

Blekinge Institute of Technology
Department of Industrial Economics and Management
2014 - 2016 MBA Programme



Open Innovation for small companies:

How should an open innovation model be designed to increase the innovation capacity for small companies?

Complete Thesis Proposal

Thesis course - IY2578 - Spring 2016

Erik Pernestam, erik.pernestam@gmail.com

and

Lars Wattsgård, lars@wattsgard.se

2016-05-02

Abstract

This master thesis compares the theory regarding open innovation in large companies with empirical studies on small companies inside an incubator. For small companies as a collective as well as Sweden as a nation it is of utter importance to strive to increase growth as well as give more ideas commercial traction. Focus has been to evaluate existing knowledge, structures and processes from large companies, to decide what could be adopted and applied to the small company in an incubator environment. We do not seek to define a complete innovation model, for any specific type of case company, nor generalise among all small companies, but rather study general guidelines to understand how open innovation methods could be applied to the broad spectra of small innovative companies.

Open innovation is a broad topic and has evolved over the years regarding areas where it is applicable. Based on relevant theories and empirical data, a model on how to use open innovation to small companies has been proposed. By applying this model in an incubator environment, it could be possible to take advantage of the practices offered by open innovation in large companies, while still benefiting from being small.

By usage of a qualitative analysis method, this thesis formed theories, through the research of a narrow field of interest with a focus on deep exploratory research.

Acknowledgements

We would like to thank our families for their tremendous support during the MBA program in general and the writing of this master thesis in particular. We would also like to thank our peer reviewers who have contributed in a constructive way to this master thesis as well as our employers who have shown both support and understanding throughout the program.

Last but definitely not least; we would very much like to thank our thesis supervisor Dr. Urban Ljungquist for his valuable input, guidance and great source of knowledge. The thesis would not have reached this level without your constructive comments and suggestions.

/// Erik Pernestam and Lars Wattsgård

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1 Introduction

In Sweden 60-80 000 new businesses are started each year. Most of these companies have relatively small barriers of entry, such as a hairdresser or a carpenter. Naturally there are also the opposite, companies with high barriers of entry, barriers such as capital to fund the start-up or the necessary competence to pursue a certain technology, innovation or market with an uncertain outcome. Despite governmental initiatives of tax reductions, regulations and similar support studies show that there are fewer companies that survive the first two-three years in Sweden compared to other OECD-countries (Tillväxtanalys, 2014).

The obvious difference between the two is the level of risk and uncertainty the company will face in its early years. With a new product or service previously unknown to the market, it will always be challenging to assess how the market will greet it. The carpenter, hairdresser or shoe seller with a known business model can easier overlook what is needed to make ends meet. For small innovative companies with a higher level of uncertainty many turn to business incubators to find a different kind of support. Everything from venture capital, networking, competence to idea pollination, merges within these central innovation hubs.

In markets where several companies compete and complement each other, with products as well as related services, it is necessary to find a competitive edge. For a small sized company, with limited resources, typically only minor updates are done to the current product portfolio. New product development (NPD) often requires external capital, such as bank loans, business angels or support from local investment funds.

In the small company segment, one approach to grow business and stay competitive is to innovate and generate unique solutions, (Linde and Ahlstedt, 2011). At the same time, historical buyer and seller relations can be transformed into a long-term cooperation, creating a stable value stream for both parties. Furthermore, competition is not any longer only on quality and price, as the relation and cooperation with customers become a more important way to generate value. Typically, competition is still tough with regards to quality and cost, but the relationship and cooperation with the customer become a more important part to secure long-term value (Zeng, 2010).

Both authors have extensive experience from product development and innovation management from areas such as software development and medical technology. We have experienced a lack of resource allocation to promising ideas that possibly could have developed into new thriving companies with the right method. We argue that it is important to shed light on how innovations in small companies can be supported to survive and grow. Small companies are often closely linked to one or a few innovations and they are especially vulnerable, which is

why the innovation environment in an incubator is vital to study. We want to increase our understanding in this area and propose improvements that can be applied within an incubator.

1.1 Background

The importance of small innovative companies is not neglected. In 2007, the Swedish innovation agency Vinnova, published their Vinnova Policy 2007:01. Main directives is to promote national innovation, female innovators, national and international networking and work opportunities. The discussion focuses on the strengths of the fast paced and transformative way small and medium sized firms work, with a market driven approach to development (Vinnova, 2007). It also emphasizes the need for Sweden to promote small and medium sized innovative companies as to secure the future of Sweden's business environment.

Even though the innovation climate is currently considered to be very good this is not any guarantee that it will be tomorrow (Stenberg, 2002). As globalization increases with more companies establishing themselves in Sweden and more Swedish companies establishing themselves abroad the Swedish economy and thus also the innovation environment is depending more on international changes (Vikström, 2011). This implies that Sweden need to be able to support innovations on an international level to prevent innovations from leaving the country (Vikström, 2011). Gassmann (2006) adds that the increased market dynamics and competition also increases the importance of support for innovations. Chesbrough (2003) also claims that the mobility of knowledge workers, venture capital as well as the wide range of possible suppliers has forced a change in the traditional way of innovation.

Not only Sweden makes these kinds of efforts and similar governmentally funded agencies are the Small Business Innovation Research (SBIR) in the US and the Innovation Relay Center network (IRC) in Europe.

Drucker (2001) states that companies must continuously strive to improve their performance, becoming more efficient or offering better products as equal alternatives cannot co-exist in the same segment. However this does not imply that the company necessarily need to grow larger in size. In the meantime, for each product generation the trend moves towards shorter product life cycles with hard to meet profit margins which pushes product development departments to the limit. Companies that do not have the resources to increase R&D expenses may experience that they inhibit innovation or are even forced to postpone viable products. This has led to a shift from only relying on internal resources toward a more open view on innovation where resources can be added from the outside to expand existing opportunities (Fleming, 2001; Hargadon and Sutton, 1997).

In 2003, Henry Chesbrough collected these trends that had previously been studied under the term "Open Innovation" by Henry Chesbrough. His work has received a lot of attention among scholars as well as leading industries. In short, the concept of open innovation promotes a flow

of ideas both internally and externally, opening up the company boundaries to consider new business models.

1.2 Problem discussion

Even though the concept of open innovation has received a lot of traction the main research has been done on large companies with the primary intention of management implications in large technological companies (West et al., 2006). Narula (2004) argues that that the main reason that small companies have been outside of scope is due to their lack of technological assets accessibility of external resources. The small companies are by definition forced to reach out externally to find the right competences, which implies that they already are using an open innovation approach (Edwards et al., 2005). While this may be completely true it is also important to consider that large and small companies are often specialized in different types of innovation (Vossen, 2008).

Open innovation methods ranges from including the customers in the product development process, creating product platforms common for software development or even organizing innovation networks with external partners for a certain reward (Gassmann, Enkel and Chesbrough, 2010). Larger companies may to a certain extent rely on open innovation to bridge gaps in their own product development. For example, licensing technology to get access to features that otherwise would take a lot of research efforts to acquire without infringement of intellectual property. These open innovation methods have not been applied to the same extent on small companies and the empirical research is not affluent (Gassmann, Enkel and Chesbrough, 2010).

We believe that a large part of the innovative movements will shift in favour for smaller companies than today. This is where we want to investigate the possibilities, models and methods for small companies to adopt certain innovation practices used in larger companies. Logic being, that if done the right way, it will increase the product development capacity with scarce resources and in the long run increase the competitiveness and growth of small companies.

The model by Lee et al. (2010) in figure 1.1 below, suggests that the commercialisation of an innovation is an essential part that is often overlooked in small companies. In other words the use of external resources comes in late in the innovation cycle. Lee et al. (2010) also concludes the limited ability for small companies find external partners and build trust within its network. Lichtenthaler and Ernst (2009) also argue that many firms are not interested in inviting external sources into their innovation processes. Keupp and Gassmann (2009) highlights the increased transaction costs as well as trust issues with intellectual property as the main issues for a successful use of open innovation independent of the size of the company.

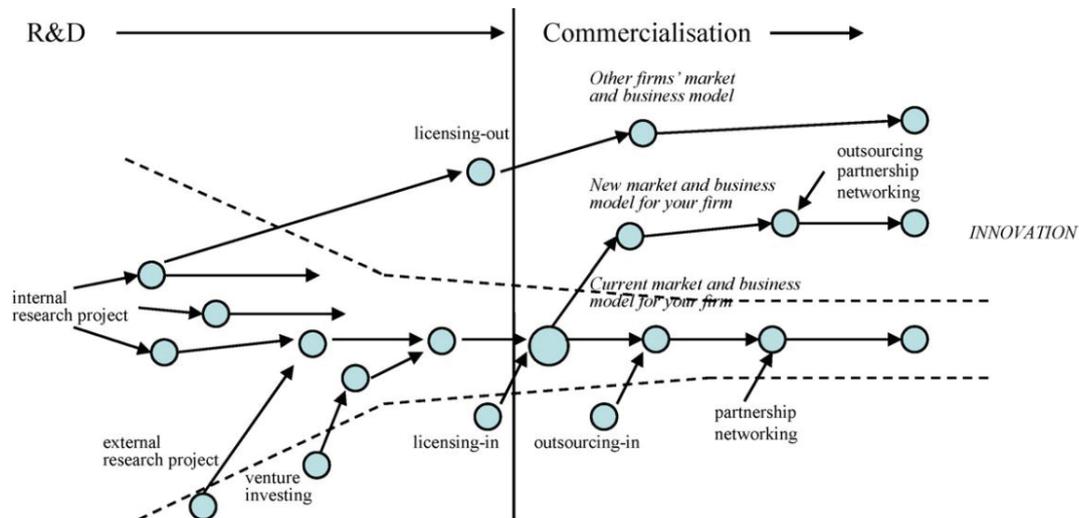


Figure 1.1. Lee et al. (2010) *Open innovation model for small and medium sized enterprises (SMEs)*.

Building on the issues highlighted by Lee et al. (2010), Keupp and Gassmann (2009) and Lichtenthaler and Ernst (2009), our thesis proposes that known open innovation methods from large companies applied, with the support from an incubator as intermediary, would increase their innovation capacity for small technological companies.

1.3 Problem formulation and purpose

This thesis will focus on extracting open innovation ideas and methods used in large companies where the theoretical groundwork is generally considered to be well supported. The theoretical framework extracted will form the base of what is intended to be formed into a platform for open innovation in small companies within an incubator. This is necessary to study empirically as the theoretical framework is not currently sufficient. Thus the research question for this thesis is:

“How can an open innovation model from large companies be applied on small companies within an incubator?”

Small companies may enter a business incubator environment but even though there are a lot of different types of incubation programs they usually only offer low level services such as office space and support with administrative tasks (Bergek and Norrman, 2008; Löfsten et al., 2006). However, with a more open approach where the flow of ideas and knowledge is supported in a more holistic way we argue that the result in terms of successful innovations would be greater. Thus the purpose of this thesis is:

“The purpose is to suggest an open innovation model designed to suit small companies in order to increase their innovation capacity.”

Answering this question we are able to contribute to both open innovation practitioners as well as shed light on the theoretical aspects.

1.4 De-limitations

We have limited our empirical studies to growing small companies, residing within Sweden, but with no limitation regarding their international connections. Implying that structures and support given within incubator programs, and equivalents, may be less applicable on an international level even though each program also has individual traits.

1.5 Thesis structure

The thesis is structured in the following chapters.

- Chapter 2: Theory
This chapter is aimed at introducing the reader and to present an overview of the theoretical studies on the general subject as well as providing the in depth knowledge of chosen theories that is necessary to understand the analysis of the collected data.
- Chapter 3: Method
This chapter presents the research method chosen to build knowledge around the chosen topic. A discussion regarding alternative methods as well as the limitations and weaknesses of the chosen method is also covered in this chapter.
- Chapter 4: Empirical findings
The empirical findings chapter presents the collected findings in a clear and structured way.
- Chapter 5: Analysis
The analysis chapter aims at studying the collected data and through the lens given by the theoretical framework previously defined give answers to the stated research question(s).
- Chapter 6: Conclusion
The last chapter gives a short summary of the findings and its implications, including the shortcomings of the conducted research. The chapter finishes by suggesting future research topics.

2 Theory

This chapter gives the theoretical foundation to understand the fundamental aspects of product development and innovation for small and large companies in general terms. More specific concepts of innovation methods such as open innovation are further described together with its implications and current limitations.

2.1 The general product development process in small and large companies

The following chapter describes the product development process in both small and large companies in general terms. Regardless of the size of the company the product development process, or rather a method of organising the innovation process, has a lot of variations depending on the nature of the project, business area and even possibly due to regulatory reasons. However, there are general guidelines which are adapted to the given product development environment.

The general project model guidelines according to Tonnquist (2012) consists of a collection of activities with pre-defined targets or milestones, which ultimately leads to the predefined goal. This general project model presented by Tonnquist (2012) contains the following phases; Pre-study, Planning, Execution and Closure. Adjusted for companies developing physical products this translates to the phases; Analysis, Planning, Design, Prototype, Pilot Series and Production. As previously stated, this may be necessary to adjust depending on scope. As an example, new product development projects, sustaining projects or product differentiation projects usually differ in their process.

A company with a successful product development process does not always mean that it is the company with the best ideas. Successful companies are often more likely to have found a way to handle trade-offs, in fact capitalising on an average idea, formed into a compelling product or service. This further implies that multiple divisions have collaborated and made the adequate decisions to finally deliver a positive contribution to the market. The development process is likely to have contained consistent checks within the project group, stakeholders as well as focus groups to reduce uncertainties about its final setup. Point being, entirely unique ideas and solutions are rare, which is why average ideas need to rely on a product development process to form ideas into a realized product in a viable context (Tonnquist, 2012).

Furthermore, it is necessary to divide the challenges of the product development process, depending on its level of innovation. Improving existing technology can usually be considered to be of incremental product development, implying a low degree of innovation. While exploring new technologies or markets, implies a high degree of innovation. The latter usually faces high uncertainty, where 'normal' management tools and processes that work well on incremental innovations are inadequate. Such innovation projects cannot be confined to a linear stage-gate-milestone development process (Fees, 2010). In other words, the product

development managers must have an agile approach, to overcome the uncertainties that may unfold during the project, which potentially may lead to the abortion of the project.

In the end, the importance of successful product development is recognised as fundamental to companies' survival. In the long term, it is also what sets successful companies apart from more modest companies within an industry. However, each company has their approach to the product development process, which also extends to a general view of supplier involvement, networking and collaboration between developers with no real general framework (Tidd & Bessant, 2013). Dershin (2010) argues that innovation should be perceived as a complex, adaptive and non-linear system. Not a collection of isolated events. Or as Miller and Olleros (2007) puts it, from a managerial perspective some executives still view innovation as an unmanageable process, filled with potential risks.

2.1.1 Innovation and product development

Until now we have described product development and innovation in general terms where their processes are integrated to a large extent. However, there are differences between innovation and product development; they are usually not mutually equivalent although they coincide.

“Companies achieve competitive advantage through acts of innovation. They approach innovation in its broadest sense, including both new technologies and new ways of doing things.” (Porter, 1990).

In paragraph 2.1 we described product development as a process with a series of steps, which ends with a commercially viable product or service. Both the innovation and product development processes come together in the first steps of the whole product development process. In other words, the innovation process is an integrated part of the product development process (Tidd & Bessant, 2013). Tidd & Bessant (2013) continues to explain that invention is in the same way often confused with innovation, where the invention only constitutes the first step of an innovation process. However, companies often continuously improve or develop new products, without adding innovation height in terms of ground-breaking ideas.

2.1.2 Small and large companies - differences in the product development process

The general conception is that small companies do their product development work with little resources at hand, referring to both financial and labour resources (Laforet and Tann, 2006; Millward and Lewis, 2005; Lee et al., 2010). According to Ledwith et al. (2006), it is also common that the few employees are covering several professions, reaching from new product development (NPD) to sales. As the company grows larger, with more products and more personnel, the lack of well-defined job descriptions, processes and routines will at a certain point get troublesome.

In some aspects, the small start-up company may not have a precise product development process to lean against, instead benefiting from short communication paths within the company. With only one, or at the most a handful of, products they will have all eyes on the target (March-Chordà et al., 2002; Scozzi et al., 2005). It also means that most decisions will be made by only one or a few people, all involved in most aspects of the small company. This setup can make the company more agile regarding changing its current offer to increase customer value or to make adaptations to specific clients (Reid & Brady, 2012). It can also lead to an ineffective or inconclusive decision process that may impact the whole company in a negative way.

Working with NPD in large companies usually consists of a more structured approach with separate departments, well-defined responsibilities, and processes. The trade-off in agility is weighed against the possibility to manage several NPD-projects simultaneously, which includes mobilising resources where they make the most effect (Wakasugi and Koyata, 1997). Another key in large company NPD is the positive leverage of risk between the projects that are pursued. Existing products produce a positive cash flow that can fund research and NPD.

NPD work in large companies is more often further away from the customers than a small company. The distance can be more of a logistical issue with many different distributors or subsidiary companies between the company and the customer. It can also be a result of internal differences between departments that alienate NPD from getting proper market input and customer validation.

Comparing the two, Lee et al. (2010) states that small companies often faces innovation barriers such as labour shortage, lack of information, lack of infrastructure and finances while large companies rather faces barriers such as monopolistic or oligopolistic markets, powerless R&D department and reluctance to additional innovation. According to Keupp and Gassmann (2009) these barriers or internal rigidities are one explanation why some companies adopts open innovation rather than others. Lichtenthaler and Ernst (2009) on the other hand, suggest that the decision to open up the innovation process depends just as much on the level of technology aggressiveness. Small companies pursuing radical innovations leading to new technologies are less prone to inter-firm collaborations although requiring a high amount of R&D activities Lichtenthaler and Ernst (2009).

To conclude, the main differences in NPD between small and large companies reside in the following areas:

- Resource allocation.
- Process control.
- Agility and adaptable to new market developments or consumer trends.
- Distance to the customer
- Risk awareness.

2.2 Exploiting shared innovation methodologies and its implications

In the period of 1980-1987, the book *“Research on the Management of Innovation - the Minnesota Studies”* was written. Large companies present and their innovation management were minutely examined (Van de Ven et al., 2000). At the time, the nature of shared innovation was merely jointly developed products, between two large enterprises complementing each other's competencies.

Described by Sandström and Björk (2010) the nature of the innovation process is constantly changing and during recent times, it has primarily evolved from incremental product innovation to business model innovation, disruptive innovation and open innovation. The disruptive innovation could be defined as a significant change related to either technology- or business model as by Veryzer (1998). This development imposes new challenges and demands on the innovation process in general. According to Sandström and Björk (2010), the theoretical studies of disruptive innovation has started to shift from primarily being used to explain business failures towards exploring how companies can proactively use it to their advantage. This conclusion has led to an adaptation of the ideation phase, where companies are increasingly leaning upon external resources to become more innovative - open innovation.

It is a current trend of democratisation within innovation methodologies, which lead to disruptive development on a larger scale. One example is mentioned by Osterwalder and Pigneur (2010) who describes an interesting shift in the media business, where the original business model of selling a few products in large volumes, is challenged by the offering of a wide variety of products sold in very low volumes. He claims that the reason behind the trend is due to a democratisation of the production tools and distribution channels. The theory of democratisation of, e.g. production tooling and new digital distribution channels, applied on more traditional product development companies may have a deep impact on the industry as well as its tail of suppliers.

Similar trends can be observed in the production industry where niche consumer goods are sold in low volumes on a platform with a broad database of customers, such as eBay. In this environment, a key element is to develop a suitable business model. Osterwalder and Pigneur (2010) gives one example of Rolls Royce who switched their business model, from developing and producing airplane engines to charging the customer for each running hour of the engine. Hence, Rolls Royce changed from a product providing company, to a service providing company with an increased profit.

Another trend in a similar category that has recently been popular for companies to exploit is to organise innovation platforms or contests open to the public, to solve real problems for companies. Some examples worth mentioning are GE Ecomagination Challenge, P&G Connect & Develop program and IBM Innovation Jam among others. These initiatives give companies

access to a vast bucket of innovative ideas and suggestions if they are handled correctly and the public can release its innovative ideas in solving real problems. West (2008) describes that companies in different ways try to imitate such creative environments by setting aside time and resources for their employees to pursue their product ideas.

In a way West (2008) advocates a certain amount of freedom within the structured company to maintain a “hacker mentality” and the joy of solving real problems. IDEO is one example of a Community of Innovation (COI). Illustrated by figure 2.1, the main differences between a COI and a Community of Practice (COP).

According to West (2008), when IDEO initiates a new project they use their database of own employees together with knowledgeable resources from the outside such as consultants, scientists, other academics and CEOs. In other words, pretty much anyone that could have valuable input to the project and give their employees a holistic picture of the task.

Iturrioz et al. (2015) makes his statement in the same direction and emphasises the social circumstances and importance of intermediaries to foster shared innovation. The key to shared innovation is based on diversity, interdependence and a supportive climate for innovation activities. Volberda et al. (2013) also advocates the use of intermediaries or external change agents to ease the adoption of innovation management. In this context, external change agents can be consultants, academics or other knowledgeable external actors but it is of great essence to match the kind of leadership with the type of innovation management that is introduced.

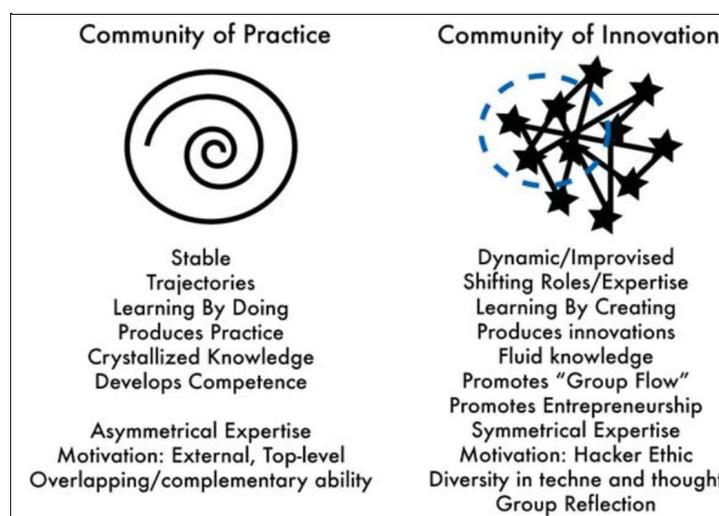


Figure 2.1. West (2008) on COP and COI differences.

Innovation, as described here, is somewhat of an unstructured process of networking, typically with the common factor of a driving force to get to the result. Tidd & Bessant (2013) introduces

the 'spaghetti' model for innovation. Sharing knowledge in a spaghetti-like fashion creates a proper scene for innovation.

2.3 Open Innovation

Open innovation is a holistic concept that was presented by Henry Chesbrough at the beginning of the 21st century. The concept has taken many different shapes over the years even including influences on other disciplines such as economics, psychology and sociology (von Krogh and Spaeth, 2007). Targeting large corporations, Chesbrough's definition of open innovation is "*the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation*" (Chesbrough, 2012, p. 20). This differs from the traditional way of working in a closed vertical model, where internal innovation leads to the internal development of products, that are distributed outside of the company. Although, much of the building blocks of open innovation can be traced to earlier studies. Ideas on customer integration were for example presented by von Hippel's (1986).

It is important that the reader understand that open innovation comes in many different variations. Or as Huizingh puts it: "*Open innovation comes in many forms and tastes, which adds to the richness of the concept but hinders theory development. Therefore, it is necessary to develop open innovation frameworks*" (Huizingh, 2011, p.3). Dahlander and Gann (2010) also add that open innovation is rather a span of various levels of open innovation implementation than an open versus closed dichotomy.

The ambition with open innovation is to foster a more permeable environment where innovations and ideas can be transferred between partners to advance a particular technology or to join forces by sharing risk and reward of co-development. The background is of course of economic nature; companies can no longer afford to sit neither on their unused inventions and patents nor can they solely rely on its innovation resources to generate the future. Instead, they will need to complement the internal innovation by external input, and to make internal ideas available to others on commercial terms. According to Chesbrough (2012), as much as 70-90 per-cent of high-tech company's patents are neither used internally nor licenced to anyone outside, hence not creating any new value at all for the company.

Chesbrough (2012) recognises two different types of Open Innovation; outside in and inside out.

- *Outside in* demands that the company opens up its innovation processes inputs and contributions from external sources.
- *Inside out* requires that the company allows ideas that do not get traction inside the company to reach outside the company boundaries to find what is necessary to make it blossom.

Both from an academic point of view but also from an empirical perspective, the inside-out part of the model is much less studied and explored.

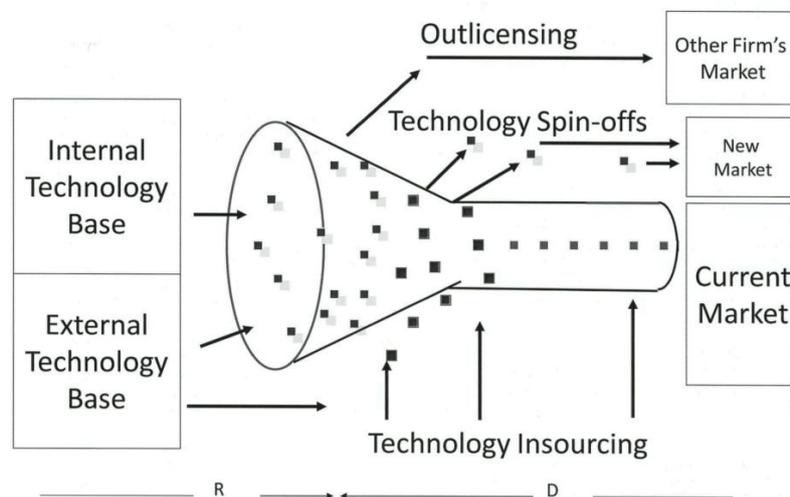


Figure 2.2. Chesbrough (2012) model of Open Innovation.

As previously mentioned, this kind of collaborative methods must rely on some fundamental properties. Chesbrough (2012) means that successful open innovation requires a set of diverse people who can gather knowledge from different sources, work side by side and collaborate to find new combinations to move existing technology forward. Another fundamental aspect is to manage the intellectual property, especially when considering open innovation in capital-intensive projects. Hence, it is also necessary to open up the company attitudes towards new business models to capture more value from innovations.

Although Chesbrough's model in figure 2.2 above can be seen as a backbone there are many variations and industry adaptations. Lichtenthaler (2010) presented a roadmap to exploit technology going outside of the company while Wallin and von Krogh (2010) has focused on integrating knowledge into the company. Wallin and von Krogh (2010) defines their open innovation model in five stages; define the innovation process, define innovation-relevant knowledge, chose integration method, select controlling mechanisms and find balance through control and incentives.

Perhaps the most interesting addition to this model regarding small companies has been presented by Lee et al. (2010), which can be viewed in figure 2.2 above. Lee et al. (2010) suggests that to a large extent small companies searches for potential collaboration partners late in the innovation process. It is when the product is about to be commercialised the small companies reaches out, which is possibly a result of the lack of resources.

The level of collaboration between small companies and possible partners using open innovation are not studied to the same extent as within large companies (West et al., 2006).

Although different collaboration practices among large companies has been suggested (Chesbrough, 2003; Narula, 2004; Lee et al., 2010) has contributed to this by suggesting a set of collaboration practices for small companies that can be seen in figure 2.3 below. During the innovation exploration stage the small company is more likely to find partnerships that help them focus on a few technological areas, usually with universities or similar institutes due to the fear of giving away technology to potential competitors (Lee et al., 2010; Narula, 2004). In the innovation exploitation stage, small companies are more likely to enter strategic alliances with both large and small firms directly (Lee et al., 2010; Luukkonen, 2005).

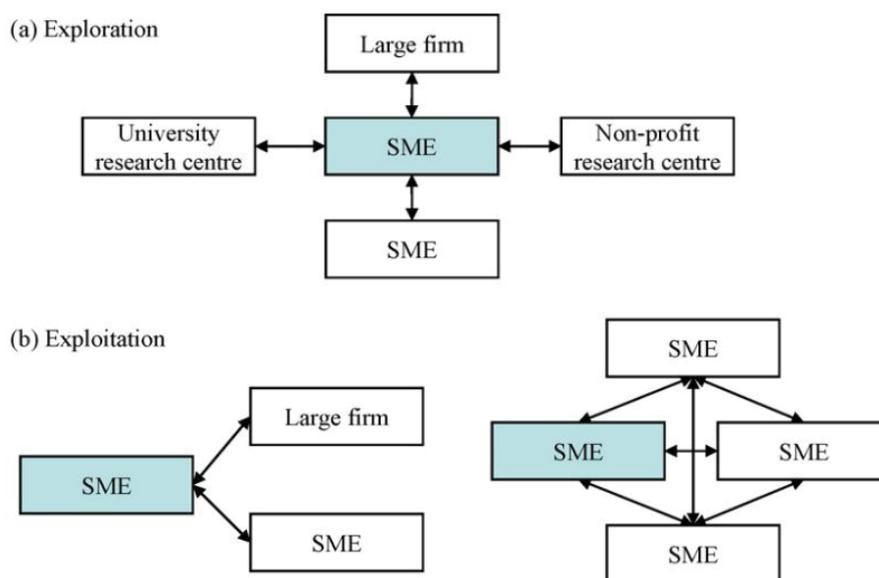


Figure 2.3. Lee et al. (2010) suggested collaboration practices of open Innovation.

Lee et al. (2010) stresses the importance for small companies to use networks in order to find co-development partners and expand their competences. However, the level of commitment in terms of information, time and financials to monitor the environment to keep an updated network is likely to be too much for small companies in general.

2.3.1 Open Innovation in a future perspective

The term open innovation has been a widespread term for quite some time and although there are many interpretations, it is certain that it will continue to influence the way we think of and work with innovation in the future. Chesbrough's thoughts of the future path of open innovation are that it will grow larger, with more engaging participants from more diverse backgrounds. Chesbrough (2012) discusses open innovation to more and more include organisations, suppliers, competitors and even whole social communities. Huizingh (2011) are on a similar path, claiming that in ten years no one will talk about open innovation as it will be fully

integrated as no organisation can afford not to. However, Huizingh (2011) also argue that now when the early adopters have proven the concept successful in large companies it is not likely to go as smooth for the general company. They may just as well be more reluctant to organizational changes and adopting new innovation methodologies.

Phillips is one example of an enterprise that actively uses so-called “tech scouts” for monitoring the market for innovations. Once an innovation has caught their attention, discussions are started and agreements are put in place, one way of using technology insourcing (Goffin & Mitchell, 2010). It provides Philips with a neutral and anonymous intermediary, able to, in a defused manner, discuss with start-ups about their future technologies without disclosing the corporation behind. This is necessary for Philips to remain invisible when probing for new technology, as it does not want to be associated with a specific technology until the product is launched.

One of the most important trends that need to be recognised to analyze where we are headed, with all kinds of shared innovation methodologies, is that the traditional high-tech companies or entrepreneurs are not longer in the front row to the same extent. In the future, it is likely that innovation initiative is democratised just as Chesbrough suggests. Leitner (2013) is on the same track and argues that this can be traced down to demographic changes with increased level of education, willingness to contribute to innovation and to adopt new ideas. He also argues that the individualisation of society is a driving force for this development as people tend to express themselves by influencing design and behaviour of their products to fit their needs and perception.

Innovation will more and more become a state of mind, something that happens anywhere at anytime. Leitner (2013) argues that the current trend will go so far that all employees, regardless of level, will take part in innovation activities. Creativity and innovation will become a part of the daily routine and an essential ability, which also reconnects with Huizingh’s (2011) and Chesbrough’s (2012) ideas.

2.3.2 Open Innovation in large companies

Interviewed by Ruchon (2014), is Mr Steven Vaassen, Open Innovation Leader at Philips Consumer Lifestyle, describes how Philips were transformed into an open innovation organisation. Driven by a new CTO in Philips, "He brought to Philips a clear vision about why Open Innovation is important and the values it adds.". Then by both top-down work, evangelization, pushing these values and benefits from top management downwards into the organisation. Once the evangelisation is under way, equally important, is the bottom-up work, by providing a set of tools, methods and processes, he got open innovation into being a natural part of their working days. Open Innovation Champions are available in all locations where

Innovation is done, and a small central team is coaching them. Funding is done locally at each site. (Ruchon, 2014).

We refer to the above as “fluent OI practitioning”.

As previously mentioned the information availability, the demographic changes, and individualistic trends have all influenced to a, generally speaking, higher pace in society which is also reflected in the expectations on product innovation (Leitner, 2013). Some companies have included customers much earlier in their product development cycle to get quicker feedback to what products actually are viable while others have pursued the co-development path.

Some examples of open innovation models:

- Technology spin-offs
- Customer value (product / business model development)
- Redefining failed products
- Technology out-licensing
- Co-development / joint ventures

Chesbrough (2012) mentions Xerox as one example of a large company where he get the opportunity to track 35 projects that had been rejected internally as they did not fit into the existing business model of the company. Although most of these 35 projects that were pursued outside of the company failed, some did succeed and finally became publicly traded companies where the combined market value exceeded Xerox own value by far. The failure of not recognising the potential in these projects can be traced to the company’s view of its core business and its method for handling spill overs within its R&D department. These technology spin-offs are one way to create revenue from innovation that falls outside of the current business scope.

According to Chesbrough (Allio, 2005), his studies of these 35 project made him understand that their success rate did not really come down to the actual technology or the quality of it but more the ability to identify the customer problem and package the solution to maximise the customer value. This iteration process of trial and error in order to design a new business model around the innovation is difficult for larger companies as it requires agility, which is why it is important for larger companies to follow up on start-ups and small companies in their industry to see what is going on.

A more successful example of open innovation in large companies can be found in the pharmaceutical industry. Allio (2005) presents an example of successful open innovation from the pharmaceutical industry where Pfizer beautifully moved a failing drug from its

cardiovascular department to a whole new business area at that time. Today we know that drug as Viagra and the market is enormous without exaggeration.

Chesbrough and Schwartz (2007) also takes Millennium Pharmaceuticals as one good example where the management early on realized their lack of capital to fund long and meticulous product development of new drugs. Instead, they focused on the early stages of innovating a broad spectrum of new drugs and then partnered up with larger firms to handle the remaining development and testing to an approved drug. This way of licensing their early innovations to avoid extensive capital expenses was very successful and they could later move on to fund their own drug development and becoming a direct competitor to the former co-development partners.

However, when considering a co-development venture where the core competencies of a company are involved and shared they must be managed closely. Cisco has made many successful ventures with smaller companies within its own core business. Chesbrough and Schwartz (2007) describe their approach has been to have a certain amount of equity in the partnering company and possibly even a deal to acquire the company within a certain time frame in order to protect themselves.

As always there is another side to the story too. Large companies may claim that they are using open innovation throughout the entire company while the reality is that they are only open in areas of technology where they have fallen behind. It is also argued that the benefit of open innovation is far more studied than the costs from the missed out intellectual property rights together with the much more demanding managerial situation. The cultural differences or special business environments could also make it hard to work openly with outsiders (The Economist, 2007b). Also, Iturrioz et. al (2015) concurs and uncovers two recurring problems with the setup; risk aversion induced by opportunistic behaviour and extensive costs due to the necessity to create trust among stakeholders.

We refer to this as "opportunistic OI practicing".

Bourreau and Doğan (2010) shows that it is always beneficial to cooperate, even with a direct competitor. Still there are both transaction costs and agreement costs; there are big benefits if large firms manage to work together. Presenting models for lost revenues due to being less competitive; benefiting from faster, better and cheaper development; the pros overcome the cons.

Toyota's Mr. Bill Reinert argues that with the massive investments that are necessary to spend on research and factory equipment it would be disastrous succumb to open innovation and risk to lose any competitive lead. Or as he also puts it "*Eventually even Google will have to make*

something tangible, and when they do they will protect it just like Tesla Motors, which does not have an open model” (The Economist, 2007a, p. 9).

2.4 Designated innovation environments

In general terms, a business incubator is an organisation formed to assist small start-up companies in many different ways ranging from only offering an office space to teaching sales classes (Bergek and Norrman, 2008). One of the most crucial characteristics of an incubator according to Thompson and Downing (2007) is to offer competence and experience to the start-ups. It is also important to keep a holistic view of the often-specific needs different companies may have. An incubator must not generalize to such extent that one model is forced upon two fundamentally different companies.

Science parks are related to incubators but are usually more focused on larger projects, which may include everything from corporate divisions, university labs to small companies. These science parks often do not offer any business-oriented services, which are central for incubators. However, different incubators may have unique approaches and limitations to their offerings for start-ups (Löfsten et al., 2006).

The environment in an incubator, created by the web of knowledge and connections, is expected to support the start-ups in many different ways. Well-connected incubator programs have good connections with banks, venture capitalists and an extensive network of expertise. Being connected to an incubator program may yield credibility to the start-up in question, but it also gives an opportunity to engage in networks. Networks of suppliers, other start-ups, university research programs as well as potential customers (Löfsten et al., 2006).

2.4.1 Innovation challenges and limitations for small companies

As we now understand, the open innovation model presented suggests that innovations can be initiated at any place, coming both from internal or external sources of the company. These ideas must then be carried to the commercial market, adding value to the customer through the current business model or through an alternative one. The real challenge is to make this happen with the limited resources normally available in a small company.

To answer this question, Chesbrough makes the following statement; *“Companies having sales of less than say \$100 million have likely already been open innovators for a long time because they haven’t had the critical mass to do the internal R&D. In the middle range, say between \$100 million and \$5 billion, the issue is critical. The answer is that there’s a growing number of intermediaries that will seek out external technologies for client firms or will help spin out some of their clients’ technologies for a fee” (Allio, 2005, p. 21).*

Using the term Small and Mid-sized Enterprises (SME), Iturrioz et al. (2015, p. 104) are making a statement in the same direction; *“Although SME flexibility and specificity can be relevant drivers*

for boosting innovation, their capacity for innovation is restricted by limited resources, forcing them to focus on small-scale innovation initiatives linked with specific products ... Their difficulties to manage the whole innovation process by themselves encourage innovative SMEs to collaborate with others.”

2.4.2 The innovation triple helix

Discussing incubators require mentioning the innovation triple helix. Consisting of the “... *innovative interaction between the spheres of universities, firms, and the state.*” Originally described by Etzkowitz (1993) for areas such as Harvard and Cambridge, it applies to most thriving entrepreneurial areas of today.

Lavén (2011), uses the innovation triple helix as a starting point for his research and further describes how a well-working innovation system looks. Figure 2.4 shows the more developed innovation system, based on the innovation triple helix.

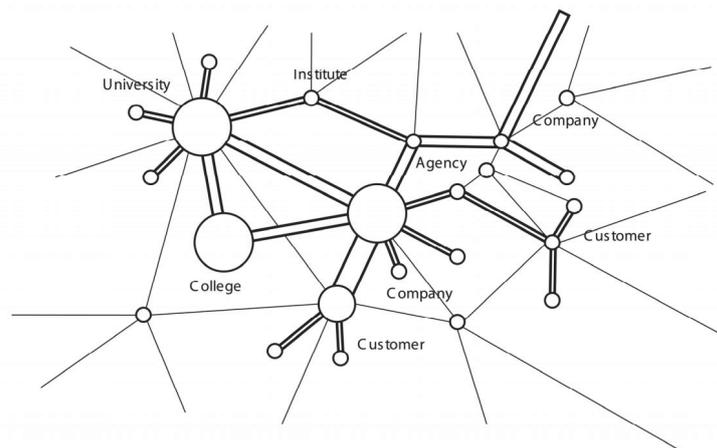


Figure 2.4: *Visualisation of an evolved strong innovation system (Lavén, 2011).*

Of equal importance as the three ingredients mentioned above, is the need for these to be physically present at the same geographical location. Without adjacent location, these do not create the wanted value. (Lavén, 2011)

2.5 Theoretical framework

What is necessary in order to adapt an open innovation model for small companies? By now it is clear that many large companies have realised that ideas do not only come from inside the company, instead collaboration with external partners may be a more successful approach.

However, we have also shown that the variety of open innovation approaches in large companies is vast. While some large companies have merely adopted partial open innovation methods, such as organizing competitions, others have integrated methods on a more

sophisticated level. Keupp and Gassman (2009) separate these into four archetypes (isolationists, scouts, explorers and professionals) depending on the breadth and depth they are using open innovation methods. Keupp and Gassman (2009) states that the division is fairly stable over time, which would indicate that it is fundamental strategic choices. On the other hand, Lichtenthaler and Ernst (2009) suggest that it is rather the choice in technology strategy and market environment that sets the level of open innovation methods in use. This is also where we can distinguish key elements that need to be transferred to an open innovation model adapted for small companies. Given the range of options available, it is important to adopt the suitable parts and adjust them over time to company specific strategy, market environment and technology.

With Chesbrough's (2012) model of open innovation, figure 2.2, in mind, together with the theoretical framework presented, there are a number of important areas that stands out. Looking at the large companies that have successfully adopted open innovation methods we see a couple of common practices:

- Support from top management.
- An awareness that it is likely that the best talents are likely to exist outside of the company.
- A designated organization backing up the work of harvesting ideas from outside the company without compromising its internal NPD.
- An integrated process where internal ideas are allowed to leave the company, join forces with other supportive resources and sometimes even return to the company again.
- Increasing value for your customers is the most important goal.

One of the largest questions to solve to align an open innovation model between small and large companies is to identify promising innovations and match them together with a large suitable company. Here is where the incubator, with their intermediary position, comes into the process and can potentially play a vital role in facilitating the transfer of information. However, it is currently unclear how such a setup should be designed to communicate, in a clear way, the mutual benefits between stakeholders.

Business incubators or similar facilitators are to a large extent tied to universities with several levels of commitment to external sources to increase economic growth for the region. Our general proposition indicates that the variety of companies, academics, entrepreneurs and students are met with an ad hoc approach in many instances. Ideas that are screened, analysed and finally chosen, are given support to a certain extent but in general, the structure necessary to use open innovation to its full potential is missing.

One could argue that, as a small company, you are forced to utilise open innovation just as Chesbrough (Allio, 2005) also suggest. However, our proposition rather suggests that there are major differences in, using partial open innovation techniques by chance, compared to that of applying a structured programme that facilitates the flow of ideas between entrepreneurs, students, small companies and large companies.

Many companies are facing the risk of missing such opportunities as it is somewhat outside its core business (Chesbrough, 2003). However, Keupp and Gassman (2009) advocates organisational separation between innovation exploration and exploitation, giving small companies the possibility to collaborate when stakes are high and the possible outcome is uncertain. Inter-firm agreements would give more ideas the possibility to get traction regarding funding, joint ventures or just driven by people with the right competence et cetera, the economic outcome could grow into many more new large companies.

For the sake of clarity, a visual parallel can be made to the funnel of open innovation seen in figure 2.2 above, initially drawn by Chesbrough (2003) and with additions by Lee et al. (2010) in figure 1.1. As it shows knowledge flowing out of and into the large company's project selection process, with the outcome of innovatively refined existing products, new products for new markets, and even income in the shape of licensed knowledge.

In the small company, we have replaced the punctured funnel with a tube as shown in figure 2.5 below, still with holes in it, as input and changes are a necessity for its survival. As the incubators promote and encourage networking, these tubes are occasionally put alongside each other, enabling an exchange of knowledge and creation of possible forms of cooperation. For potential partners to understand each other, both regarding commercial approaches, as well as, possible technical overlaps in solutions, it takes much energy and time for the fresh business person.

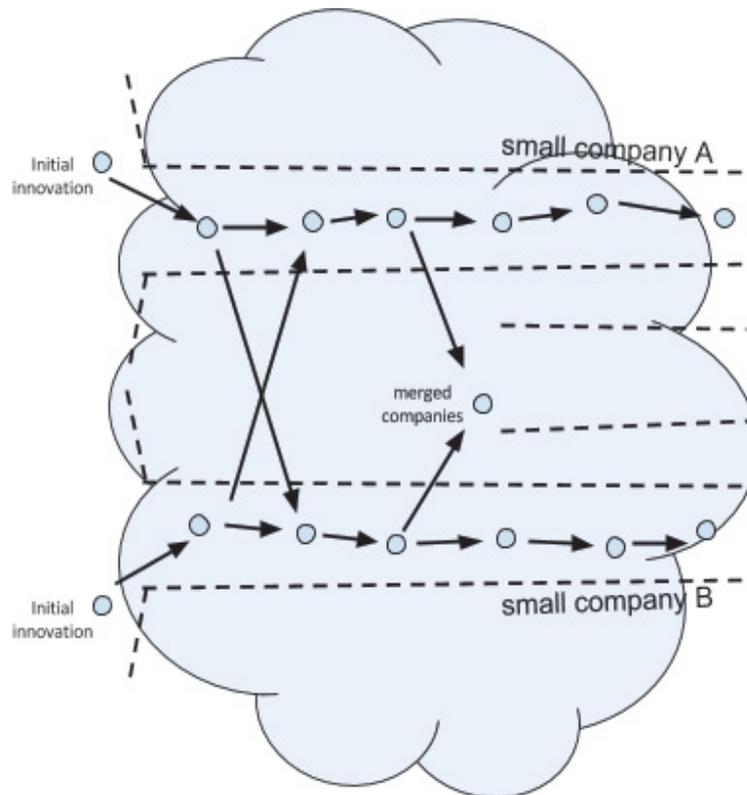


Figure 2.5. *Open Innovation model for small companies showing the flow of ideas.*

The importance of intermediaries has been discussed in earlier work (Chesbrough, 2003; Bougrain and Haudeville, 2002; Lee et al. (2010)) but with limitations to public authorities. In figure 2.5 above the cloud represents the incubator in an intermediary role with the goal to support innovation activities, transfer technologies and match ideas just as they are in large companies.

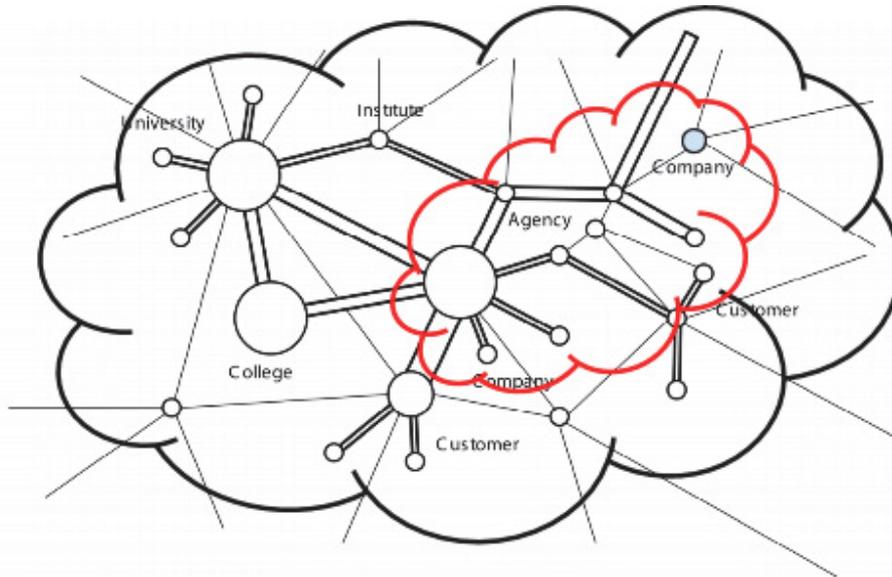


Figure 2.6. *Open Innovation model for small companies showing collaboration web.*

The above figure 2.6 shows the collaboration web with the two incubators as intermediary support. The figure is derived from the work done by Lavén (2011) illustrating a well working innovation system stressing the importance of adjacent location between the instances. Without the adjacent location these do not create the wanted value according to Lavén (2011). With the incubator as intermediary this necessity is decreased and the network management role can be centralized to one or several specialized incubators, which also collaborates.

This collaboration mode could strengthen ties between industry peers as well as releasing tied up resources in small companies that can focus more on maintaining their technical knowledge.

3 Method

The aim of the following chapter is to give the reader the necessary information on how we have chosen to collect data and pursue the research question stated. The selected methods are discussed together with rival methods with their benefits and shortcomings. Finally, a discussion regarding the analysis of the acquired data is presented in conjunction with a reflection of the quality of the selected research method and sources.

3.1 Selected research method

In this thesis, we have chosen to focus on studying existing theories concerning open innovation and make conclusions from empirical data. This approach gives us the opportunity to identify and analyse patterns from the gathered empirical data.

The choice to use a case study as research method closely connects to the availability of suitable reference companies and their business support representatives.

According to Yin (2013), the case study method is useful when the question is why or how a contemporary event occur, where the investigators cannot influence the possible outcomes and where the studied phenomenon is hard to distinguish from its context or environment. Similar suggestions of a suitable application of case studies are also supported by Gomm et al (2000), Saunders et al. (2000) and Perry (1998).

In a more narrow approach, Eisenhardt (1989) claims that the use of case studies is: *“Particularly well suited to new research areas or research areas for which existing theory seems inadequate. This type of work is highly complementary to incremental theory building from normal science research. The former is useful in early stages of research on a topic or when a fresh perspective is needed, whilst the latter is useful in later stages of knowledge”* (Eisenhardt, 1989, p. 548-549). In other words are case studies often viewed as a good starting approach for exploratory research before more structured approaches can be used.

The use of the case study method has often been accused of lacking validity and objectivity in comparison to other social research methods (Rowley, 2002). I.e. experiments and surveys are both hard to use for this particular research area. As we will lack a structured way of conducting the research and the availability of hard data with statistical significance the nature of our research rules out the possibility to use quantitative research methods such as surveys. An experiment, on the other hand, would demand a lot more control from the researchers and the real life context may be lost. Experiments are used to answer *what-if* questions and require the possibility to monitor and alter variables while a case study does the opposite (Rugg and Petre, 2007). One could argue that a combination of field studies (e.g. case study) together with a more qualitative approach (e.g. survey) would give an even more vivid and generalizable picture

of the research topic (Gable, 1994). However, in this particular case, the effort put into combining a survey with case study research was not found to be effective due to the narrow time frame for the majority of our respondents, the possible sample size together with the currently insufficient theoretical platform.

To use a quantitative research method also makes it harder to reach enough depth to understand the studied event (Yin, 2013). Quantitative approaches such as surveys have also been accused of only rendering a quick image of what is being studied without revealing much of the actual meaning of the underlying data, the outcome of certain variables may also be hard to trace in regards to cause and effect (Gable, 1994). Furthermore, the use of surveys and similar quantitative approaches are rather inflexible. Or as Gable (1994) puts it; *“Once the work is underway, there is little one can do upon realizing that some crucial item was omitted from the questionnaire, or upon discovering that a question is ambiguous or is being misunderstood by respondents. Essentially, the researcher should have a very good idea of the answer before starting a survey. Thus, traditional survey research usually serves as a methodology of verification rather than discovery”* (Gable, 1994, p. 3)

Instead, we will choose a qualitative research method where theories will be formed during the research of a narrow field of interest with a focus on deep explanatory research. We argue that a qualitative research method will increase our opportunities to reach a thorough understanding of the event in focus. Although, qualitative approaches such as case studies are considered to be the right approach when it is necessary to understand the current settings, generating theories along the way as well as studying new topics it has also been criticised. According to Kerlinger (1986), three major weaknesses are the inability to alter specific variables, the obvious risk of interpretation errors and randomising results (e.g. repeatability and generalizability).

Although the case study approach does not imply, that any specific methods to acquire necessary data techniques such as interviews, observation, and archival records, are usually close at hand. Regarding participant-observation, there are obvious risks of having a researcher taking an active part of a phenomenon that is investigated, which can lead to unnecessary bias; there are benefits as well (Yin, 2013). However, the risk of potential bias must be weighed against the level of information that otherwise would be hard to gather as an outsider. This type of informal research method is interesting but not very well suited for this particular case study. Left are interviews and secondary data such as financial reports and marketing material. However, it is common that the qualitative research method requires more resources in terms of time to conduct, transcribe and analyse interviews.

The design of this case study is based on a few sets of cases but will contain sub-units within the analysis, for example, the company owner and business support. This can also be referred to as

an embedded case study. An embedded case study is appropriate to use when to describe specific features, contexts and processes of a phenomenon (Yin, 2013).

3.2 Data collection

The data collection phase focuses on acquiring research data from the organisations that support small businesses and start-ups using their methods and processes. Given that the nature of the organisation may vary, data collection is followed with a more in-depth focus on the actual case study companies within the organisation. The case companies are chosen to be close to what can be called “traditional” in the sense that they are focusing on a product or a service that has started to transcend to and incorporate new technology.

Yin (2013) proposes that data collection uses multiple sources of evidence to build a case study database where a chain of evidence can be followed throughout the research article and as theories are formed and presented to the reader. In this specific study, we are forced to rely largely on interviews and archival records as well as possible secondary sources of information, such as corporate websites and financial reports. Using interviews is also suggested in a theory building approach where the case study is iterated to form knowledge on new topics (Eisenhardt, 1989) as well as making an in-depth case study (Bryman and Bell, 2005).

3.2.1 Interview setup

The selection phase of the cases is important, although Eisenhardt also argues that “*While the cases may be chosen randomly, random selection is neither necessary, nor even preferable*” (Eisenhardt, 1989, p.537). According to Eisenhardt (1989), the focus should rather be to find extremes or cases where the interest is observable.

To be efficient and accurate it is important to prepare the interview questions in great detail (Gillham, 2008). Gillham (2008) suggests that first of all a set of problem areas should be defined and organised into groups. The bundle of questions should then be reformulated to suit the interview as well as tested on a pilot before the actual respondent is interviewed.

Another part of the interview preparations is to formalise what is expected to be found, as well as what the goal with the interview is. An important part is to keep an open mind-set throughout the interviews, which otherwise faces the risk of being influenced by prior knowledge or thoughts (Gillham, 2008).

After the interview has been performed, the audio recordings from the interview, need to be transcribed into written form. This is also where the first interpretive choices are made regarding the level of detail, coding and grouped. The reader needs to be aware of that there are many ways of transcribing the same data and nuances from the actual interview can never be fully reflected.

To easier overlook the interview data a thematic analysis can be applied to synthesise the contents. According to Boyatzis (1998), there are five primary purposes of using thematic analysis: overview, finding relationships, analysis, systematic observation and the quantification of qualitative data. The overall aim of the thematic analysis is to organise and summarise a large amount of data from different sources without losing the context (Mills et al., 2010). It is argued that the division and shortening of data reduce the coherence and contextual importance to a great extent. However, the increased possibility to find patterns and themes within a large set of data has made it a common analytical method to use (Mills et al., 2010).

3.2.2 Interview implementation

In the first step of the interviews, we focused our efforts to find incubators with the ambition to grow ideas and innovations with an international market in mind. In the second step, to find prominent companies within the given incubator. Making it necessary to prepare two sets of interview questions specially adapted to the target. The framework for the open-ended semi-structured interviews was reduced from the theoretical framework and literature review. The main issues were identified, grouped and after the questions had been re-formulated they were sent to the thesis supervisor where we got to test relevance as well as the range of the questions.

Before starting with the actual interviews, we made a proposition of what we thought we would find as well as further reducing the area in where we wanted to explore.

The interview questions were sent a day in advance to give the interviewee a general view of what we were trying to research, as well as to plant a little seed if the general knowledge of open innovation would be limited. The full set of questions can be found in Appendix I and II.

Our search for interviewees started by an internet search of prominent incubators that fitted the above description. We followed by researching currently enrolled companies together with alumni companies where this was possible. We also researched articles in financial papers concerning both companies as well as incubators to enhance our view of their development.

In this thesis interviews were conducted on one occasion with each respondent with a pre-set time limit of 30 minutes. In total, seven interviews were performed on five different dates. Interviewees' general opinions and experience in the context was investigated through open-ended semi-structured interviews, which were somewhat altered depending on how our theories found traction. This type of interview setup gives an excellent opportunity to explore certain topics in more detail as well as the flexibility to alter the aim of the interview as new information arises. The acquired data were iterated back to the literature review, which was expanded or enhanced where necessary and sometimes followed up by a mail conversation if something was not clear.

We chose to conduct our interviews over the telephone instead of face-to-face. This is mainly due to logistical and timing reasons. We soon realised that the persons we were aiming at interviewing were very busy in general and a telephone interview restricted to 30 minutes were a pragmatic solution. It can be questioned if a face to face meeting would possibly have yielded any deeper or more vivid information from the respondents. Most interviews were conducted with both of the thesis writers present but on a few occasions, only one of us could participate. Our strategy to have both of us taking part in the interview were chosen to be better able to follow up on the information given by the respondent, make better ad hoc decisions during the interviews and decrease possible preconceptions, which would result in a deeper and more accurate theory building.

The interviews were recorded, transcribed and later we added our comments to highlight and link important parts in need of further research or with a connection to other empirical data. A more analytical approach using thematic analysis were made to get a wider holistic view of our interview data together with our separate notes. The transcriptions were coded into groups depending on its connections to the theoretical framework and its usage at the respondent's company. With a theoretical framework based on the use of open innovation in large companies and the empirical data collected from small companies within an incubator, we are applying an existing framework on a previously unexplored area. In other words, this thesis uses a deductive approach in the sense that we are relying on predetermined theory from large companies. However, our application on small companies within an incubator with little to no prior theoretical foundation requires an inductive analysis approach.

Getting in touch with the executives of the incubators, was not particularly hard. However, when asking for companies inside the incubator, most were reluctant to pass on a reference. We were told to contact the incubating companies freely, but without the sanctions of the executives themselves. It became apparent that several studies had been done before ours. On some occasions, we did not have a particular company within a specific incubator to contact we started a conference call platform and called all companies from the top and down until one of them had the time and the ability to participate.

3.3 Quality of research method

Yin (2013) mentions several approaches to analyzing gathered data to find relevant evidence to support theoretical propositions. A few of these approaches are; working data from the ground up, developing case descriptions and examining rival explanations.

As our expectations are that we will mostly need to rely on interviews and archival records to form our theoretical propositions, the data analysis method will need to be able to cover this.

To ensure the quality of our analysis of the data, interviews need to be recorded and transcribed or, at the very minimum, notes are made during the interview and reviewed by the interviewee

right afterwards. Otherwise, there are risks that the outcome will suffer from the researcher's interpretations.

In general, Yin (2013) presents four general approaches on how to ensure the quality of empirical research; construct validity, internal validity, external validity, and reliability.

- Construct validity: Aligning data collection to propositions to reduce or expose subjectivity as well as using multiple sources of evidence.
- Internal validity: Identification of causal relationships. Certain settings may yield a certain outcome.
- External validity: Generalise the findings through replication on another case.
- External reliability: Proper recordings and documentation ensure the repetitiveness of the study.

Yin (2013) also presents five methods to increase the level of internal and external validity; pattern matching, explanation building, time-series analysis, logic models and cross-case synthesis where the first three methods are used to increase internal validity while the other two addresses the external validity.

Our research question and purpose have continuously been discussed and scrutinised during the choice of a method when collecting empirical data, forming our theories as well as during the final discussion. This has been done to present relevant and appropriate empirical evidence.

To increase validity, we have thought through our interview question and have had our thesis supervisor reviewing them on several occasions. We have also kept a critical view on our empirical data and tried to connect specific parts to other available sources.

The interviews have also been conducted with top-positioned persons at the incubators and the companies, which give them the possibility to give us adequate and correct information. The interviews were recorded and transcribed to avoid data mix-up and to be able to review the interviews with new ears later.

Even though each incubator and company may be more or less unique, we argue that the general findings are possible to apply in a general sense. Thus, the external validity should be considered to be at a moderate level.

The reliability of this thesis is supported by a thorough description of our approach and choices along the way. During the thesis work we have had support from both fellow students as opponents as well as a thesis supervisor, which implies that the thesis process has been done in

the correct way. The full set of interview questions can be reviewed by the reader (Appendix I and II) further to increase the reliability of stated theories and assumptions.

3.4 Source Criticism

As the majority of our empirical data is acquired through interviews at companies of our choice meeting certain criteria as we are aware of that it is necessary to question the objectivity of the gathered data. This also applies to any of the secondary data collected, which may be acquired for other purposes with other agendas than being truly objective. Even though there exist risks that our empirical data could be questionable to some extent, we have made a great effort in thinking through our interview questions as well as trying to give the interviewee as much freedom of speech as possible and then adding on specific details as each question is explored more in depth. Where possible, secondary sources were used to support or discard theories. In this matter, we have had a critical mind-set to all our sources to give the reader an objective and neutral platform to present our research findings upon.

4 Empirical findings

The purpose of this chapter is to present primary empirical results to the reader in a clear and structured way. The reader may have its interpretation of the presented findings, which are broken down in further detail in the analysis chapter.

4.1 Interview objects

The case companies that were interviewed are in the following section divided into two categories: Innovation environments (commonly called incubators) and small start-up companies. The small start-up companies are currently enrolled in an incubator.

4.1.1 Innovation environments

SU Inkubator

The interviewee was the CEO of SU Inkubator, Mona Wilcke. She has a PhD within biochemistry, a track record of founding medtech companies as well as business development. She is also the CEO of SU Holdings, an investment company owned by SU.

SU Inkubator currently engages with seven business coaches with the goal to screen early ideas as well as inspire, educate and coach students and researchers in entrepreneurial skills. Most early ideas are screened within SU Innovationskontoret and later moved to SU Inkubator as soon it is verified as a strong and viable idea. Most business ideas are within medical technology, biological chemistry, physics and material science. SU Inkubator offers office space, dedicated business coaching four hours a week and networking events. In figure 4.1 below we see a typical setup of an incubator where the overall incubation time stretches up to 18 months.

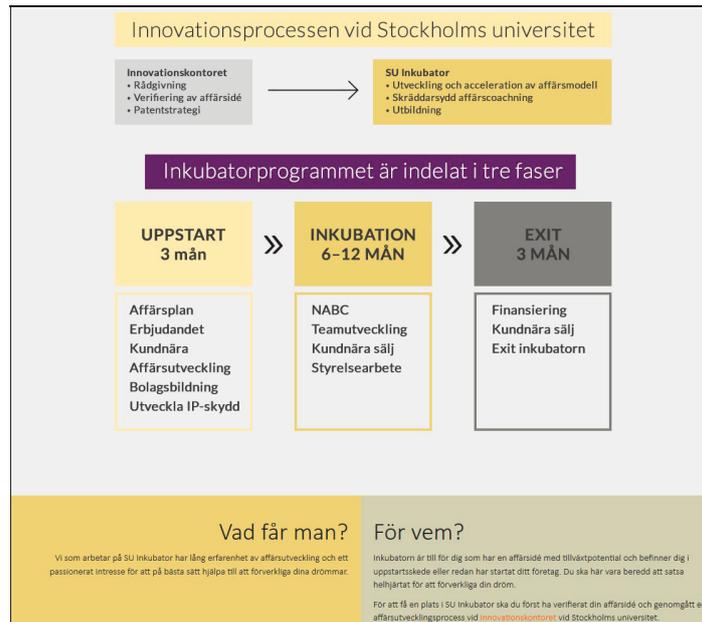


Figure 4.1 A typical set of incubation phases.

VentureLab

The interviewee is the executive director of the VentureLab operation, Johanna Östberg. The term of her position is one-year, with an option of a one-year extension. She has a Bachelor in Service Management, with various courses in business administration and economics.

VentureLab is tied to Lunds University and currently employs five business coaches that all have recently finished their studies at Lunds University. Connection between students and coaches is very important to VentureLab, making many coaches fresh out of the university. VentureLab is funded by the eight faculties at the university, with support from Tillväxtverket among others. VentureLab holds innovations from many different business areas, with diversity being one of the most important criteria. Ideas come from everything from medical technology to web applications.

Ideon Innovation

The interviewee is the CEO of the incubator at Ideon Science Park in Lund, Rickard Mosell. He is also the acting CEO of the entire Ideon Science Park. The incubator itself is called Ideon Innovation and is funded by several local partners as well as Vinnova. He has a long track record of business advisory together with a degree in law.

Ideon Innovation currently employs eight business coaches that strive to develop entrepreneurs, ideas and companies through value-creating processes and supporting resources. With experienced business coaches and a wide innovation network Ideon Innovation delivers value and makes innovations grow faster and stronger. Ideon Innovation is a certified Business

Innovation Centre, BIC. A company that would like to enter Ideon Innovation need to be open and coachable, as well as having an international idea with a potential to grow.

The Game Incubator - Gothia Science Park

The interviewee is the CEO of The Game Incubator (TGI), Per-Arne Lundberg. He has a long history within game development and entrepreneurship.

The Game Incubator (TGI) is a part of the Gothia Science Park (GSP) Incubator dedicated to the game industry. It was established in 2003 and is continuously hosting around 20 projects or so. It is based both in Gothenburg and in Skövde. It also hosts some IT projects, but main focus is on gaming and it has a solid international reputation in the world of game development.

4.1.2 Types of innovation environments

Using the categorization by Bergek and Norrman (2008), we have divided the incubators into three different phases, depending on stage of establishment of the small companies they engage with:

- **Phase 1** - Pre-incubation - idea hatching
 - The earliest stage with an approach to let as many as possible to try out how it is like to drive their own business. Also in place to promote, inspire and encourage future entrepreneurs. Headed by an experienced student as elected executive or managing director. Diversity is encouraged and ideas need to be scalable. Some also support with filing a patent for an invention in the cases where a product is based on that.
 - **E.g:** *Venture LAB, SU Innovationskontoret*
- **Phase 2** - Incubation
 - Typically this step comes after phase 1, that are working closely with phase 2 incubators. Here is a more focused effort spent on getting the small company into business. Some also take some per-centage of ownership of the hosted company. Typically headed by a CEO and run as a business in itself.
 - **E.g:** *SU Inkubator, Ideon Innovation*
- **Phase 3** - Business development
 - Can be seen as more of a commercial and moneymaking part of incubators. Investing in the invention with real money and actively pushing the technology into the potential business area. Phase 3 can happen after phase 2, but they are not mutually connected. There is a lack of consensus among the leaders of the incubators whether or not this approach is successful or not.
 - **E.g:** *SU Holdings*

Ideon Open - leading Open Innovation

Ideon Open is not an incubator in itself, it is instead a consulting company that uses Open Innovation as their main business focus. The interviewee is one of the Open Innovation Navigators of Ideon Open, Anders Jidorf. He has a background in management with several CEO positions and turnaround programs.

Ideon Open is powered by Ideon Science Park based in Lund with a focus on Open Innovation in large companies. It currently employs eight “Open Innovation Navigators”. They provide a neutral platform for collaboration between consultancy businesses, university staff, and small start-ups, amongst others. Their proximity to the university as well as the Ideon Innovation incubator, gives them a very strong networking position, creating a bridge between the academic and the commercial world.

4.1.3 Start-up Companies

Studentnode

The interviewee is the co-owner and CEO of Student Node, Erik Sturesson. He has a bachelor degree in business from Stockholm University. He has been with the company since the start, around two years ago.

The vision of Student Node is to offer a platform to help academics to match their education, ambition and experience with potential companies in the most efficient way. Student Node early realised that many human resources departments were working hard to find the most promising academic talents without really showing off what the experiences and ambience were at the office. Student Node bridges this gap with matching events, workshops together with a web-based social platform. Student Node is currently located at SU Inkubator.

iobeam

The interviewee is a software engineer that has been with the company for less than a year. Prior to iobeam he was part of starting up a company called Sensebit, that is now an established company. Sensebit was started without the support of an incubator.

iobeam is an IoT start-up based in New York, with an engineering filial in Stockholm. They are developing a data analysis platform for the Internet of Things. Their Stockholm operations are hosted in the “Start-up People of Sweden”, also called SUP46, office in central Stockholm. They are in development phase and have a ‘closed beta’ version of their product under testing with chosen customers.

4.2 Interview highlights

The following paragraphs are to give a more vivid description from the interviews.

The interviewees that managed an incubator, all provide a picture of being creative, driven and productive people with a history of building businesses. Several have a Ph.D. degree and

basically, all have either been a CEO either in their company or a smaller size company in need of restructuring and a driven leader. There is a profound interest in creating businesspersons, out of the accepted and incubating small companies, and to establish them with all the available future business partners.

Every incubator seems to have a different amount of resources available regarding funding and handles that in a variety of ways. Some compensate a lack of financing with having an even more extensive network. Others push over more responsibility on the small company itself, with the motivation that the future business leader, either way, owns their future. It is still, by no means a bad thing for the small company to join the incubator programme, it is just that they provide different things.

It is also common to, once the max time allowed has passed, move from one incubator to another. Partly motivated by the maturity of the company as well their product/service, together with that incubators target different maturity of their guests. E.g. a phase There is also various levels of requirements from the incubator towards the incubating company. Some are very tough and does only allow companies with decent funding to be present. Others provide the entire period free of charge and one can do what one wants, but after the fixed time, e.g. one year, there is no remedy, just to move one. Others are more arbitrary on the time aspects, but that flexibility is relying on how the start-up is connected to the university and so on.

As mentioned, how the CEO is running their respective incubator, is heavily dependent upon their personal history and experiences. As the organisation of the incubator itself is small, e.g. the CEO, administrative staff and possibly one or two business coaches, all the remaining business development is done by consultants on an hourly basis. This puts the entire responsibility on the CEO him/herself, to establish proper connections within the relevant industries (as most incubators typically cover several industries) as well as with investors, banks, lawyers and the like. Having such a personal touch on each incubator further brings questions on what is the best practice? This topic is outside of the scope of this thesis, but it is safe to say, that the current setup makes it, to a large extent, up to the manager.

4.3 Themes

Described in the method chapter, the empirical data is analysed using a thematic approach Below are the results from the analysis.

4.3.1 Networks and openness

For the smaller company, the network provided from the incubator is the most critical for its future success. Highlighted from all interviews with incubators, it is their biggest focus. It is also where the entrepreneur learns how to navigate and communicate in the world of business.

While promoting networking to the greatest extent, it is today also a much more open communication that takes place between incubating companies as well as between incubators.

"Ten years ago everything was supposed to be protected by NDA, but that is not the case today." (Wilcke, 2016)

Discretion is one of the most important elements when building trust amongst peers. In business development, this has historically, and still is, being put on paper in the shape of carefully designed Non-Disclosure Agreements (NDA) where all parties agree to handle information under strict confidentiality. Ten years ago this was the same for start-ups and entrepreneurs, making information-share in an early phase problematic, but this has changed today. Small companies at the beginning of their product development are talking to more or less everyone about their idea. In the rare case of pure inventions, they are still kept in the dark until appropriately protected, but besides those few, there is a much more including approach today, making cooperations much easier to without initial paperwork, etc. (Wilcke, 2016; Lundberg, 2016; Goffin and Mitchell, 2010).

As a complement to the above proposition (for some of the incubators) is entire conference departments inviting guest speakers, hosting and driving forums, etc. Described as a way to meet other people, get hold of new trends and research results, as well as opportunities to present to investors. The reputation of the incubator is then necessary, as it attracts the right people and opportunities for investments.

"Put a pile of well-educated, energetic and smart people together and it will come out interesting things. You do not know what, but it will be interesting." (Mosell, 2016)

4.3.2 Collaboration

Large ↔ small

Our literature study shows a fluid exchange of knowledge in the context of OI in large companies. The below quote is therefore contradictory to the theory, as it is the point of view by a prominent innovation enabler in the region of Ideon, Lund, Skåne.

"Open innovation is something that large companies realise that they have to deal with, where the small companies are not the initiator of this, but large companies, that realise they have too much management in itself and need to get in touch with students, smaller companies, be agiler." (Mosell, 2016)

It indicates a more rigid approach to open innovation, and as only being done upon initiation of executive management. A single quote is not a proof for an entire business, but it is in line with

other interviews as well. There are very few occasions of OI projects actually being done with a small incubating company being part of it.

Small ↔ small

Common for all incubators is the wish to provide an as extensive as possible network with anyone that can bring benefits to the small incubating company. It is not important only for the small company itself, but for the continued prosperity of the incubator as well.

Describing the collaboration landscape of an incubator as an “innovation porridge” (Mosell, 2016), and the supportiveness between small companies in an incubator as “... the most inclusive people I have ever met!” (Lundberg, 2016). This shows the significant amount of support available inside incubators, not only from the incubator to the incubatees, but also between the small companies. Co-locating companies within similar areas provides mutually beneficial discussions even though the technical details of the discussing parties do not overlap (Rensfelt, 2016).

Less common is for some incubators to even undertake matchmaking work, where motivated students are curious about being part of a starting company. They might not have an idea themselves, so instead putting them in the direction of a company with a need. In itself, this is not an open innovation activity, more of a resource matching activity.

Observing a similar behaviour, in The Game Incubator, when unsuccessful companies shut down their business, then other more successful companies absorb these resources, maintaining the employment opportunity in the same region, but for a new employer (Lundberg, 2016).

At The Game Incubator, TGI, three types of collaboration is described:

- Regular customer/supplier relation, where a company provides solutions for another company.
 - Both large ↔ small and small ↔ small.
- Cooperations between two companies, still one delivering to the other, but with a cooperation and not a delivery only in that sense.
 - More commonly small ↔ small.
- Partnership between industry and academics, where start-ups might implement solutions for a private sector company, based upon research from the University together with a start-up. Industrial gamification is bordering to this as well.
 - More commonly large ↔ small.

TGI is thereby unique in the sense that the collaboration described in the second bullet is something natural in that incubator. Other incubators have not stated any obstacles for such

cooperation, but in the case of TGI, with small companies in such similar businesses, it is more easily done, and has become a natural way of cooperation.

4.3.3 Push and pull

Witnessing how to carry out support by the incubators, it is with the mission to make a long-term business developer, out of the person driving the small company. In other words, the business coach will be backing up, but not drive the development; sometimes even considered as too laid back in the support of the incubatee. In the end, it is always up to the entrepreneur to succeed with the business they are trying to build. It is somewhat of a pull relationship from the incubatee, if support is wanted.

The support is done some hours per week, sometimes following a template plan with gate reviews reported to the incubator CEO.

Described by Jidorf (2016), in the context of being a Open Innovation Navigator at Ideon Open, business area responsible persons comes to them with the message, "*Our business is shrinking year by year, and I am getting nothing tangible out of my development organisation! We need help!*". A starting point like this, creates a strong sense of urgency, a pull from the customer; product development is being put on steroids. Combined with methods such as lean start-up, minimum viable product and close interactions direct with the targeted customers, it shortcuts standard large company development projects.

But when comparing with how Open Innovation is carried out, the opinions go apart.

"Usage of Open Innovation requires a pain-point! It is needed for such endeavour to succeed!" (Mosell, 2016)

While being one of the approaches of an outside in OI method, it is not the only way to work.

In essence, two standpoints were encountered:

Pull - Solving 'pain points' at Ideon Innovation

Briefly describing the approach at Ideon Innovation, is: that they invite large companies that share current issues they have (everything from production yield, to design or software efficiency). Then innovative people take part of these pain points, get a minimum amount of time to come up with a rough draft that is presented more or less directly to the CEO or executives. That enables 'early fail' for bad ideas (not wasting resources) and approval of good ideas. For chosen ideas, they then have an immediate buy-in from their future sponsor, which is a splendid starting point when working with large companies. Without this, there are a lot of efforts spent on promoting your idea and sometimes even getting lost in middle management, instead of developing and delivering it.

Push - Bringing patented inventions to the industry

Another approach is to finance the final steps of e.g. a chemical process related patent. By doing so, the holding company then becomes the agent for that IPR and takes on the drive to license it to large companies in the industry. The inventor gets a percentage of the future incomes, but do not involve in the promotion and commercialization of his invention, typically going back to further research in similar areas. Being a much more resource demanding work, without an initial customer to the invention and the risk is in the hands of the holding company.

While being opposite regarding whom is taking the initiative, the final result is an outside in type of OI.

4.3.4 Allocation of limited resources

As in most organisations, the lack of resources is a common cause for limiting achievements. As most incubators provide a business coach to each start-up, it is with a set amount of time (some hours per week). In the incubating small company, resource constraint is even more profound.

“An almost anorectic approach to organisation” (Lundberg, 2016)

In the incubator environment, opportunities to network are sometimes overwhelmingly large, to the extent that it interferes with actually getting the work done. There is a constant flow of guest presenters and investors coming, for the benefit of the start-up. It is then important for the small company to spend their time wisely.

Contrary to the small companies are the large companies that engage with Ideon Open. Ideon Open work solely with large companies as their customers and have a true passion for their undertakings. Here there are no resource issues mentioned, at least not within the OI projects they run. Examples given is product development that at a late stage, having ended up in a dead end, where the OI project brings unexpected competence and solution opportunities onto the table. (e.g. origami artists helping TetraPak to fold their beverage cartons in a better way). This is where OI has its strongest benefits, but it requires dedication and resources in this implementation.

4.3.5 Neutrality and continuity

Common for all parties interviewed is the ability to communicate and collaborate without greater efforts. Incubators have the focus to build their incubatees, and will do whatever is possible within their reach. The incubatees are struggling to bring their product or service to the customer, but there are no immediately communicated issues such as politics or similar, that larger companies can sometimes suffer.

Ideon Open brings forward one benefit of neutrality in the role of an intermediaries. In the cases when their customers have asked for mapping of new technologies. Then, as Ideon Open is a part of Ideon Science Park, when they are probing into the academic networks in Sweden as well

as Europe, they are welcomed and can more smoothly create a consolidated picture of current new tech and studies. This has been done on behalf of some customers, but is not done continuously

On the matter of politics and threats, this is where one of the largest thresholds are for OI projects with a client that is inexperienced in OI is to start a project. In some aspects, the company need to reinvent itself altogether.

“Even though a company may be really good at what they do, it is important that they know that the sharpest brains are elsewhere. [...] openness gives more back to you than being secretive and closed....” (Jidorf, 2016)

Jidorf (2016) proceeds to describe their strategy for new projects, with new large company clients. As Ideon Open works with methodologies such as 'lean start-up' - where one brings very early prototypes to the customer directly - this is contradictory to conventional NPD where you don't show the product until it is ready.

“It may sound very basic but to many companies their existing NPD-process leads to excessive internal investigations which often leads them wrong or halting in a too late stage. An idea can be as good as any idea possibly can be but if the execution is not 100% it will all be in vain.” (Jidorf, 2016)

Small companies are occasionally involved, when the competence and technology available match the problem at hand, but it is not actively promoted to engage with small companies just for the sake of it. Still, small companies are referred to as an appreciated type of resource to involve with, as it *“... gives a good dynamic to any team of people.”* As small companies have a different approach to what is possible with regards to NPD, the essence is to get it to the customer; it helps large companies to see things differently.

Most incubators have an appointed CEO that provides confidence and continuity over time for the incubator and their incubatees. Some have spent many years in the position; it benefits both the incubator network as well as their network.

As some initiatives are very inclusive towards their prospecting small companies, thus accepting as many as possible of their applicants, to promote entrepreneurship (Östberg, 2016), as well as being able to pick the winners later on (Bergek and Norrman, 2008; Lundberg, 2016). Having such a broad approach to accepting incubatees, it puts tough requirements on the incubator, to work with a slim yet progressive platform. It can be realised by a compensatory surrounding network, such as using Phase 2 incubators around them for support and joint efforts. It is in the interest of a Phase 2 incubator to supports its Phase 1 neighbours, as it provides a good source for transfers of incubatees.

It is also with slightly different assignments for a Phase 1 operation, which do not only develop companies but also are to enthuse students to drive their ideas as well as to get the chance to try out to lead their business. In this situation it is preferred to be a, somewhat inexperienced, still student, or fresh graduate, but driven personality that can connect with other students in the right way. The term can sometimes be as little as one year with a possible one-year extension. It can be considered; it is not as important with leadership continuity in a Phase 1 operation.

For Phase 2 operations, the seniority and experience of the person driving, commonly a CEO, is preferred.

4.3.6 Culture and time

From our theoretical framework, it shows successful usage of OI as a culture, promoted and deeply rooted in the organisation. Philips has a long-term product development strategy, combined with an insight that many smart people work outside of Philips. These still have solutions for Philips, beneficially for both parties, that can be integrated and made into a Philips product (Goffin and Mitchell, 2010). A change of company culture takes a long time.

The results from our interviews show an openness among small companies to join OI projects, once the occasions come. Jidorf (2016), being an Open Innovation Navigator, refers to this as a part of the DNA in Ideon Open, to openly innovate and leave no one out of the possible solution. However, to be considered is that Ideon Open is billing their customers for driving Open Innovation projects on their behalf. It could be said that Ideon Open very much indeed has OI in their culture, but their customers are merely borrowing this DNA during the period of the project.

Referring to OI as a culture, there are two highlights from Ideon Open. One is the serious effort spent on securing that all involved in a project knows who carries what competence, cause without that, people lack the understanding of each other's expertise. This is vital for a respectful and mutually beneficial collaboration. Second is the (potential) experienced threat an outside party brings into the organisation. Typically middle management is afraid to expose their competence level and afraid to look mediocre in comparison with the external team members. It requires confidence and courage from management when first taking on OI as a way of working.

Phase 2 incubators all work with a timespan of 12-24 months. After this, it is time for the small company to move on. This is no obstacle for OI to take place. However, it put higher requirements on it to be timely triggered if incubators were to take a more active role. Once it is underway, an established cooperation can continue, no matter being physically located in an incubator or not.

4.4 Open Innovation approaches found

Table 4.1 describes and compares the interviewed innovation environments. Noteworthy is the more lightweight Phase 1 incubators, with their maximum of 12 months. Phase 2 incubators all have longer time periods, they all have in common that they think it is too short.

Out of the innovation environments interviewed, only one actively engages in a push approach, SU Holdings. Common for all interviews are the positive approach and promotion of networking and collaboration.

Name	Phase	Open Innovation approach	Time	Push/Pull of Innovation	Location
Venture LAB	Phase 1	<ul style="list-style-type: none"> ● Ad-hoc but positive E.g. promote hackathons 	12 mth	N/A	Lund
Ideon innovation	Phase 2	<ul style="list-style-type: none"> ● Supportive but Ad-hoc ● Solving “pain-points” ● Relying on Ideon Open for OI initiatives as a sister company 	24 mth	Pull when solving pain-points	Lund
Ideon Open	Semi phase 3	<ul style="list-style-type: none"> ● Active as OI consultants ● Only assignments from large companies, using small companies when possible in their OI projects. 	N/A	Pull project created	Lund
The Game Incubator	Phase 1 & 2	<ul style="list-style-type: none"> ● None ● Autonomous community supporting and collaborating 	12 - 24 mth	Neutral	Skövde Göteborg
SU Inkubator	Phase 2	<ul style="list-style-type: none"> ● Supportive to cooperation ● Supporting networking in the area, no OI initiatives. 	12 - 18 mth	Neutral	Stockholm
SU Holdings	Phase 3	<ul style="list-style-type: none"> ● Active to promote licensing of patents in jointly owned companies. ● Utilisation of research for public benefit 	N/A	Push	Stockholm

Table 4.1 *Innovation environments with key data and Open Innovation approach*

5 Analysis

The purpose of this chapter is to discuss the results extracted from the empirical studies and connect them to the theoretical framework where possible.

5.1 Open Innovation applications

Starting by using the model by Chesbrough (2003) with a seemingly continuous flow of ideas, inventions, and innovations, flying in and out of the OI funnel. Together with the observations of OI at Philips (Goffin and Mitchell, 2010), using tech-scouts and an efficient communication platform. Comparing these approaches with the OI work found during this thesis, a more blunt usage has been observed. The findings are showing a use of small, agile companies and their methodologies, quickly bringing innovations to the market, through the capabilities of, and upon an initiative from, the large company. Chesbrough (2003) defines this as an outside in type of OI.

Using the analogy of flowing knowledge, OI is expected to be a continuous process. On the contrary, the empirical findings indicate isolated events undertaken upon direct initiative from either, a CEO or an experienced development executive (that knows when to go outside of the company for expertise). For the cases seen, where OI is applied, e.g. when the large company organisation is no longer capable of providing new products or solutions, it is a productive way to develop products and solutions.

5.1.1 The large company perspective

For fruitful and experienced practitioners of open innovation, described in chapter 2.3.2. In the case of Philips, there is a publically communicated approach of how to do it and clearly stated overall focus areas for wanted collaboration. Giving potential partners a good indication of where there are holes in the funnel at Philips, allowing them to spend time and resources on things that have a good chance of obtaining traction inside Philips. It goes for “fluent OI practitioners” when it is part of the company culture.

As we have not observed this continuous way of working during the empirical part of this thesis, instead an “opportunistic OI practitioner” has been seen. Distributed by Ideon Open, it is a successful approach in the cases described. Open Innovation as such, having its strength in being a somewhat unconventional approach to problem solving and innovation; it is not without a hassle to achieve these stated fantastic results. As Ideon Open only works with large companies as customers, it is only the outside in type of OI described in their examples.

5.1.2 The small company perspective

Small companies inside an incubator are in a very vulnerable situation. Focusing on a single product or service, as most are, almost exclusively in the "make-it or break-it" scenario. As the incubators host many such small companies, co-located in the same place, it becomes a focused

area of support and understanding for one and another. The incubators interviewed has one thing in common in their descriptions of what they want to accomplish and provide:

1. First and foremost - an outstanding network.
2. Develop a business leadership with the entrepreneur.

The network holds everything from business angels, international investors, legal advisors, IP and patent lawyers, future customers, journalists, well the list can be made long; actively and continuously looking for upcoming events, fairs, conferences, and investor visits. To a great extent, it is about making the small company representative exposed to potential customers and partners. Traits such as business plans, pitching investors and similar are all commonly practised and trained. As a major limiter to what is done, is the bandwidth issue within the small company itself. There is no lack of opportunities, just less time to join all of them.

When it comes to the network, this is where a form of unstructured open innovation takes place today. As the entrepreneur spends his/her time in the incubator together with external input from future customers and partners, the target product itself is changed and refined. Together with the refinement of their product, comes the establishing and presence that the company and its product exist. Sometimes stated as the one most important thing to do, to talk to everyone about your product, it is one of the cornerstones in open innovation. If people do not know your product, then they can never know how, or even if, they can benefit from it.

As all this networking takes place, with the purpose for the small company to be seen, funded, and partnered with; it also consumes a considerable amount of time and energy. The resources spent on networking could instead have been allocated on refining and speeding up the time to market. The bandwidth of the company is once again becoming a problem. The need of a neutral tech-broker between small and small companies is prominent, described as completely out of scope for most of the incubators in this study.

Tentative directing of resources has been observed, both in VentureLab - pairing interested and driven students together, and also to some extent in The Game Incubator, within the active and autonomous community present there.

Based on the openness of small incubating companies, together with the benefits seen once Open Innovation collaborations are put together, and the unfortunate situation that all these companies are struggling with a bandwidth issue:

Proposition 1:

Qualified brokering and pairing of small companies is an area with significant leverage where structures (and funding) are missing today.

It is likely a daunting task to get to grips with, as product complexity of a small company can be hard to penetrate. Even though, using the neutral role of being an intermediary and the expected openness of the small companies, being this tech-spider in the web will be challenging.

5.1.3 Sanctioned and trusted by sponsors

Ideon Innovation, (Mosell, 2016), states that, for young and small companies, the need for quick feedback and 'early-fail' is paramount. Firstly; in the extension of that argument comes next success factor, having a pull relationship from the large company as a partner, with a secured buy-in from future sponsors already from the start. The small company do not have financial means to develop something in vain, the road to success needs to be reasonably smooth. Secondly; that the open innovation sessions are only to take place with representatives from the large company, possessing decision power and authority to judge go/no-go right there and then. Sponsored by a top-down decision that the open innovation solution will be used, and once that's decided, it becomes a sanctioned bottom-up force that establishes and secures implementation of it.

Jidorf (2016) further anchors this approach, describing the usual sponsors of open innovation projects driven by Ideon Open: executive management and business area responsible. There are several reasons for this, amongst others the typically urgent situation leading up to the engagement with Ideon Open, e.g. severe problems unsolved for a long time or a failing market. It provides a sense of urgency and authority to the project, a privilege that's usually not available for internal projects. The combination of sanctions from sponsors, with the neutrality of an intermediary, such as Ideon Open, brings into a project, enables a bottom-up drive typically not achievable when engaging with a regular consultancy company.

The function of an intermediary is further referred to when discussing how Ideon Open finds participants for their projects. They make no exclusions and everyone are a potential partner (Jidorf, 2016) and it correlates well to the model used at Philips (Goffin and Mitchell, 2010).

The benefit of using intermediaries (Iturrioz et al., 2015; Volberda et al., 2013) is well documented. By this approach, defusing the potential threshold of cooperation, in combination with the already existing openness on the small incubating companies scene, creates an atmosphere for very fruitful collaborations and cooperations. Furthermore, in small companies, the organisation is simple and less or no politics are to be expected.

Engaging in OI work, the parties need to trust each other. Through the introduction of intermediaries, this can be facilitated, or simply by a trusting relation between the parties. In the incubator environments, we have witnessed, trust is not considered a problem for cooperation.

Open innovation can, as shown, also handle more complicated situations when it comes to discretion and how to manage sensitive information. However, as openness is a more adopted

approach today, it also opens up for tech-scouts to understand what start-ups are doing and possible fits with other start-ups. Linde and Ahlstedt (2011), refers to the opportunity for small companies to adopt open innovation, but only parts that are less resource demanding.

Quoted by Goffin and Mitchell (2010), is Philips Open Innovation Manager for the Consumer Lifestyle Division, Katja van der Wal:

"Before you get to legal agreements you must agree some working principles based on establishing trust and transparency between the partners", says van der Wal, "because without this the contracts stage can become a nightmare."

Found in our interviews, small companies seldom engaged in open innovation projects, (*"it happens to one start-up out of ten"*, (Mosell, 2016)). Even more rare, are the exploration of open innovation in-between small companies themselves. With the openness described by all incubator responsible, opportunities for tech-scouts are bigger than ever.

A final connection back to the historical viewpoint of OI; that the small company provides the invention, inspiration, and agility, while the large company provides muscles in the shape of funding, sales and marketing, operations, an established supply chain, etc. In the case of two small companies creating a joint OI project, these benefits of OI are then missing.

Proposition 2:

The obstacle for collaboration between small companies are not the willingness; instead the efforts needed to find the right companion are so big, that it becomes a coincidence whether or not it happens.

5.1.4 The role of the incubator

As incubator responsible describe their undertakings, it paints a picture of a workplace with limited resources, where everything is possible, as long as financial requirements are not significant. Critical for the small company survival during this phase is the need to develop professional business skills, this is also where incubators spend the little resources they have. All incubators provide a personal coach that follows the company through the entire period they are hosted in the incubator. Perceived as a great resource to be provided with, enabling discussions with a neutral person with experiences, its primary focus is on the business aspects of the small company. (Wilcke, 2016; Mosell, 2016; Stureson, 2016; Östberg, 2016)

In a business such as the gaming industry, artistry and creative freedom are some of the greatest drivers, cooperation and resource sharing is frequently seen and considered a natural part of the work. Making money is considered as a very nice by-product of the fact that people are allowed to do what they love to do. These small companies depend on their social capital and exchange man-hours and other resources regularly, putting each other's success above the need to finish

your planned tasks for the day. Still keeping strict confidentiality about future release dates, unique concepts and the like, the loyalty and support for each other are striking. Touching upon how inter-company resources are handled, the gaming business seems more like one complete network of developers, rather than a set of small companies sitting in the same incubator. In the unfortunate cases of bankruptcy, commonly most resources are sucked into other gaming studios and the business as a whole continues. (Lundberg, 2016)

Proposition 3:

Adding a technical analyst (an intermediary) to the provided incubation service creates better conditions for engaging in collaboration for these small companies.

Methodologies evolve rapidly, especially in the world of small companies. Approaches such as "lean start-up", and "minimum viable product", are very focused on a product for the customer, the final target. Here is a big difference between a start-up that designs and puts a new product on the market, compared to a start-up that refines an existing product, improving either production yield in some smart way, or improving some control software for e.g. an existing robot control system or so. Focusing on so-called 'pain-points' within a large company, which can be solved by dedicated, ex-students, masters programme graduates or enrolled Ph.D. students (Mosell, 2016). This is one kind of OI, almost in the shape of a consulting assignment, as it does not only solve an existing problem for the industry but also creates an external business that is to provide more jobs in the future. In common is the focused efforts of starting up a company and realising a solution.

One of the more fundamental requirements for most incubators is that the idea/service/product is scalable. For instance applicable to other industries in a slightly modified way, or over several countries. Motivated by the underlying reason for creating long-term growth for the business as well as the entire region (Östberg, 2016; Wilcke, 2016; Lundberg, 2016;) and country. (Vinnova, 2007)

5.1.5 The socio-technical network

Less discussed in the literature, but found from our interviews, is the benefit of a socio-technical network. Profound technical problems and solution aspects are often not discussed with incubator colleagues, instead solved by networks and forums online, making the physical location for such endeavours less important. More important, is the presence of a network that at a technical level, opens up for creative and productive discussions on concepts and point of views hard to find elsewhere. Cross-pollination can happen here, between products and solutions never imagined to have something in common in the first place. It is also here we think open innovation intermediaries should come into the picture.

Described in some incubator environments, is that the importance of belonging to a particular community grows beyond what it can deliver regarding increased development opportunities.

The popularity of individual communities faces long-term risks of attracting wrong people for wrong reasons.

Once Open Innovation would become a natural part of the working day, (Leitner, 2013) this socio-technical network is one context where the Open Innovation could take place.

5.2 Summary of applications

Using concepts found in theory and empirically, we have grouped attributes of successful Open Innovation concepts together and compared them. Table 5.1 is to provide an overview that is in detailed explained in the previous parts of chapter 5 Analysis.

<u>Theoretical findings</u> large companies	<u>Key factors</u>	<u>Empirical findings</u> small companies
<ul style="list-style-type: none"> ● Philips uses evangelisation (top-down) ● Open Innovation Champions 	Sanctioned and supported (top-down)	<ul style="list-style-type: none"> ● Initiated by CEO or executive ● Small companies support each other,
<ul style="list-style-type: none"> ● Usage of intermediaries ● Tech scouts 	Intermediaries	<ul style="list-style-type: none"> ● Open Innovation Navigators: (large <-> small : cooperation) ● Missing: (small <-> small)
<ul style="list-style-type: none"> ● Companies using OI integrate outside competence easily ● 1st trust; 2nd agreements (vital) 	Accepting threat from outside competence	<ul style="list-style-type: none"> ● Sponsored by top managers ● Smooth sailing OI Navigators ● Small companies are less hostile
<ul style="list-style-type: none"> ● Open Innovation integrated in organisation (all functions) ● Companies manage with slim OI budgets 	Bandwidth of company (resource constraints)	<ul style="list-style-type: none"> ● Unstructured ad-hoc networking ● Coincidences creates opportunities ● Early-fail workshops with mandated sponsors
<ul style="list-style-type: none"> ● Successful OI practitioners have it in their blood, established ● OI Leadership is essential 	Open Innovation as a culture	<ul style="list-style-type: none"> ● Unknown to many ● Cooperation is common without OI ● OI done as a one time project

Table 5.1 Comparison of key factors between theoretical framework and empirical findings.

5.3 What is missing

As Iturrioz et al. (2015) points out, the advantage of being a small company, with its flexibility and lean product development, also cripples most companies into exploring only innovations that are within reach. In other words, to fully bridge the gap between large and small companies using open innovation as a method, a strategic change will need to take place. Based on the theoretical framework we argue that the small company must find a clear communication path to the central parts of the large company to become a part of its core business and its available

resources. In the same manner, the large company must give the small company room to breathe and evolve its business case.

As the failure rate is high among start-ups, it is common that large companies merely sees small companies and start-ups as a place to recruit talent. We argue that this is another reason why open innovation collaborations fail, even though an acquisition of small companies may be a part of the open innovation strategy. To fully align the strategy, the setup must be transparent and mutually beneficial, to create a long-term relationship. A theoretical model of how to implement such practices in an incubator environment are not yet explored.

As we have previously stated, the main differences between NPD in small and large companies are:

- Resource allocation.
- Process control.
- Agility and adaptable to new market developments or consumer trends.
- Distance to the customer
- Risk awareness.

From an open innovation perspective our empirical studies suggests that the lack of resources, process control and customer awareness are the main parts that are missing to be able to follow through with an open innovation approach. This is also where the incubator need to act as an intermediary to funnel ideas and give support other than what is customary today. However, as Jidorf (2016) describes, *“our main strength is our neutrality, which gives us access to networks and levels of the company in a whole different way than our peers.”* Which implies that it is far from all companies that are open to this kind of innovation approach in the first place. Jidorf (2016) continues; *“We are not regular consultants that work at a distance, we are deeply involved and takes full responsibility that their products reaches the market. We are looking at the whole NPD process as an ecosystem of ideas where we help them to spin-out ideas that does not match the core business of the company, set up joint ventures, co-operations and workshops.”* Mosell (2016) argues that there is an abundance of ideas and what is missing is to match ideas with correct people and to find the right place in the value chain.

Jidorf (2016) describes a similar approach; *“we have used an agile setup where a number of pain-points are located within a company, these are broken down to problems that are presented to resources within the incubator. This way, start-ups can attract funding for their main projects, generate new business ideas and grow their commercial network.”* Even though this describes a narrow approach which does not fit all companies, start-ups nor incubators. However, it shows a different and very agile approach that creates value for many parties. This is also close to the accelerator platforms, which is now a global trend in many large corporations,

to bring entrepreneurs closer to the company where disruptive ideas, new business models and alternative value chains can be explored (Ingenjörskarriär, 2016).

This generates a question of what an incubator actually should offer and to what extent. The above examples prove that working close with companies creates value, but it is questionable if this is closer to a product development management consultancy than an incubator environment. Regardless of how to label the activities, it is necessary to understand that to implement an open innovation approach for small companies it is important to become more operative within the incubator. It is also of utter importance to build long-term relationships with companies to generate the trust that is necessary for companies to open up R&D departments, which are often considered to be the heart of the company. From what we have learnt in our empirical studies, we argue that these two points are the main areas that are missing to be able to implement a successful open innovation approach.

6 Conclusions

In the same sense as all incubator responsible are putting the success of their hosted companies first, it is also clear to the authors of this report that the focus and opportunities for each incubator are different. The geographical setting, reputation, track record of old incubatees, all examples of circumstances that impact the potential success of enrolling companies. Not only regarding what kind of support that is available, but also indirect e.g. regarding which investors that are even available to present/pitch to, creating a chance for future investments.

Using the basics from Chesbrough's (2003) open innovation funnel and Etzkowitz's (1993) innovation triple helix as a foundation. Adding to that, benefits of intermediaries (Iturrioz et al., 2015) and more structured networking agent (Lee et al., 2010), into a model of a more active and hands-on incubator as illustrated in figure 2.6.

This leads us back to our initial research question:

“How can an open innovation model from large companies be applied on small companies within an incubator?”

Any suggestions to answer this must be with a healthy respect for the almost anorectic style of organisation, resource utilisation and financial leeway that these small companies live with (Lundberg, 2016). This to the extent that any suggested model cannot base its added activities on the small company itself, instead must rely on its surroundings. In chapter 2.1 we stated that large and small companies have different barriers to adopt open innovation practices. The empirical analysis of our cases supports the theoretical foundation and three general propositions can be derived from our data:

Proposition 1:

Qualified **brokering and pairing** of small companies is an area with significant leverage where structures (and funding) are missing today.

Proposition 2:

The obstacle for collaboration between small companies are not the willingness; instead the efforts needed to **find the right companion** are so big, that it becomes a coincidence whether or not it happens.

Proposition 3:

Adding a technical analyst (an **intermediary**) to the provided incubation service creates better conditions for engaging in collaboration for small companies.

Parida et al. (2014) found that some large companies find collaboration with small companies to be risky, both due to the risk of their limited resources may force them out of business but also due to the high transaction cost of finding the right company as well as sustaining their agreement. *“In the past when the case company Alpha had found a specialized small company, they opted to acquire them instead of establishing collaboration”* (Parida et al., 2014, p. 381). We argue that a company acquisition may not be the best long-term solution in a socioeconomic context where the acquired company may be engulfed by a large company and thus losing its agile advantage. An incubator with a more operative role would firstly, decrease the transaction costs as it would manage and maintain the network “cloud” as illustrated in figure 2.5. Secondly, it would also serve as an intermediary building trust between the companies during the initial phase. Thirdly, it would work to bridge gaps in the organizational cultures.

These conclusions support Lee et al. (2010) to some extent, who claims that open innovation intermediaries should mainly focus on three activities; create a network among stakeholders, maintain an updated network and follow trends as well as working with management questions.

The outcome of this thesis shows that a more operatively active and offensive incubator could be able to overcome existing open innovation barriers both between small-small and small-large company collaborations.

6.1 Implications

The suggested open innovation approach changes the role of the incubator, from a more passive platform of networking assets to a more active set of hands-on resources that engages in the NPD activities. The flow then changes, from pushing ideas out to the market to, rather pulling ideas into the incubator regardless where they come from. The incubator would then act more like an ecosystem that is individually nurturing ideas without generalisation. Implying that current incubators are to a large extent far away from being able to apply open innovation strategies to any greater degree in their present setup. On the other hand, it is also a risk that a configuration, too much operatively engaged, will change the organisation to something other than an incubator. However, with the definition to generate new companies, support start-ups and generate growth in the best possible way, it is necessary to question the existing norms.

It is clear that the success of individual companies, within many incubators, are left to coincidence and in the hands of the entrepreneur, rather than the result of a strategic and a well structured process. To some extent it is possible that this is a product of the lack of funding. With this in mind it is natural to think that the current development with accelerators financed by large companies will become more common. However, this is only a complement as the most important intermediaries must be without particular company ties.

Perhaps the largest implications will be on the third operative task of bridging gaps between organizations. The management role of the incubator would then demand an open consulting

role, targeting both classic managerial questions as well as process and business model innovation.

6.2 Core contribution

The main contribution to the subject of open innovation is first and foremost a more vivid and explorative approach to mapping the use of such techniques within incubator environments. What our empirical findings suggests is that the structures of the processes that are used to funnel ideas to and from small companies are loosely formalised, often defined by visionary leaders in the top of the incubators that can have very different views on what open innovation is and how it is best applied.

Shown by open innovation practitioners, is the need for them, as a neutral part, to design groups of people carefully, to operate as a collaborative open innovation team. Our findings indicate a current approach amongst the incubators, to have willingly seen their small companies engaged in open innovation projects, but lack the resources themselves to have tech-brokers available to enable open innovation methodologies in their offer to incubating companies. Small companies themselves will openly innovate now and then, today much depending upon whom they bump into along the way, but for incubators to maximise their outcome, external support to incubators and their clients are required.

This thesis provides an approach to add an open innovation process that, well connected through theoretical studies of open innovation in general and empirical analysis of small companies in particular. This has in turn been mapped with what is essential in NPD for small companies in comparison to large companies.

6.3 Recommendations for further studies

Although this thesis has found some interesting points it is necessary to remember that the study is limited to a small number of cases, which makes the results difficult to generalize. The differences between the incubators way of conducting their work suggests that further studies should concentrate on more similar types of incubators. Further studies should also address a larger number of cases with a qualitative, or a combination of a qualitative and quantitative approach to validate previous findings.

The proposals of this thesis are merely theoretical models for how an open innovation culture could be composed for the settings of small companies in an incubator environment. A suggested approach for further research would be to apply this model in theory on a range of different types of incubators in order to outline certain criteria necessary to support the model. Next step would be to try out this model empirically in order to further understand its business impact and limitations.

As an extension of the term open innovation, one recommendation of future studies would be to explore open business models as well. According to Chesbrough and Schwartz (2007), it is necessary to redeem the traditional views on intellectual property management, licensing, spin-offs and similar methods to extend the possibilities to absorb external ideas into the company. It is also necessary to explore more paths for internal ideas to make it to the outside market. In the end, it is not only the way we handle the knowledge that needs to be reinvented, but it is also just as much the whole business model in itself.

From what this thesis conclude, it is fair to say that the ideas and applications of open innovation are still evolving and transcending. One topic to be explored further arose during our empirical studies of The Game Incubator (TGI). It showed an implementation of a community-based platform for sharing and testing ideas that we did not come across at any other innovation environment. The way the gaming industry are mentoring start-ups is to our knowledge unique and would be of big value to study further.

Another interesting topic is that different innovation environments have very different business strategies, where push and pull are two of them and describes how the flow of ideas are presented to companies. These differences may have many reasons; however, our empirical studies suggest that it is most likely the result of different leaders and their particular backgrounds that have led to the specific setups in each respective innovation environment. But this should be explored further and compared to the historically generated results of the incubator.

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7.2 Interviews

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8 Appendix

8.1 Appendix I - Interview questions to Incubators

Introduction

Short introduction about the subject of open innovation/small companies.

Name of the interviewee and previous experience

The Incubator

1. Can you tell us about the background of the organization? Main driving forces for the organization in the start?
2. Describe your vision and strategy and how you are taking measures to achieve it?
3. In what way is the incubator supporting internal or external networking?
4. How are you using your processes and possible exemptions from them?

Both with regards to educating the incubating companies as well as creating their business models. The incubator usually follows a specific process that may increase or decrease the likelihood of being positive to open innovation. These questions tries to uncover any such tendencies that may discourage open innovation

The Companies

5. What kind of companies are you looking for? Size, market and maturity etc.
6. What is the typical life cycle of a company within the incubation period?
7. How does the cooperation between university, incubator and industry work in general?

Certain businesses may be more likely to engage in open innovation than others, these questions tries to uncover how the range of companies that the incubator is involved in compare to their view on open innovation.

Knowledge

8. What kind of resources does the companies request?
Production, marketing, strategy, IP, R&D?
9. Are knowledge sharing encouraged within the incubator or with external partners? In what way?

These questions tries to map the overall view of transferring knowledge and sharing resources.

Other

Is it possible for you to share some of your documentation that is supporting your vision/strategy of the incubator?

8.2 Appendix II - Interview questions to Companies within an Incubator

Introduction

Short introduction about the subject of open innovation/small companies.

Name of the interviewee and previous experience and a company presentation

The business leader is important for a small company, these questions tries to uncover any managerial choices that may discourage open innovation. Earlier experience may increase and decrease the likelihood of being positive to open innovation.

The company

1. What has been the hardest part during the start-up of your company?

I.e. production, personnel, marketing, sales, management, R&D, IP, legal or other?

2. Are you trading knowledge or co-operating in technical questions with any other company or university inside or outside of the incubator? In what way and to what extent? How have you decided on what terms?

3. In what way is the incubator supporting internal or external networking?

Strategy

4. Did you have a clear strategy before taking part in the incubator program? Has It changed?

5. What are your relation to your competitors? Elimination, co-operative, co-existent?

6. What trait is most important for the company in the current phase? Agility, growth, price competitiveness, time to market or other?

7. Have you made any long-term analysis of your current technology or possible competing technologies? Have any strategic alliances been made? On who's request? On what terms?

The company may already use certain parts of open innovation just by being small and doing what is necessary, these questions tries to uncover such indices.

The Product/Service

8. How have you used external input during the product definition?

(e.g. early customer input, competitors features, other)

9. Are there any companies leasing technology or to your business or are you leasing to any other company? Could also involve technical platforms for customers or suppliers.

10. Has the initial innovation generated any secondary ideas to pursue? How do you deal with ideas outside of the core business?

11. Would you say that patents and intellectual protection is holding up innovations in general? Any specific examples?

These questions tries to map what happens to ideas outside the core competence that might be valuable in the future. Uncover any unintentional use of open innovation.