be even expected to be valid after several years. This requires faster movements with the new technologies as ever before and thus, only the lifecycle of these modern ideas might not rationally fulfill the requirement of profiting from the idea or partnerships for several years.

However, it must be noted, that the Case company is working in a fairly traditional market with quite conservative customers, which does give constraints for the more radical innovations. Moreover, the interviews brough out the Businesses wide understanding of the market and business environment. This knowledge should be brought to the innovation teams as well, that are currently more technically oriented. This would make the idea development much more encompassing, keeping the business problem and business potential more highly in mind as the lack of understanding over the wider business problem was deemed an issue by both the R&D team and the Businesses. It would also make it easier to see the idea in a bigger picture, as a part of the process instead of viewing it as the main

product. This issue was brought up by the Businesses, stating that changing into this more holistic way of thinking would make the evaluation of ideas more critical, and open the view to other possibilities for solving the same problem.

Lastly, it was discovered that there was still a lot of room for improvement in the communications, starting from the used terminology. The OI team already started talking about partnerships instead of open innovation noticing the ambiguous connotations towards open innovation. Furthermore, the discovered opportunities should be reported in a more cohesive manner, as it was noticed that not all of the interviewees had even realized that the OI team had presented them with external opportunities during the last months. Furthermore, as it was noticed that the Businesses hold a huge amount of silent information, the team needs to start facilitating more structured dialogues with the Business stakeholders, as well as the front lines, to get an access to the silent information. There needs to be facilitated discussions between the Businesses and the OI team to create a mutual understanding of the open innovation values, risks, and expectations. This was deemed to have much room for improvement based on the interviews.

6.2 Managerial implications

By providing directly to the organization's objectives, new suggestions of innovations have much greater chances of getting forward to development (Velamuri et al., 2017, 502). Thus, the objectives and requirements for innovation are the first things to understand in innovation management. The idea or an opportunity doesn't need to come top-down, but whoever is the organization's decision maker for budgeting the innovations must believe in the aims of open innovation both intellectually and emotionally, understanding and endorsing the change (Hamel, 1996). Thus, open and clear communications towards the decision makers is crucial for the success of open innovation practises. This research helps the open innovation managers to identify the value of understanding the organization's decision makers' objectives and requirements, and how they could be discovered and mapped out. Furthermore, the research highlights the need to openly communicate with the decision makers to also help them understand the value of open innovation. Creating a framework with the objectives, and supporting strategies is advised both as a communication tool, and as a way to understand the requirements for the open innovation environment. Qualitative

content analysis is a good research method in understanding and developing the meaning of communication (Cavanagh, 1997, 6) and can be useful in similar circumstances as depicted in the case company.

Organizations need an appropriate balance on both open innovation and internal R&D, as the openness is usually more directed to the short-term innovation success and short innovation cycles (Enkel et al., 2009, 312). Thus, it is advised to manage open innovation as supporting the internal R&D. This makes it simpler to identify the needs for complementary skills and knowledge from external sources. Furthermore, it brings out the importance of recognizing the organization's core capabilities (Prahalad & Hamel, 1990, 5; Vicente et al., 2015, 30) To better manage open innovation, it is advised to map out the open innovation environment to be able to recognize the structures supporting and complicating open innovation. This research helps open innovation managers to understand the broad scale of activities needed in open innovation management, such as the innovation culture and the designed openness for constant feedback and transparent communications, and how they support the strategic objectives. However, each organization needs to mend these topics to their specific environment, considering the structure of the open innovation team, their decision-making power, establishment inside their organization and means of executing open innovation. The research also sheds light on the importance of systematization of the open innovation management (e.g., Grönlund et al., 2010) as well as the value of setting KPI's for the management and operations (e.g., AlRababah, 2017; Meier et al., 2013)

The managers should focus on creating purposeful and selective knowledge flow management as well as open innovation process and measures, and not loose time and value with high legal IP control (Brunswicker & Chesbrough, 2018, 44). As was learned from the Startup interviews, to better accommodate to the startup's potential and ways of working, the managers must be willing to take risks and to view failure and negative feedback as learning opportunities as well as to be able to test and launch ideas quicker. Managing open innovation processes with startups requires a clear buy-in from the management to agree over the step gates that are built with straight forward testing and remuneration for achieving the goals as agreed. This allows to prove the idea's value quicker, gives the startup more security to get involved with the open innovation process and sets healthy pressure to stay on the agreed steps and results. These agreed processes make it more simple and effective for both parties, sets expectations from the beginning, and helps to realize the value-risk

assessment of the idea earlier in the process. Facilitating this kind of discussions and negotiations with startups have the potential of making the management of startup collaboration easier due to the better understanding of the partner.

The framework helps in managing the knowledge and technology transfer, as well as evaluating performance and setting goals through the process of creating objectives, strategies and KPI's (Olvera et al., 2021, 459-460). The framework and the study were deemed useful for the case company's OI team to better organize the open innovation management internally and externally, and to find the measurements best supporting their work and development. Similar research and framework can be suggested to other companies building up their open innovation management as well. Although the framework is not advised to be copied as is, mimicking the research method could yield to similar results for other case uses as well, or to take it further for more quantifiable results of open innovation KPI's and strategies. Furthermore, the literature review gives a good base for creating understanding of the strategic management of open innovation.

The suggestion for the OI team is to take the framework to use in smaller sections. The innovation objectives are now clearer, but the team should invest in hosting systematic, open discussions with the Business owners about their goals, needs, and requirements. This would also help in the team's communications agenda and make the team more known among the Business owners, thus increasing the outreaches towards the team. Furthermore, similar discussions with the frontline people would help to better understand the customer environment. It would be advised to take the framework strategies to practice as is pictured in the framework. Most of these are already practiced at some level but should be applied to use with more consideration and importance. Of course, as requested by the company management, the focus should first be on improved scouting and development of complementary partnerships and effective idea processing. However, to support that, the work should be more holistic, involving a strategy on building purposive design of openness as well as internal and external communications. The startup scouting should be braver in considering more radical ideas as well, and better use the internal experts and creative people in the idea evaluation and development. Furthermore, the value of existing networks and communities should be evaluated to see if they are still valid for the team, if the strategy in the networks should be modified, and if there is still something missing that is wanted from the networks. The networks should also be more extensive than they currently are and have

a better representation of customers for more efficient and open access to them. It should be taken into consideration, how the team can better reach the intrapreneurs and support them in their innovative pursue. It is suggested to build better connections to the R&D team, not only to make the idea development projects supporting rather than competing, and to jointly improve the idea development processes, but furthermore in the creation of the innovation culture strategy. These are shared goals for both teams, and they can thus support one another in the planning and execution of these strategies.

It is suggested that the OI team will take five of the most important KPI's to use now and grow the amount later as is possible and reasonable. Making the KPI's too heavy from the beginning could cause confusion and frustration. Creating a plan on how the metrics are taken to use is important and should be the first step in implementing the KPI's. To get a holistic set of KPI's that covers the main strategies, is responding to the Business owner's and company management's requests, and easy to measure and communicate would be to 1) measure the hit rate of discovered opportunities, 2) number of new partners, 3) number of outreaches to the OI team, 4) time from opportunity identification to implementation, and 5) the number of internals and externals accessed. It would also be valuable to choose few of the most important progress KPI's to support the development of the main long-term KPI's, e.g., with the number of PoC's and pilots, total yearly budget, percentage of push and pull of ideas, partner satisfaction, and the number of projects in different project gates. Finally, regarding the partner satisfaction, the learnings of corporate-startup differences, as well as the startup needs, wants, and fears discussed in this research should be better taken into consideration in the creation of new partnerships.

6.3 Limitations and suggestions for future research on measuring open innovation

Measuring R&D activities has been generally considered to be ineffective, and it is thought to hinder the motivation and creativity inside organizations despite the ever-rising need for innovation and demonstrating the value to the organization (Brown, M. G. & Svenson, 1998, 30). This was also brough up in the R&D interviews, where most of the measuring was done by following a milestone map to see that the projects are advancing on time. However, it was in the interest of the Businesses to be presented with KPI's to be able follow the value built for their money. In reality, it seems that organizations do not employ specific metrics

for open innovation but as a “means to an end” tool in achieving set goals on growth (Chesbrough, Henry & Crowther, 2006, 234). KPI’s were deemed a good way for communicating on the value of the OI team for the Businesses, and for following the effective use of resources and success of set strategies. However, the KPI’s must not be a base for reward systems and need to be used conscious of the risk of the KPI’s leading the work to wrong direction. Furthermore, the KPI’s should be revisited from time to time, to see that they are still valid, important, and supporting the strategies as well as the objectives. The results are this for limited to the Case company’s requirements and environment, but also to the time and current nature of activities.

The academia and industries often process and value innovations differently, as the people with more experience from the industries have a more hands-on experience on the negotiation styles, industry logic, and goals (Conti & Gaule, 2011, 131-132). This created a limitation to the use of academic suggestions in the results, as the results had to be mended realistic for the Case company’s use. The results then heavily rely on the realities in the Case company, not taking a position to comment if the realities of, for example, decision power in the OI team, or used collaboration methods are the ideal ones to use in the Case company. A content analysis always involves some degree of subjective interpretation, affecting the trustworthiness of the research (Graneheim & Lundman, 2004, 106). Although the reliability of the data was highlighted by making sure the coding is done with precise rules, and accuracy was taken care in the coding and transcribing the data (Cavanagh, 1997, 11), the results could have looked different had they been made by another researcher, or with a different set of interviews. The human fatigue of personal bias and perception changing over time was avoided with a consistent checking of the data collection and coding (Cavanagh, 1997, 12), but could have been affected by the researcher’s personal experiences from the open innovation field. The validity of the research was maintained by making sure that the emerging themes were in relation to the investigated concepts (Cavanagh, 1997, 12). However, it was limited with constraints of time and access to the newer resources on the matter.

As this research was only focusing on a single case, it doesn’t provide very generalizable data for wider application, but is a depiction of the Case company’s realities. Thus, further quantitative studies are suggested to follow this case study to create larger samples of proof around the case (Huizingh, 2011, 7). Furthermore, to make deeper analysis on the KPI’s, and

to be able to make more general conclusions on how to set goals for open innovation, there needs to be a quantitative study to measure the weights of each KPI in startup-corporate open innovation in a more globally comparable setting across industries, as was done by Olvera al. (2021) when studying open innovation KPI's between corporation and Universities. With rich quantitative data, the researcher could quantify the importance of the factors in a relative manner, building path models to understand bigger chain effects and context dependencies (Huizingh, 2011, 7). Only comparing the findings of this study in a quantitative survey focused on evaluating the value of the found themes and sub-themes would bring more quantified understanding of the corporate realities in open innovation, reducing the impact of the interviewees bias towards the topic. As there were clear differences in the entrepreneurial orientation of the interviewees - some being more curious and open, while some were mostly concerned about the risks - it brought up the importance of identifying the need to further evaluate the bias. Accordingly, should the results be duplicated to another Case company, discretion must be paid to adjusting the KPI's, strategies, and objectives to the case environment.

Playing with themes such as innovation objectives, strategies and KPI's were proven to be more difficult topics to discuss than anticipated. Not only were there many misalignments in the literature, but the interviewees also struggled with the terms. For example, asking about the objectives spurred a lot of very topical, and detailed replies over certain interesting future trends rather than general goals for the future. Thus, it would be advised to have closer consideration of the terms that are used to make sure that the interviewer and interviewees are on the same page. Of course, the issue might have also been due to not having or knowing the set objectives, strategies, or KPI's, or being afraid of sharing them to the researcher. Therefore, it could also be interesting to research how widely corporates and/or startups even use innovation objectives, strategies, and KPI's and what is the real value of them. More attention should also be paid to the information sharing and discovering hidden information in these processes, and how it could be improved to foster better, and more open information sharing as open information flow is highlighted to lessen the risks of open innovation (Enkel et al., 2005, 204).

Despite the OI objectives and strategies formed in this study being more generalizable results, more attention should be paid to the values or weights of the objectives and strategies. Despite comparing the weights of the found themes inside the different interview

sets, bringing the value of the categories more closely to the end results could take the value of the framework even higher. Deeper evaluation of the values of open innovation objectives and strategies in the corporate reality would help in taking the strategies even further on reliability, and maybe even more quantifiable. It could also be researched how the open innovation KPI's could be used as incentives for the collaboration partners, as it would not only help in evaluating the success but also make the communications over milestones and expected outcomes easier. It was also noted by a Startup interviewee, that setting clear milestones with incentives and an option to drop out in case of being incapable to meet the criteria would create a positive pressure for the startup to keep up the quality and phase. Furthermore, it would create more trust towards the corporate partner as they would be committing to smaller, predefined steps in a time, keeping the process lighter and dividing the risks of piloting and launching throughout the milestones rather than having to commit to all of it in one agreement.

Finally, there is a clear gap between creating open innovation strategies and KPI's and taking them to practice. After the research, the researcher had a workshop together with the OI team to figure out how to implement the framework to use. The framework provides a good starting point for defining the right KPI's to be implemented and for building a roadmap for things that are expected to become relevant and that should be measured over time. This being said, the value of the framework will change over time, as some of the suggestions will grow their value as the team grows and gets more organized, while some might lose value as the time goes by. Although all of the suggested KPI's were deemed important and measurable by the team, the reality still needed some more planning on what sort of tools to use for the measures, how to implement it to the communications, and how to process all the information gathered. Thus, it would be beneficial to study the realities inside the corporations and startups, on what it really takes to get the best out of the results. Understanding the process steps, being able to make valuable suggestions to it, and providing tools and templates for the process would bring the research closer to reality, and noticing what really is doable, ideal, or impossible.

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