



Expertise
and insight
for the future

Janina Rinta-Möykky

Impact of Open Innovation

Open innovation's impact on large organisations and SMEs

Metropolia University of Applied Sciences

Bachelor of Business Administration

International Business and Logistics

Bachelor's Thesis

31.10.2020

Author(s) Title	Janina Rinta-Möykky Impact of Open Innovation
Number of Pages Date	34 pages + 2 appendices 30.10.2020
Degree	Bachelor of Business Administration
Degree Programme	International Business and Logistics
Instructor(s)	Michael Keaney, Senior Lecturer
<p>The purpose of this study was to explore the impact of open innovation and its impact to large organisations, as well as SMEs. The author of this thesis has previously conducted a research, A Little Book About Industryhack (2019), which covers the impact of open innovation to large organisations in the industrial sector and to SMEs. This impact report for Industryhack is based on data from interviews and does not include any theory. This research will collect literature regarding academic content as well as interviews. The findings will be collected and analysed in order to test findings from the Industryhack's impact report. Content from A Little Book About Industryhack will be used as a secondary data in this research.</p> <p>The research conducted for primary data was qualitative and it was completed as semi-structured interviews with three large organisations from Finland. The findings were compared to the results in secondary data.</p> <p>Findings of this research suggest that open innovation performs at its best for companies in more traditional or technological field such as industrial and manufacturing sectors. Results from Industryhack's impact report are impressive and the impact can be clearly seen in both parties of open innovation – the solvers and the seekers. However, open innovation also broadens the perspective and creates brand benefit. Open innovation was used for renewal of the organization and for communicating about it. Broadening the solver field and the impact on company culture were seen as important factors.</p>	
Keywords	Open innovation, innovation, innovation process

Contents

1	Introduction	1
2	Literature Review	3
2.1	Value of Open Innovation to Organisations	3
2.2	Closed innovation	5
2.3	Stage-gate Model	7
2.4	Outside-in, inside-out and coupled processes	9
2.5	Tools for open innovation	9
2.6	Openness of the process	11
2.7	Modes of Open innovation	12
2.8	Issues with open innovation	13
3	Methodology	14
3.1.1	Caruna	17
3.1.2	OP Financial Group	17
3.1.3	Newsec	17
3.2	Validity of the method	18
3.3	Industryhack impact report	18
4	Results and analysis / impact of open innovation	19
4.1	Primary data from the interviews	19
4.1.1	New perspectives and solver field	19
4.1.2	Company culture	20
4.1.3	Brand benefit and communicational impact	20
4.1.4	Access to resources	20
4.1.5	Partners	22
4.1.6	Data security	22
4.2	Secondary data from A Little Book About Industryhack	23
4.2.1	New Business opportunities for SMEs	24
4.2.2	Total of 39 new solutions	24
4.2.3	Fairer terms and faster collaboration	25
4.2.4	Contribution to the renewal of the Finnish public sector	25
4.2.5	Contribution to the renewal of the Finnish industry	26
4.3	Comparing primary and secondary data	26
5	Conclusion	28

Appendices

Appendix 1. Interview questions in English

Appendix 2. Interview questions in Finnish

1 Introduction

Open innovation as a term is broad, and there is a large amount of research on this topic. Therefore, the topic is narrowed down to the impact of open innovation.

Research of this thesis is about the impact of open innovation which includes its impact in large organisations, small and medium-sized enterprises (SMEs).

Open innovation is not a new thing. However, Henry Chesbrough brought the term to public knowledge through his book *Open innovation: The New Imperative For Creating And Profiting From Technology* in 2003. After this publication, there was a considerable increase in open innovation research. As Hossain states in his research *Open Innovation: So Far And A way Forward 2013*, the definition of open innovation is not clear-cut yet. (Hossain, 2013: 31)

The most important and the most recurring definition of open innovation includes an organisation executing R&D not only internally, but also externally. However, Chesbrough states followingly "Open innovation means that valuable ideas can come from inside or outside the company and can go to market from inside or outside the company as well" (Chesbrough, 2003: 43). Therefore, it is important to note that open innovation does not mean generating ideas solely for internal use, but to utilise the innovations outside of the organisation's boundaries; open innovation does not mean opening your organisation borders to only get resources from outside, but also providing resources to the outside from the inside. Sometimes in the innovation process, an innovation that does not fit the target organisation is created, which should not be thrown into the waste, but get use out of it, for example by selling it to an external buyer.

SME's need to have a high level of knowledge when it comes to managing the relationship with external partners. Therefore, it is probable that the SME needs to invest in resources to have a successful collaboration with the external partner. (Vrgović and Jošanov-Vrgović, 2018:9)

Innovating is crucial to keep up with the increasingly competitive environment and to constantly develop the company. There is a vast number of factors why organisations should open their R&D process and organisation boundaries to execute open innovation.

Grönlund (2010) stated: "The question is no longer why to innovate, but how to innovate." Some essential elements for understanding open innovation and its possibilities are competition, access to knowledge and the comparison between open and closed innovation.

The author of this thesis conducted research A little book about Industryhack for the consulting firm Industryhack's, which covers the impact of open innovation. The research was conducted based on data in the consulting company's database and customer interviews. However, the research does not include theoretical discussion. Therefore, for this thesis, literature regarding academic content will be collected and analysed in order to test the findings in the Industryhack's impact report (Rinta-Möykky, Vilén, 2019). It is important to remember that Industryhack is implementing only one tool of open innovation; therefore, a closer look at several other methods is essential.

The research question for this thesis is: How open innovation impacts/effects SMEs and large organisations? The topic covers the research of the impact in large organisations, SME's and public organisations. Company categories must be defined by the size to be able to segment them. In Figure 1. Organisations are classified by the count of employees based on European Commission statistics. (Eurostat)

Small and medium-sized enterprises	50-249 persons employed
Large enterprises	≥250 persons employed

Figure 1. Companies organised by size

The topic will also cover the different tools of open innovation and factors which motivate an organisation to open up its innovation process to external parties. Although Chesbrough is criticised harshly regarding his opposing or dualistic treatment of open and closed innovation, they should be taken into account and cover the topic in the research.

2 Literature Review

Chesbrough has published multiple pieces of research and articles about open innovation after the first book *Open Innovation: The New Imperative for Creating and Profiting from Technology* in 2003. Enkel et al. state that the era of open innovation has started, and many companies nowadays implement open innovation. However, understanding of the open innovation mechanism is still deficient in terms of how to profit from the concept entirely. After introducing open innovation to the company, Procter and Gamble gained a 50% increase in their product success rate, and a 60% increase in the efficiency of R&D. (Enkel et al. 2009: 312)

It could be claimed that Chesbrough stabilised the term of open innovation and raised the interest for further research. Although the concept of open innovation is not new, it is important that the term was identified and defined. The importance of knowledge outside the organisation has been recognised for a long time, but after Chesbrough's publications, there is now a more precise terminology and theory of how to execute open innovation. Chesbrough inspired a lot of new research, which has identified different angles and ideas.

However, open innovation has existed long before Chesbrough's first publication, and it is a widely debated topic. Trott and Hartmann (2009) criticise Chesbrough's theory about open innovation, and the harsh comparison of open and closed innovation. Trott and Hartmann argue in their research that "open innovation is old wine in new bottle". For example, they state that open innovation is a variation of the stage-gate model by Cooper and Kleinschmidt (Trott and Haartmann, 2009: 729). Stage-gate model is explained more in depth in chapter 2.3 below.

2.1 Value of Open Innovation to Organisations

Grönlund et al. (2010) lists multiple benefits open innovation creates for a company and its new product development (NPD).

The main benefits of open innovation are the ability to leverage NPD on someone else's budget, a greater sense of urgency for internal groups to act on ideas and technology and, over time, an opportunity to create a more innovative culture from the "outside in" through continued exposure and

relationships with external innovators. (Grönlund, Sjödin and Friskhammar 2010:108)

A company's competitive advantage can be formed from the company's knowledge assets (Birshinshaw & Fey, 2001). Birkinshaw and Fey (2001) argue that developing a company's knowledge assets is dependent on the inflows and outflows of information and knowledge across the company's organisation boundaries. Information coming from the outside adds to the company's knowledge assets, as the information outflow to competitors, for example, reduces a company's discreteness. Open innovation enables this information inflow and outflow to an organisation.

Labour markets are changing and careers inside one organisation are becoming shorter. Greenhouse et al. states that in the 21st century relationship between employee and employer is short-term focused (Greenhouse, Callanan and Godshalk, 2010). It is to be expected that employees will be changing companies they are working for, therefore employing and keeping experts and specialist will be even more challenging in the future. Large organisation might have the resources to employ the best and the most skilled people, but competition for skilled people is high. Therefore, through open innovation, an organisation does not need to employ proficiency but to seek ideas outside of its own boundaries. This way, it is possible to compound knowledge from different industries, and the innovations and solutions will be more valuable compared to innovations made internally. People from inside the organisation have deep knowledge about the industry and the organisation itself, whereas the people outside of the organisation have different views, fresh ideas and perhaps a more profound knowledge about some other industry or department. When these two are compounded, the solution will be co-created together, and the solution will be tailored to fit the organisation. This kind of solution brings more value to the company compared to off-the-shelf solutions, since it is tailored to fit the company's needs. It could also be possible to start selling the solution to other organisations, therefore new product or service is created. (Chesbrough, 2003: 43-68) However, the solution is not tailor made-anymore, if it is sold outside and not specifically made to fit someone's needs. The value to this solution comes from the diversity and uniqueness of the innovation.

2.2 Closed innovation

In the introduction of his book *Open innovation: The New Imperative For Creating And Profiting From Technology* (2003), Chesbrough covers the main characteristics of closed innovation. Closed innovation is the opposite of open innovation. Still at the beginning of the 21st century, closed innovation was believed to be the better way of doing innovation, and internal R&D was regarded as a prize asset. It was thought that not implementing internal R&D, there was a barrier when trying to enter the market, since only larger companies have resources for more extensive research facilities and projects. Therefore, the competition was tough for smaller companies that do not have the resources for long term research. Research is crucial for maintain a competitive advantage and to have the technology for today. Organisations which follow the closed innovation model follow the agenda of coming up with research and ideas inside the organisation borders, and the results should not be shared outside of the organisation. (Chesbrough, 2003)

The closed innovation model states that the best and most skilled people from the industry should be hired by the organisation itself, and the intellectual property rights should be protected and controlled in a way where the competition does not take advantage of their ideas. By contrast, the open innovation model states that there is high competition in the labour market, and all the skilled people cannot be employed by the organisation. Therefore, the organisation needs to work with skilled people inside and outside of its own boundaries. According to Chesbrough (2013), an organisation executing open innovation believes that it should profit from its intellectual property by selling it to others, and they need to buy others' intellectual property if it brings value to their own business model. However, open innovation is about solving challenges and problems with external partners, therefore commodification of intellectual property rights is not open innovation on its own. As mentioned above, Chesbrough's comparison between open and closed innovation is harsh. It could be claimed, that companies often lie somewhere between these two models, although they would be executing only closed innovation. Comparison between closed and open innovation can be seen in the Figure 2. below. (Chesbrough, 2013)

Closed innovation	Open innovation
The smart people in our field work for us	Not all the smart people work for us. We need to work with smart people inside and outside our company
To profit from R&D, we must discover it, develop it, and ship it ourselves	External R&D can create significant value; internal R&D is needed to claim some portion of that value
If we discover it ourselves, we will get to the market first	We don't have to originate the research to profit from it
The company that gets an innovation to market first will win	Building a better business model is better than getting to market first
If we create the most and the best ideas in the industry, we will win	If we make the best use of internal and external ideas, we will win.
We should control our IP, so that our competitors don't profit from our ideas	We should profit from others' use of our IP, and we should buy others' IP whenever it advances our own business model

Figure 2. Closed and open innovation (Chesbrough)

As seen in Figure 3 below, in the closed innovation model the innovations flow inside the funnel and enter the market through research and development stages. In the open innovation model, the innovations flow from outside of the company borders, and flow from inside to outside, throughout the whole process.

boundaries to successfully innovate.

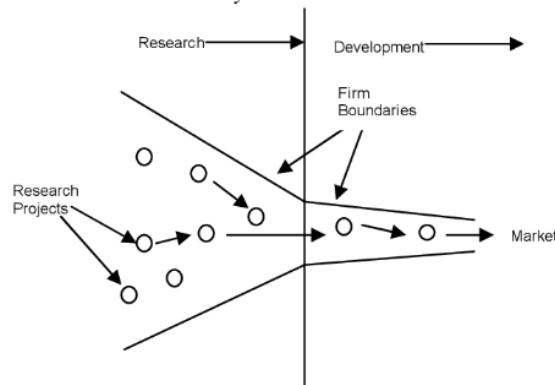


Figure I: Closed Innovation Model

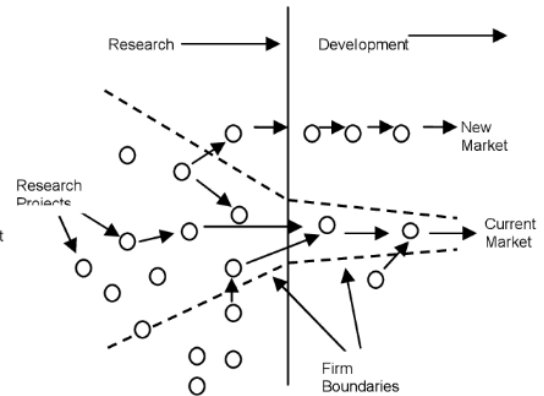


Figure II: Open Innovation Model

Open and closed innovation funnels (Chesbrough 2003)

2.3 Stage-gate Model

The stage-gate model by Robert Cooper (1990) divides the innovation process into 4 to 6 stages from the beginning in initial ideation till the post-implementation review. The model was created based on successful companies' new product development-processes (Grönlund, Sjödin and Friskhammar, 2010:109). The idea behind the stage-gate model is to have gates as checkpoints for the innovation to meet demands and to see if the innovation will be killed or continued. After each stage, there is a gate where the work is done in the stage will be reviewed.

Gate 1. Initial Screen

- Screening of the idea and its potential
- Decision to commit resources for the project
- Based on qualitative research

→ Stage 1. Initial Screen

- Preliminary market assessment and technical assessment

Gate 2. Second screen

- More strict criteria than in Gate 1. Which is due to increasing expenses after passing the gate
- Decisions are often based on market attractiveness, competitiveness, product advantage and profit potential

→ Stage 2. Detailed investigation

- Building a business case
- Product definition and project attractiveness verification
- Critical research stage
- -Research such as competitive analysis, concept testing, legal, patent and regulatory assessment, investments required and financial analysis

Gate 3.

- The final gate before the development stage
- Strict criteria due to massive spending after passing the gate
- Critical financial and risk-return review

→ Stage 3. Development

- Technical work as a priority
- Manufacturing and marketing proceeding in parallel
- Updating financial and legal analyses
- Testing of a prototype at the end of stage 3.

Gate 4.

- Checking the attractiveness of the innovation
- Checking if the project has proceeded in the required quality

→ Stage 4. Testing and validation

- Testing and validating the project
- Product quality, field trials, pilot production, trial sell
- Revised financial analysis

Gate 5. Pre-commercialisation business analysis

- The final gate before market launch and full commercialisation
- The project can be still killed

→ Stage 5. Full production and market launch

- Implementing market launch plan and production or operation
- Post-implementation review
- Assessing the project's strengths and weaknesses 6 to 18 months after the launch
- Learnings from project

Trott and Hartmann (2009) argues open innovation being a variation of the stage-gate-model, only differing by the possibility of innovations flying in and out in from the innovation funnel in open innovation process, as described in Figure 3. Stage-gate

model is seen as important model as Grönlund et al. (2010) state majority of firms in industrial sector are conducting stage-gate model on their new product -process. Grönlund et al. (2010) also state that some of the inherent limitations of stage-gate model could be reduced by including some principles from the open innovation process. Although Stage gate model is utilized in large amount of industrial companies, it has faced criticism towards being time-consuming, including time-wasting activities, bureaucratic procedures and having restriction for learning opportunities. However, company's new product development or innovation process could be energized or speeded up if stage-gate model is implemented accurately. (Grönlund, Sjödin and Friskhammar, 2010)

2.4 Outside-in, inside-out and coupled processes

Chesbrough divides an organisation's innovation into three processes. The outside-in process brings solutions from outside of the organisation, whereas the inside-out process takes solutions out from the organisation. The coupled process, on the other hand, is a combination of outside-in and inside-out processes. The outside-in process brings new ideas for an organisation through alliances, cooperation and joint ventures, for example (Chesbrough, 2017: 37). Therefore, an organisation's internal knowledge is enriched with knowledge from an external partner. However, sometimes these new ideas and solutions do not fit the organisation, but they can be used for generating profits. Therefore, the solutions are taken to the market and sold as intellectual property, for example, through the inside-out process. The coupled process is used for developing and commercialising solutions innovated during the entire open innovation process. (Enkel et al., 2009, p. 312-13)

2.5 Tools for open innovation

Huff, Möslin, Reichwald (2013) list five different tools for open innovation, which can be connected to each other. The tools are innovation contests, innovation markets, innovation communities, innovation toolkits and innovation technologies. An innovation contest is defined as a competition, where the best innovator or team wins with the best solution for a specific challenge defined by the organiser (Huff, Möslin,

Reichwald, 2013: 74). Innovation markets are online platforms or meeting places where organisations announce an innovation challenge and invite innovators to propose solutions. An organisation looking for a solution is called a seeker, whereas a company or individual offering the solution, is called a solver. Innovation communities, on the other hand, are social software-based innovation communities online, used for sharing and developing ideas, concepts and promoting solutions. Innovation toolkits are an environment for solvers to develop solutions in prescribed steps the seeker has provided. Innovation technologies provide opportunities to create a product from concept to product or service.

Industryhack's operation would be classified as an innovation contests - in other words, open innovation challenges. Industryhack was the first company in Finland promoting hackathons as a way to systematically co-create with external teams. In the Industryhack report published in 2019, the impact was researched on Industryhack's clients, large enterprises from traditional industries, who were the seekers, while the solvers were mostly SMEs who came up with the solutions. Together with the client company Industryhack defined the challenge description for publishing. During the application period, SMEs and some larger companies sent their proposals for the preliminary solution. After this, Industryhack and the client chose teams with the best solutions to continue to the actual competition. The solver company always sends their own team from within the company to take part in the challenge, and the team size is usually between 2 and 5 persons. Depending on the challenge, the solver company usually has a few weeks to moderate its solution with the data shared by the seeker company, as the data protection, rules and intellectual property rights need to be clear and contracts signed. After moderating the solution, there are intensive camp days, which usually last 1-3 days, where the solver teams develop and co-create their ideas together with the client. Often every team attending the camp days will be compensated, since taking part in the challenge takes resources and time. In the last camp day, a winning team will be chosen. The winning team will often be rewarded with a money prize and a pilot project with the customer company. Commonly, up to 4 companies will land a pilot project with the customer. Therefore, they will have a chance for further partnership. In the research done in 2019, five main themes were stated as having an impact from Industryhack's open innovation challenges. These were:

- New business opportunities to SMEs
- 34 new solutions for customers that are in use
- Fairer terms for and faster collaboration
- Contribution to the renewal of the Finnish public sector, and
- Contribution to the renewal of the Finnish industry (Rinta-Möykky, Vilén, 2019: 93)

Industryhack's open innovation challenge could be seen as a developed form of a hackathon. Hackathon is a problem-focused computer programming. The event organiser has a problem or challenge that the participants will try to solve during the intensive event.

The open innovation challenge creates clearer rules for the process, and both parties, solvers and seekers, will be treated fairly. Industryhack's CEO Mikael Hautala discusses an earlier problem issue of hackathons, where solvers' time and effort were not appreciated enough. Solvers would give their solutions and knowledge for the price of a pizza. In contrast, the seeker company would get a handful of ideas and solutions ready to be implemented, basically for free. (Pulliainen, 2020)

2.6 Openness of the process

Creating a new product with a customer is one form of open innovation, which is quite an easy process to manage. When taking multiple partners into the innovation process, it is significantly more complex to coordinate. However, the amount of contributors in the innovation process affects the openness of the innovation process. The more there are different external partners, such as customers, universities, competitors and other stakeholders, the more open the innovation process is. (Lazzarotti & Manzini 2009: 616)

Another factor affecting the openness of the innovation process concerns the choice of which parts of the innovation process are opened to the partners. Opening only one phase of the process to the partners is possible and straightforward to manage. Opening multiple or even the whole innovation funnel to the partners affects the innovation process to be more open, but it makes it more complex (Lazzarotti and

Manzini, 2009:616). However, even if the process is more complex, it may give more broad and innovative results due to increased resources.

2.7 Modes of Open innovation

Lazarotti and Manzini (2009) introduce four ways and degrees to collaborate with external partners. The first method is closed innovators, where there is a low number of partners, and only a few phases of the innovation process are opened. Closed innovators avoid the commitments and transaction costs when it comes to financial, technological and human resources. As there is a smaller number of external partners, a lot of time is also saved. However, they are not able to share risks with other stakeholders, and technological opportunities are limited (Lazarotti & Manzini 2009 P.632-633). The second method is open innovators, where there is a high number of external partners, and many phases of the innovation process are opened. Open innovators get the best benefits from external stakeholders' technology as the process is as open as possible. With open processes and multiple partners, transaction costs are high. In this scenario, transaction cost levels mean that some of the potential partners may be discouraged to put effort and resources into the solutions if there is a large number of participants. As there are more participants, the opportunity to get meaningful or lasting partnership is lower (Lazarotti & Manzini 2009:619). Therefore, the solver-company may not be willing to put resources to waste in fear of not being selected for the next stage of the open innovation process.

The third method, specialised collaborators, include multiple external partners but a low amount of opened phases. The final method, integrated innovators, consists of a low number of external partners but a large number of phases in the innovation process are opened to the external partners (Lazarotti & Manzini 2009: 616). Specialised collaborators and integrated collaborators are the intermediary models, which benefit from external opportunities, but the resources are limited (Lazarotti & Manzini 2009: 632-633).

2.8 Issues with open innovation

Not-invented-here-syndrome (NIHS) is an error in the decision-making process, which occurs when there is a bias against the knowledge which comes from the outside. NIHS occurs when an idea outside of an organisation is overlooked, and the idea from inside the organisation is chosen, although the idea from outside is better (Arias-Pérez et al., 2016: 1-4). Arias-Pérez et al. states that NIHS effects innovation process and results negatively. This is an issue of relevance to the open innovation process since innovations are generated between multiple parties.

A lot of research can be found on open innovation in large enterprises. However, executing open innovation in SMEs is not as common (Vrgović and Jošanov-Vrgović, 2018: 6). The main reason for this is in the resources of SMEs, as larger organisations often have their own R&D department, while SMEs do not. Having limited internal resources, it could be difficult finding people inside the organisation to work with an open innovation process. If the company's own research is limited, it is demanding to connect it with knowledge from the outside. Enkel et al. (2009) found in their research with European SMEs and large enterprises, the risks and barriers companies face with open innovation. Most common issues were loss of knowledge, higher coordination costs, loss of control and higher complexity and difficulty finding the right partner (Enkel et al. 2009: 312). Grönlund et al. (2010:108) states similar risks when it comes to opening a company's innovation process, such as loss of know-how and overly depending on customer's views.

Companies are understandably worried about their intellectual property and data security when shifting to open innovation. Therefore, clear rules and contracts for all parties are crucial. V. van de Vrande et al. (2009) researched reasons for SMEs to adopt open innovation in their operations. They found that the reason is market-driven; therefore open innovation for SMEs is a way to keep up with market developments and to meet customer demands. (Van de Vrande, de Jong, Vanhaverbeke, de Rochemont, 2009: 432)

Data security and intellectual property rights may be among the barriers for an organisation to start using open innovation. Intellectual property (IP) includes patents, copyrights, trade secrets, trademarks and industrial design, for example.

Open innovation brings a vast amount of opportunities to a company, but it also brings a lot of risks and new challenges when taking external actors into the process. Luoma et al. (2010) state that intellectual property rights are one factor that repeatedly occurred when they interviewed organisations that are involved with open innovation. Intellectual property rights and patents are essential when sharing company information with third parties, and it is also vital to have clear contracts about who owns the ideas which are created during the process of co-creation. (Luoma et al., 2010: 9)

Trott and Hartmann (2013:377) states following "IP is a company asset and should be treated and managed as such". Opening the boundaries of an organisation to execute open innovation comes with the potential danger of knowledge leakage. There is a risk that a potential partner runs off with the other partner's technology. To gain the benefits of collaboration and open innovation, a company needs to secure its knowledge with a tight Intellectual Property protection strategy. (Trott and Hartmann, 2013: 376-77)

Fear of failure is common when innovations are being created. Chesbrough states that most innovations fail (Chesbrough, 2003). However, Santamaría, Nieto and Barge-Gil (2010) argue that failures from innovation could be avoided through opening the firm's innovation strategy, rather than intensifying internal R&D. When a company has closed innovation process, increasing in R&D does not have noticeable impact on the results of innovation. However, through open innovation companies are more likely to achieve innovations in internal R&D. (Santamaria, Nieto, Barge-Gil, 2010: 110)

3 Methodology

This chapter covers the selected research design and method, including reasons behind the selection and the validity of the collected data.

Selected method for data collection is semi-structured one-to-one qualitative interviews. Qualitative approach was selected for the methodological approach, since non-numerical data is more relevant when answering to the research question. However, it would have been possible to use quantitative approach and collect data for example of the numerical impact of open innovation, such as growth in revenue or

employee efficiency. Semi-structured one-to-one interview was selected to get the use out of open-ended questions, which gives the interviewee (later participant) a possibility to provide broad answers and therefore deeper information, whereas the interviewer has a chance to add refining questions. Qualitative research is more flexible and creates opportunity for broader information compared to for example a questionnaire in quantitative research. According to Alf Walle (2015) qualitative research manipulates the environment and informants in lesser intrusive degree compared to quantitative research. Results from qualitative research are likely to be richer and more realistic, which makes the data broader and more challenging to analyse. (Alf Walle., 2015:12)

Semi-structured interview provides more freedom for participant's answers, but the interviewer is responsible for the flow of the interview and for gathering the needed information. Semi-structured interview has clear interview questions, however there is freedom of adding or changing the order of the questions. For successful semi-structured interview, the interviewer needs to have basic knowledge about the topic. (Alf Walle., 2015:73)

Data collected for Little book about Industryhack (2019) was collected through semi-structured qualitative interviews, which will be used as a secondary data source. However, interview questions were not the same for both researches, since the data for A little book about Industryhack (2019) was collected for Industryhack and was conducted from the facilitator's point of view. A little book about Industryhack is discussed below in chapter 4.2.

Interview schedule included 7-8 questions, although some refining questions were added during interviews when appropriate. The interview question can be found in the appendix. Each interview lasted approximately 20-35 minutes. Interviews were conducted by the author, which was found suitable since the author has conducted multiple interviews for data collection for A little book about Industryhack (2019). All participants are native speakers of Finnish, therefore selected language for interviews is Finnish to ensure comfortable interview atmosphere and ensuring rich data.

The number of interviews were narrowed down to three to allow enough time to each interview. Participants were selected deliberately to get the best results out of limited

amount of interviews. Discovering potential participants initiated from identifying companies executing open innovation. After finding potential companies for interviews, it was important to identify the right person. Initial idea was to interview management level people in innovation or research and development departments. Screening for potential companies was conducted by searching for articles about open innovation, customer labs and hackathons. Two of the participant companies were found by articles discussing their customer lab operation and one was found by LinkedIn post about the company's innovation operations. After recognising companies executing open innovation, right person to contact was searched. Finding the right person was not challenging, since they were named in the end of articles and one from the LinkedIn post. Multiple invitations were prepared to send, since management level employees may be difficult to reach and to find suitable time for interview. However, successfully interview appointments were made with each person I initiated to interview. Two of the participants were contacted by email and one directly in LinkedIn. Reason and timetable for interview were clearly stated in the first mail and first interview was very soon after the first contact. The interviews were done by phone or teams-video meeting. Each of the participants have strong backgrounds in the field of innovation. A consent form was sent to each participant.

The participants were Antti Keskinen, Head of Innovation from Caruna, Kristian Luoma, Head of OP Lab and IPR from OP Financial Group, and Lauri Pulkka, Development Manager from Newsec. According to classification in Figure 1., Each of the participants are in the Large enterprise's category. In the analysis chapter the participants will be referred as Interviewee 1, Interviewee 2 and Interviewee 3 in no particular order.

Name	Position	Company	Company Field
Antti Keskinen	Head of Innovation	Caruna	Energy Services
Kristian Luoma	Director, Head of OP Lab and IPR	OP Financial Group	Banking
Lauri Pulkka	Development Manager	Newsec	Real Estate Management

Figure 3. Participants

3.1.1 Caruna

Caruna is large organisation with over 300 employees (2019) in the energy service sector. Caruna distributes energy, and maintains, repairs, and builds electricity network in Finland (Caruna). Open innovation operations started at Caruna few years ago. Open innovation is used as an innovation tool among others. Challenge based innovation contest is used as an open innovation tool and facilitator is used in the process. Before starting the open innovation challenges, developing existing services and products were co-developed with clients.

3.1.2 OP Financial Group

OP Group is Finland's largest financial group with over 12 000 employees in Finland and Baltics in the Banking sector. OP Group has OP Lab, which is an innovation group looking for new businesses and growth through technology. Startups and scaleups are OP Group's partners in open innovation process. Open innovation is used as one tool of innovation. (OP)

3.1.3 Newsec

Newsec is large organisation in the real estate management sector. with over 2 000 employees in the Northern Europe (Newsec). Newsec has organised 3-4 customer labs, which are open innovation events with customers and startups or scaleups. Open innovation is only one of the innovation tools. Customer labs were organised to identify customers' needs in the future.

3.2 Validity of the method

Sample size in the primary data source is only three companies, therefore the results cannot be generalized. However, the scope of these three interviews are suitable for bachelor's thesis. Together with secondary data from A Little Book About Industryhack (2019) the sample size and diversity of different industries is reasonable. Secondary data includes a lot of large organisations in the traditional field, such as energy and industrial sector, as well as SMEs. Primary data on the other hand includes a company from energy sector and two companies whose asset are people and knowledge, rather than IPR and patents. However, secondary data includes only impact of challenge based open innovation challenges. Impact from challenge based open innovation may differ from other open innovation tools.

3.3 Industryhack impact report

A little book about Industryhack, published in 2019, is an impact report of a company called Industryhack. The publication states impacts of Industryhack's performance on customers and other stakeholders. Industryhack is a small company organising open innovation challenges and partnerships for co-creation. Most of Industryhack's customers are large traditional companies such as Fortum, UPM Energy, Airbus and Konecranes. Recently Industryhack has been focusing on public organisations such as City of Sendai and Tampere, Aalto University and the Finnish Tax Administration. Other stakeholders of Industryhack are typically SMEs and startups in the field of IT, such as software development, artificial intelligence, virtual reality (VR) and augmented reality (AR). Several customers and stakeholders were interviewed to collect qualitative data about Industryhack's operations and the impact of open innovation.

4 Results and analysis / impact of open innovation

This chapter discusses first the primary data from interviews and after primary data, the secondary data from Industryhack's impact report A Little Book About Industryhack (2019) will be discussed.

4.1 Primary data from the interviews

Open innovation is seen as a useful tool when an organization runs out of knowledge or wants to broaden their solver field. Open innovation enables trying an idea with lesser cost compared to developing the idea internally.

4.1.1 New perspectives and solver field

Interviewee 1 stated that open innovation works the best for them when there is a dedicated challenge or problem, and a solution or knowledge cannot be found in-house. One factor pointed by Interviewee 1 and Interviewee 3 was, open innovation can be used to scope what is out there, what kind of solutions and knowledge there is, to search for perspectives for problems and challenges. Interviewee 1 stated followingly: "What we wanted through open innovation: seek for solutions to problems we cannot find in our field today, at any level. We need new field of actors and new perspectives."

Therefore, open innovation is used also for scouting what kind of actors and expertise there is outside of the organization. However, Interview 1 stated that open innovation is not the best tool for them to develop already established services.

Collecting ideas outside of an organization was seen as valuable factor. As discussed above, Interviewee 3 stated that although open innovation does not create significant business opportunities for them, it creates creative ideas. However, value of these ideas might not be that significant either. Interviewee 3 stated that after handling several ideas, the amount of new ideas increases and similar or even the same ideas start to repeat. The biggest gain and increase in new ideas occur in the beginning when a company starts implementing open innovation.

Interviewee 3 declared that return of invest of open innovation is not generally so good, although multiple pilot projects were created from the open innovation process.

My experience is, return of invest is not generally so good. A lot of “air” and often hobby-based contribution, they don’t necessarily have the desire to continue innovation or partnership for longer time. But, creative ideas

Although open innovation does not create significant business opportunities for Interviewee 3’s company, it generates creative ideas.

4.1.2 Company culture

Interviewee 1 stated that implementing open innovation to businesses operation brings innovativeness to everyday work and encourages to entrepreneurship-like thinking among the employees. Giving out the message of desire for renewal within the organization came up as a topic multiple times in the interviews. This message impacts people inside the organization as well as outside.

4.1.3 Brand benefit and communicational impact

Interviewee 2 and Interviewee 3 pointed that the majority of the impact of open innovation for their organisation is brand benefit and the communicative significance open innovation presents to outside. Experimental culture and piloting are essential part of open innovation. Interviewee 2 stated that both of these, experimental culture and piloting, are in fact useless for their company. It might create some brief brand benefit, but it is a lot of work for such narrow profit.

4.1.4 Access to resources

As discussed in chapter 2.1, company’s competitive advantage can be the company’s knowledge assets. Therefore, open innovation could be used for growing company’s knowledge assets through gaining knowledge form the outside of the company. However, Interviewee 3 stated that even without open innovation, they would have access to the resources they got through open innovation. Although, they would not have access to the ideas and thoughts, they don’t have essential impact on their business development, therefore the benefit from open innovation remains weak. In

contrast, Interviewee 1 stated, that open innovation broadens their solver field noticeably compared to what they have today and open innovation is in fact great method for them. Interviewee 1 stated about the possibilities of technology: “Technology creates possibilities, but also creates a challenge, since there is so much information available“

Interviewee 2 stated that they would not have access to partner’s resources without committing to the partnership. Interviewee 2’s company has access to software robotics through partnership and it not seen as a possibility to start executing this internally. It was seen as a very important factor to take care of the partnership to ensure the partner will stay available. This is important especially when the partner’s knowledge or technology is unique.

Interviewee 3 stated that at its best open innovation can act as a source of knowledge and increases opinion diversity, since it does not lead to results that well.

We have used open innovation as an information source to find out how to target our internal innovation. That kind of symbiosis is smart. Open innovation doesn’t lead to results that well. With internal innovation you can make up the lack of performance or results. And with open innovation you can solve the lack of imagination.

As mentioned above, open innovation can be used as a tool for broadening the perspective, which can solve the lack of imagination.

However, Interviewee 3 stated that they would not have access to the ideas and opinion diversity increases through open innovation. Yet again, it was seen that the ideas are not that profitable to be commercialised. New ideas and opinion diversity were anyhow seen as an important factor. It was stated that “the more we know, the more it restricts our imagination”. This can be detected when an expert innovates, the horizon is narrower compared to person who does not know as much about the topic. The ideas are rawer but broadens the perspective. Therefore, the expert can then develop the raw idea further.

As discussed in section 2.1 competition for skilled people are high. Interviewee 2 pointed that in the future careers inside one organization are getting shorter and people start to move more between companies. Experts and specialists are already desired

employees in the market, however, in the future the competition among the skilled people will be even higher. This leads to decrease of closed R&D units, which implies open innovation will playing more important role in future in a company's development process.

4.1.5 Partners

Interviewee 1's company includes up to four different parties in the innovation process. These four parties may include, customer or end users, solvers, facilitator and professionals from the company itself. When creating the solution through open innovation, there is a great chance to involve the end-user of the product right from the start. By involving end-user in the innovation process, the solution can be built more specifically to fit end-users needs

4.1.6 Data security

Congruent point from the interviews were that companies should share more data, for successful innovation process. As discussed in chapter 2.8, companies might have a fear of loss of knowledge, therefore there is a threshold for revealing data to partners in the innovation process. However, revealing data is an important factor for successful open innovation. If enough of data is not revealed, the other party of the innovation process is not able to solve the challenge in best possible way.

Interviewee 2 stated, that data secrecy, such as IPR or patents, should not be the main asset for companies anymore. Service design, speed and company's brand will increase role instead of data secrecy for maintaining sustainable competitive advantage. Interviewee 3 agreed with data secrecy is losing its importance. Interviewee 3 stated that companies are revealing too little data, which makes innovation process more challenging.

I think companies reveal way too little data. Because if somebody does not understand, they can't help either. Knowledge is an asset, which increases when it is shared. Around this topic, companies have a lot of misunderstandings and gaps in skills. It would create a lot of good things if there was bravery to share.

Interviewees 2 and 3 agreed, that although data secrecy cannot be the main asset for companies anymore, and there is not enough data revealed, there definitely is some data that cannot be shared, such as company secrets.

Finding the best equilibrium between sharing enough but not too much of data is crucial. Companies in different industries have different kinds of levels of sensitive data. Interviewee 2 stated that their company's main asset is the employees and their presence for their customer. This kind of asset cannot be taken away with revealing too much data. However, for example companies from the secondary data are from different industry, and they may have very sensitive data, which would be destructive for the company if leaked.

Interviewee 2 stated trust playing an important role when including open innovation to company's operation. Trust between parties enables even the sensitive data being shared. However, not everything should be left to trust. Therefore, each interview participant mentioned that they use non-disclosure agreements (NDAs) during the innovation process. Technical traces are used to protect data and to track the responsible for possible misappropriation of data. Employees are trained to handle sensitive data and instructed what is shared. Since open innovation involves multiple parties, it is important to ensure each party meets the standards for data security. Interviewee 3 stated that larger companies typically have a certain level of security, however especially smaller companies and their technology are audited and made sure the data security meets required standards.

4.2 Secondary data from A Little Book About Industryhack

Rinta-Möykky and Vilén (2019) state five findings from Industryhack's impact as an open innovation challenge facilitator. These five findings are new business opportunities for SMEs, 34 solutions from the challenges, fairer terms and faster collaboration, contribution to the renewal of the Finnish public sector and contribution to the renewal of Finnish industry.

4.2.1 New Business opportunities for SMEs

Through open innovation challenges SMEs have better opportunities to land long-term partnerships with a large organisation. Getting the first contact or sales meeting with a large organisation is most likely challenging for a SME due to lack of resources for its sales team or advertising. However, through applying open innovation, SMEs will have a greater opportunity to make themselves known and to showcase their knowledge and resources. As Industryhack selects the most potentially creative solver-teams from the applications, the seekers will get good quality teams and solutions to respond to their challenge. Therefore, the seeker, which is a large organisation, is also more likely to find good partners. Finding a suitable partner among the vast number of SMEs is also challenging. Open innovation challenge creates a pathway for both parties to find a good match for partnership. Jukka-Pekka Häkli from UPM states in the A Little Book About Insutryhack, that without open innovation challenge UPM would not have been able to find as good solution for their challenge on their own. For some of the SMEs open innovation challenges have become the primary sales channel for customer acquisition. Open innovation challenge is an excellent opportunity for a SME since there is a great chance of landing a proof of concept project or even further, long-lasting partnership with a large organisation. Gaining partnerships and references through open innovation challenges is a significant turning point for a small company. Through Industryhack's open innovation challenge, there are even new companies started from the basis of the solution created in the challenge. (Rinta-Möykky and Vilén, 2019)

4.2.2 Total of 39 new solutions

The main objective of the open innovation challenge is to gain a solution to a well-specified problem or theme. The challenge or problem is defined together with Industryhack and the seeker. These 39 solutions are products or development projects which have continued after the open innovation challenge and proof of concept or pilot project. These solutions are used internally in seeker-companies, or they may be new services for consumers. Helpponouto is a waste pick up service for consumers created in Industryhack's open innovation challenge organised with Lassila & Tikanoja. Fortum's open innovation challenge generated Aurinkolaskuri, which is another service created for consumers to calculate solar power for their homes. Fingrid gained three internal

solutions for better power grid forecasting. CGI participated as a solver-team and created Apuri for Stara for better city maintenance planning. (Rinta-Möykky and Vilén, 2019)

4.2.3 Fairer terms and faster collaboration

As discussed above, intellectual property rights and data security plays a significant role in open innovation. Therefore, it is advantageous to use a facilitator like Industryhack to make sure the open innovation process is fair for both sides. Large organisations often have their own legal departments, but SMEs do not possibly have resources for legal teams or counselling. This makes cooperation between large organisations and SME unfair and imbalanced. Without appropriate contracts, the co-creation process is risky, and data might be stolen. Industryhack has created general terms for open innovation challenges and proof of concept projects to fit both sides of the partnership to make sure it is convenient and fair for everyone. This gives more time for seekers and solvers to focus on the challenge and to use the time for creating solutions. Culture of experimentation and a faster process is encouraged at Industryhack, but contracts and agreements on terms take time. Therefore, ready-made standard contracts make the process seamless and agile. When both sides of the open innovation challenge feel that they are participating in an equal and fair game, companies stay motivated by taking part in the challenges. (Rinta-Möykky and Vilén, 2019)

Krause, Schutte and Preez (2012) state in their research that a majority of SMEs considered intellectual property rights to be one of the most significant barriers to taking part in open innovation. (Krause, Schutte, Preez, 2012: 203-12) This supports the finding of clear contracts and rules playing a significant role in open innovation challenge.

4.2.4 Contribution to the renewal of the Finnish public sector

Each year the Finnish public sector is buying services costing 35 billion euros. At the beginning of parliamentary term 2019, the government set a goal of increasing innovative public procurement to 10% of public procurement, by the end of the parliamentary term (Työ- ja elinkeinoministeriö, 2020). 3,5 billion euros would be spent on innovations in the public sector, which means there is an excellent opportunity for implementing open innovation in the public sector. Open innovation challenge has the potential for a dramatic change in co-creation between startups, SMEs and the public sector. As the

public sector gains resources through open innovation challenge, it is possible to affect Finnish wellbeing and ecosystem. Tuomo Suortti from Business Finland commented the open innovation challenge organised with Industryhack as following

This was a kickstart for our own and a little more serious and ambitious digitalisation. We learned how agile developing tools and culture are applied to an organisation - From the challenge, we got a team that we became partners with and started building a product for internal use. With normal competition procedure, we wouldn't have found a partner for this.

This states the importance of open innovation in the public sector. Standard competition procedures in the public sector are old-fashioned and do not attract all of the potential partners. Bringing procurement to this day and supporting digitalisation in the public sector affects everyone living in Finland and enables better use of taxpayers' money. (Rinta-Möykky and Vilén, 2019)

4.2.5 Contribution to the renewal of the Finnish industry

Industryhack's main objective was to help contribute to the renewal of the Finnish industry. Experimental culture and co-creating outside of organisations' borders are becoming more popular as companies have seen the potential of open innovation. Connecting traditional organisation to agile startup creates opportunities for industrial internet and makes it more interesting through open innovation challenge. Industryhack has facilitated open innovation challenges, with 20 of the 50 largest companies in Finland. Over 464 concepts have been developed, over 3500 working days have been used to develop solutions and innovations. (Rinta-Möykky and Vilén, 2019)

4.3 Comparing primary and secondary data

As the A little Book About Industryhack states five impacts of open innovation, the primary data from three interviews do not state the impacts as clearly. This is due to the differentiation of the impacts between the three interviewed companies from the primary data. Reason for this differentiation probably lies in the fact that the companies are from different fields. Companies interviewed for A Little Book About Industryhack, are from more industrial and manufacturing fields, whereas companies from the primary data are mainly from sector whose value is in the people and their contribution.

Since the impacts between primary data interviews were so diverse, the results were analysed by comparing the impacts under certain topics. These topics were:

1. New perspectives and solver field
2. Company culture
3. Brand benefit and communicational impact
4. Access to resources
5. Partners
6. Data security

Primary data stated that open innovation creates new perspectives and broadens the solver field. This affects also the solvers in the innovation process, therefore this can be connected to chapter 5.2.1 in secondary data, which concerns new business opportunities to SMEs. As the seeker company gains new perspectives and solver field through the solvers, and the solvers acquire new opportunities for their businesses.

Renewal of companies and the whole industry through open innovation was stated in both data sources. Open innovation encourages employees to more entrepreneurshipe-like-thinking and innovativeness. Renewal of companies and the whole industry promotes digitalisation and experimental culture. Digitalisation enables new technologies and experimental culture enables trying the new technologies with lower costs through piloting projects.

Two of the companies in the primary data stated that the most important impact of open innovation for their companies is brand benefit. Although brand is important, it is quite thin benefit from open innovation process which takes time and resources. As mentioned in section 5.1.1, return of investment is not generally that high for a company whose main asset is people and their contribution. Another impact from companies whose most important gain was brand benefit, was the communicative impact. Desire for renewal was seen as important factor to be communicated to the outside. Secondary data states that the benefits of open innovation are broader compared to primary data. In total 39 new solutions were created through Industryhack's open innovation challenges. These 39 solutions have continued after the pilot projects. Significant solutions, services and even new businesses were created. This fact supports the claim that open innovation may be more beneficial for a

seeker company in the more traditional field, such as manufacturing and the industrial sector.

Access to resources was contradictory topic. Companies which main asset is the people and their contribution did not see the value of the resources accessed through open innovation that significant. However, new ideas and broader perspective were achieved. Yet again, the value of the ideas is variable. Companies in the more traditional field on the other hand noticed a high value of resources gained through open innovation. Through the open innovation process the company gets access to knowledge and technologies they do not have in-house.

Long-term partnerships were born through Industryhack's open innovation challenges as the secondary data states in the sections 5.2.1. and 5.2.2. Multiple different stakeholders are incorporated in the innovation process, which increases diversity and creates a possibility for developing the best possible solution to the challenge. By incorporating end-user right from the beginning, the product or service will be created to fit the actual user's needs.

Data security is important factor for safe and successful innovation. Primary data shows that companies do not actually reveal enough data. Reason for this may lie in the fear of loss of knowledge. Enough information needs to be shared to the innovation partner or solvers, to enable best premise for creating new product or service for the seeker. Using facilitator in open innovation process ensures fair collaboration for each participant and saves time from agreements and contracts through ready-made standard contracts. Creating contracts and making sure each participant fills the requirements for certain level of data security.

5 Conclusion

The main question is, how to innovate and which method to use, rather than why innovate. Innovating is crucial for a company to achieve sustainable competitive advantage. Impact of open innovation is broad, and it affects companies as well as the whole society. Keeping up with the fast phase of technology and development is crucial for companies to survive. However, although open innovation is diverse and can be

used for multiple purposes and in multiple different ways, is not the best tool for innovation for every company.

In the beginning of this thesis, the hypothesis was that open innovation has positive impact on every company that takes open innovation as a part of their operation. However, the level of the impact was not clear. Open innovation's impact in the A Little Book About Industryhack was impressive, however, the seekers in the research were from traditional and industrial fields. What was to be solved, was the impact on open innovation on different industries and sectors.

Literature about open innovation is mainly positive, although it has received criticisms of being only a variation of already existing model. Although open innovation is not new as a concept, it was important to coin the term and therefore develop an open innovation process. Although the term itself was generated in 2003, it still not unequivocal. However, the most occurring explanation for the term comprises opening the organisation borders to get resources from the outside and to provide resources from the inside to the outside. As company's knowledge assets can form the company's competitive advantage, it is important to develop the knowledge through open innovation by the inflows and outflows of information.

Open and closed innovation are seen as the opposites of each other. Closed innovation comprises internal R&D and the idea of employing the skilled people, rather than cooperating with them. Closed innovation model seems especially unbeneficial for smaller companies, which do not have resources for internal R&D departments. Point that came out from the preliminary data is, that internal R&D departments will decrease their value and sourcing information from outside the organisation will become more common.

Career inside one company are becoming shorter and competition for the skilled people is high. Through open innovation the knowledge can be accessed without employing the experts and specialists in a certain field. This enables compounding knowledge from different industries and broadens the perspective. As the people inside the organisation have deep knowledge about the field their ideas might be narrowed due to their expertise. Stakeholders outside of the organisation have different kind of perspectives and might have more broad ideas. When compounding these two factors,

expertise from the inside of the company and the view and knowledge from outside of the organisation, solution created for a challenge or problem will be more likely more diverse and unique.

Openness of the innovation process is defined by the number of partners in the innovation process. The more open the process is, the more innovative and broad results will be achieved. However, when the number of participants increases, the process becomes more complex to coordinate. Data from primary data implies, that up to four different parties were used in the innovation process. One of the parties was a facilitator, which makes the process more manageable for the seeker company. Facilitators have experience and established process for the open innovation process, therefore the seeker company does not need to use as much resources for coordination.

When opening the innovation process, also some issues will occur.

Issues stated in the primary data mainly covered the topic of the amount of data to be revealed and the return of invest. Issues covered in the literature were for example Not-invented-here-syndrome (NIHS), fear of failure, data security, loss of knowledge and resources of smaller companies. NIHS is an interesting error in the decision-making process, when there is a bias against a knowledge that comes from the outside of the organisations. The knowledge is overlook, although it would be better than the knowledge in-house. Losing intellectual property or worrying about data security is well-founded fear or even issue during open innovation process. Therefore, it is important to have clear rule and comprehensive contracts about the shared data and the ownership of the idea or innovation. Lack of resources of smaller companies, may include limited research and therefore it is challenging to connect with knowledge outside of the company. Smaller companies often do not have their own legal departments; therefore it may be unequal collaboration with large organisation. However, although smaller companies do not have their own R&D units, they may have some detailed or even unique knowledge. Therefore, smaller companies, especially start-ups, are on the solver-side of the open innovation process.

As a conclusion from the collected preliminary data and secondary data, open innovation has better and broader impact on traditional industries, compared to companies whose main assets are people and their contribution. However, as

discussed in methodology, with this small sample size the data cannot be generalized. For some open innovation plays as a source of knowledge and ideas at best, but for some it creates significant business opportunities. Common factor from both, the primary data and secondary data, is that there is a desire for renewal. This renewal may be renewal of the whole industry or renewal of the company. Companies do not only want to renew, but to communicate the renewal to outside.

Access to knowledge and resources seemed to be another topic of differentiation in the primary data interviews. If the data from primary data would be generalized, the conclusion would be that large organizations do have the access to the knowledge they got through open innovation, even without implementing open innovation.

As a result of the primary data, companies whose main asset are people and their contribution, stated that often enough data is not revealed. However, companies in that field, do not often have information about their processes or products which would affect their operation negatively when shared. Companies in different industries such as technology and manufacturing industry may often have information that is crucial for their sustainable competitive advantage.

For further research it would be suggested to research the impact of open innovation in the perspective of solvers and in several open innovation tools. Another interesting alternative for further research would be the impact of open innovation to public organisations. Public organisations can perform as seeker or solver side of the innovation process. It would be beneficial to include larger sample size to the research, since the sample size for gathering the primary data for this thesis was only three. The research could be quantitative and numerical data could be gathered to measure the impact of open innovation.

6 References

Arias-Pérez, J., Perdomo, G. and Castaño, C., 2017. Not-invented-here syndrome and innovation performance: the confounding effect of innovation capabilities as organisational routines in service firms. *International Journal of Innovation Management*, [e-journal] 21(1). 10.1142/S1363919617500360.

Birkinshaw J., Fey C., 2001. External sources of knowledge and performance in R&D organisations. *Journal of Management* [e-journal] 31(4). 10.1177/0149206304272346

Business Finland, 2019. *Open innovation matchmaking*. [online] Available at: <<https://www.businessfinland.fi/en/whats-new/events/2019/open-innovation-matchmaking/>> [Accessed 08 February 2020]

Caruna Vuosiraportti, 2019 [online] Available at: <<https://www.caruna.fi/caruna/vuosiraportti2019>> [Accessed 28.10.220]

Chesbrough, H., 2003. *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Harvard Business Review Press. Boston: Harvard Business School Press

Enkel, E., Gassmann, O., and Chesbrough, H., 2009. Open R&D and Open Innovation: Exploring the Phenomenon. *R&D Management* 39(4): 311-316.

Eurostat, 2016. *Small and medium-sized enterprises*. [online] Available at: <<https://ec.europa.eu/eurostat/web/structural-business-statistics/structural-business-statistics/sme>> [Accessed 06 February 2020]

Greenhouse, J., Callanan, G., Godshalk, V., 2010. *Career Management*. Sage Publications.

Grönlund, J., Sjödin, D., Friskhammar, J., 2010. Open Innovation and the Stage-Gate Process: A Revised Model for New Product Development. *California Management Review* [e-journal] 52(3). 10.1525/cmr.2010.52.3.106

Hossain, M., 2013. Open innovation: so far and a way forward. *World Journal of Science, Technology and Sustainable Development*, [e-journal] 10(1):30-41. 10.1108/20425941311313083.

Huff, A., Möslin, K. and Reichwald, R., 2013. *Leading Open Innovation*. Cambridge: The MIT Press.

Industryhack, 2020. General Terms for Open Innovation Contest. [online] Available at: <<https://industryhack.com/openterms>> [Accessed 10 February 2020]

Krause, W., Schutte, C., and Preez, N., 2012. *Open innovation in South African small and medium-sized enterprises*. [pdf] Cape Town: University of Stellenbosch. Available at: <https://www.researchgate.net/publication/290440615_OPEN_INNOVATION_IN_SOUTH_AFRICAN_SMALL_AND_MEDIUM-SIZED_ENTERPRISES> [Accessed 12.10.2020]

Lazzarotti V. and Manzini R., 2009 Different Modes of Open Innovation: A Theoretical Framework and An Empirical Study. *International Journal of Innovation Management* [e-journal] 13(4):616-632. 10.1142/s1363919609002443

Luoma, T., Paasi, J. and Valkokari, K., 2010. *Barriers to Innovating Openly*. [pdf] Tampere: VTT Technical Research Centre of Finland. Available at: <https://www.vttresearch.com/sites/default/files/julkaisut/muut/2010/Luomaetal_final.pdf> [Accessed 23 December 2019]

Newsec, 2020 [online] Available at: <https://www.newsec.com>

OP Ryhmä, 2020. Tietoa ryhmästä [online] Available at: <<https://www.op.fi/op-ryhma/tietoa-ryhmasta/op-lyhyesti>>

Pulliainen, M., 2020. "Koodareita pitäisi kohdella kuin kuninkaallisia" – hackathonit toipuvat alkuaikojensa pizza ja kola -maineesta. *Tivi*, [online] Available at: <https://www.tivi.fi/uutiset/koodareita-pitaisi-kohdella-kuin-kuninkaallisia-hackathonit-toipuvat-alkuaikojensa-pizza-ja-kola-maineesta/a298e369-950a-42e3-8c54-ff023bbfad5e?fbclid=IwAR0lp2xavmv58_DLRW3OcaeP4EtWC2FA4U4hthJsVYoo9q54IYD3YHGCH6Q> [Accessed 10 February 2020]

Rinta-Möykky, J. and Vilén, P., 2019. *A little book about Industryhack: Stories and impact from our first five years 2014-2019*. [pdf] Industryhack. Available at: <<https://industryhack.com/impact/>> [Accessed 25 October 2020]

Santamaría, L., Nieto, M., and Barge-Gil A., 2010. The Relevance of Different Open Innovation Strategies for R&D Performers. *Cuadernos de Economía y Dirección de la Empresa* [e-journal] 13(45). 10.1016/s1138-5758(10)70025-6

Trott, P and Harmann D., 2009. Why "open Innovation" is old wine in new bottles. [pdf] Delft: Delft University of Technology. 13(04) 10.1142/s1363919609002509

Trott P. and Hartmann D., 2013. Open innovation: old ideas in a fancy tuxedo remedy a false dichotomy. In Joe Tidd, ed., *Open Innovation Research, Management and Practice*, 359-386. London: Imperial College Press.

Työ ja elinkeinoministeriö, 2020. Julkiset hankinnat yhteiskunna tärkeiden kehitystavoiteiden toteutuksessa. [online] Available at: <https://tem.fi/documents/1410877/2132258/TEM_IJH_Toimenpidesuunnitelma.pdf/71b99e5f-7529-ea26-e3e389566d21a4ea/TEM_IJH_Toimenpidesuunnitelma.pdf?t=1598879442837>

Van de Vrande, V., de Jong, J., Vanhaverbeke, W. and de Rochemont, M., 2009. Open innovation in SMEs: Trends, motives and management challenges. *Technovation*, [e-journal] 29(6-7): 423-437. 10.1016/j.technovation.2008.10.001

Vrgović, P., and Jošanov-Vrgović, I., 2018:9. Open innovation systems in developing countries: Sustainable digital networks and collaboration SMEs. *Dynamic Relationships Management Journal* [e-journal] 7(2). 10.17708/DRMJ.2018.v07n02a01

Walle, A., 2015., *Qualitative Research in Business: A Practical Overview*. Tyne: Cambridge scholars publishing

Interview questions in English

Why did start using open innovation as a part of your operation?

How open innovation has effected your company culture?

How do you think open innovation effects society?

Would you have access to resources you got during the open innovation process, without cooperation with the partner?

What are the most important learnings you and your company got from open innovation?

Interview question in Finnish

Miksi otitte avoimen innovation osaksi toimintaanne?

Miten avoin innovaatio on vaikuttanut yrityksenne kulttuuriin?

Miten avoin innovaatio on vaikuttanut uusien innovaatioiden luomiseen?

Miten uskot avoimen innovaation vaikuttavan yhteiskuntaan?

Pääsittekö käsiksi resursseihin, joihin ette olisi päässeet ilman avointa innovaatiota?

Tärkeimmät avoimen innovaation luomat opit?