CHALMERS

OPEN INNOVATION IN PRACTICE:

Based on two case studies from companies in the automotive and telecommunication industry

Master of Science Thesis
in the Management and Economics of Innovation Programme

GOKCEN TURKEL
SOFIA THEODORAKOPOULOU

Department of Technology Management and Economics
Division of Management of Organizational Renewal and Entrepreneurship
CHALMERS UNIVERSITY OF TECHNOLOGY
Göteborg, Sweden 2015
Report No. E 2015:071

MASTER'S THESIS E2015:071

OPEN INNOVATION IN PRACTICE
Based on two case studies from companies in the automotive and telecommunication industry

GÖKCEN TURKEL

SOFIA THEODORAKOPOULOU

Tutor, Chalmers: Kamilla Kohn Rådberg

Department of Technology Management and Economics

Division of Management of Organizational Renewal and Entrepreneurship
CHALMERS UNIVERSITY OF TECHNOLOGY

Göteborg, Sweden 2015

Open Innovation in Practice
Based on two case studies from companies in the automotive and telecommunication industries

GÖKCEN TURKEL
SOFIA THEODORAKOPOULOU

Master's Thesis E2015:071
Department of Technology Management and Economics
Division of Management of Organizational Renewal and Entrepreneurship
Chalmers University of Technology
SE-412 96 Göteborg
Sweden
Telephone: + 46 (0)31-772 1000

Cover: Bendalls, (2015). Open Innovation. [online] Available at: http://www.bendalls.com.au/open-innovation

Chalmers Reproservice
Göteborg, Sweden 2015

Abstract

Nowadays, the competition between organisations becomes more and more difficult for them. Therefore, organisations always search new ways to be more innovative and gain competitive advantage over their competitors. During these years, the ways that companies innovate have changed. One of the newest trends that concerns companies and their way to be more innovative is open innovation, which is the focal point of this master thesis. However, since this concept is fairly new (was coined in 2003) and broad, the scope of this thesis is to investigate how the companies understand and participate in open innovation settings and how they utilise their participation in those kind of settings.

The starting point of the research is the analysis of the literature and the deep understanding of open innovation concept. Since the purpose of the thesis is to investigate the practical perspectives of open innovation, it is essential to comprehend the theoretical perspective as well. Hence, the literature review starts with the developmental steps from closed to open innovation through years. In between those concepts, it can be found some concepts such as partnership, cooperation and collaboration. In the thesis, those concepts are distinguished in order to be analysed in the discussion part. Furthermore, the open innovation concept is discussed in more detailed and the categorisation, the different modes, benefits and challenges are highlighted. Different viewpoints regarding open innovation and some applications in different industries complete this literature analysis.

Moreover, in order to investigate the practical version of open innovation, two large companies have been chosen as case studies and employees as well as managers from those companies have been interviewed. After the completion of the interviews, the findings are presented and discussed combined with theory. Based on the empirical data and literature, it is observed that both companies want to participate and be more present in open innovation settings, however they are not totally aware of the concept and this is one reason that does not allow them to utilise open innovation to the full extent. Although they have been experimented with different ways, they are still in the searching phase and they misapprehend open innovation with other similar concepts like collaboration.

Finally, some suggestions are given to the case study companies which want to be involved into open innovation and also some recommendations for further research in this area are presented.

Keywords: Open Innovation, Innovation, Open Innovation in Practice, Large Firms, Case Study.

Acknowledgements

With this thesis, we now finalise the two years that we have spent at Chalmers University of Technology. It was a difficult but absolutely an exciting journey that we have gone through. We are grateful that we have grown by learning a lot throughout these two years.

Our appreciation goes to our supervisor Kamilla Kohn Rådberg at Chalmers University of Technology for her continuous support and patience, for guiding in the planning of the thesis, and also for helping to reach out people inside the companies. We would like to also thank all the employees and managers at Company A and Company B for participating in interviews and also for sharing their experiences and thoughts with us. Finally, we would like to thank to our families as well as to Tezcan Çoğalan and Michalis Stroumpoulis for their endless support and encouragement. We are grateful for all the things that all of you have made this thesis possible.

Gothenburg, June 2015

Gökcen Turkel and Sofia Theodorakopoulou

List of Figures

Table of abbreviations

OI	Open Innovation
R&D	Research and Development
IP	Intellectual Property
IPR	Intellectual Property Rights
NIH	Not Invented Here
NDA	Non-disclosure Agreement

Table of Contents

1 Introduction

In this chapter the background to the study, purpose, research questions, and limitations are presented in order to get a general overview of the thesis.

1.1 Background

In today's global market, organisations try to survive and gain an advantage against their competitors in order to increase their market share (Porter, 1985). Since the competition becomes more and more difficult, organisations have to find new ways to differentiate themselves. Moreover, traditional ways of running a business have been losing ground from new and more attractive ones, since technology has been constantly changing and organisations cannot rely on their current position (Porter, 1985). According to Bower and Christensen (1995), especially large organisations become more rigid and smaller organisations take their market share because of their ability to innovate and change in adaption to new technologies, new market situations and customer needs. According to Porter and Millar (noted in Chau & Tam, 2000), with a proper strategy, new technology adoption can lead to sustainable competitive advantages. The point to emphasise, it is not only about adaptation to changes but also ability to innovate and drive change. Furthermore, large firms, because of their size and the bureaucracy, have the tendency to move slower than the market but still they have the resources to become more innovative (Wagner & Hansen, 2005). As a result, large and small companies have their own advantages as well as disadvantages regarding innovation.

According to Chesbrough (2004), companies have been using new ways to become innovative. The common way to create innovation has previously been to strengthen the company's Research and Development department, hereafter it will be referred as R&D, and take all decisions regarding product development inside the firm (Almirall & Casadesus-Masanell, 2010). However, companies realized the limitations of their R&D resources and wanted to expand the sources of knowledge (Koschatzky 2001; Enkel, Gassmann & Chesbrough, 2009). Therefore, when it comes to innovation, for many companies, closed innovation becomes obsolete and organisations have been moving towards more open settings for innovation (Chesbrough, 2003a). With open innovation, hereafter it will be referred as OI, companies have the opportunity to grasp more ideas from external actors and not rely only in the knowledge comes from their R&D department. This is of importance, since they may lose essential information that may result to lose their market position (Chesbrough et al., 2006). OI is a debatable phenomenon wherein one side authors urge companies to open up their boundaries and utilise both internal and external technologies (Elmquist et al., 2009), while from the other side some other authors believe that OI is "old wine in new bottles" (Trott & Hartmann, 2009). The evidence is that OI is in the centre of attention (Chesbrough et al., 2014), especially for large established companies, which search for new innovative solutions (Leifer et al., 2000).

1.2 Purpose and Research Questions

First of all, the purpose of the thesis is to have in-depth understanding of OI concept. The authors believe that it is much more difficult in today's world to compete by only focusing on the internal research and development activities. The technology is constantly changing and it forces companies to find different ways to be more innovative in order to gain sustainable competitive advantage (Porter, 1985). OI is one answer to manage this challenge. However, before starting this thesis, the question is if companies really know the aspects of OI in order to grasp the benefits of it? Because otherwise, it will result with waste of time and money without capturing the benefits companies would want.

Secondly, OI has become very popular and so many articles have been written regarding OI in the literature. This is another reason that we are interested how it looks like in practice whether or not it is just another trend or buzz-word? Moreover, we would also like to analyse how companies understand and define OI concept, how and to what extend they participate in OI settings. Also, one aspect of this research is the deeper understanding of the relationship between theory and practice. Therefore, we would like to investigate the gap between the two of them, in terms of which one, either the theory or the practice, is ahead.

Thirdly, the purpose is also to investigate how large companies in practice understand the concept of OI. Huizingh (2011) points out that size is one of the most obvious company characteristics in OI. Both small and large companies have their specific advantages and disadvantages. For instance, according to Huizingh (2011), small companies can take the advantage a lot of OI since their market and resources are limited and as a result they can get access to resources through OI. On the other side, large companies have more resources which create more opportunities to create collaborative networks. They also better manage their intellectual property rights (hereafter it will be referred as IPRs), since they have more experience (Huizingh, 2011). As it can be seen, for different size of companies, the value of OI will be varied. Therefore, the scope of the thesis is decided to only focus on large established companies since also most OI adopters are larger companies (Chesbrough, 2003a).

In the light of the information provided above, the authors have understood that the spectrum of OI is broad in literature. There are many different perspectives but not a clear definition of what OI could be. Therefore, we would like to see how OI is understood in practice and take the example of two large firms. As a result, the first issue for investigation is the interpretation of OI for firms. Consequently, the first research question is generated:

RQ1. How do the companies define the concept of OI?

Moreover, having identified their perception of what OI is, the second era to dig is the way large companies engage with OI activities. Due to the broad definition of OI, companies have been

using many different ways to participate to OI model. Therefore, the second research question is as follows:

RQ2. How and to what extent do the companies participate in OI?

Finally, companies that participate to OI activities should have a purpose and a benefit from it. Further, theory could be far distant from reality and the final outcome that the organisations have while participating in OI could be different than the expectations. Hence, the last investigation subject is the utilisation of OI for these companies and the last research question is:

RQ3. How do they utilise their participation in OI and what are seen as the results?

In order to fulfil the purpose, large established companies are chosen as sample for this research.

1.3 Scope and Limitations

There is a need for better understanding of OI concept, especially for the companies that want to embed this concept in their regular way of working. This is because, without the proper understanding, companies will probably likely waste their time and resources and will not be able to capture the value of it. From the other hand, if firms comprehend the logic of the concept and be aware of the way to implement it, then it will be advantageous to them. They will have the opportunity to be more innovative and flexible in their development processes (Vanhaverbeke et al., 2008). Therefore, the perspective taken for this thesis is about the practical issues that arise when companies are involved in OI activities and settings. The better comprehending will be possessed, by analysing all the information that come from the interviewees and matched with the theory so as to understand the gap between theory and practice and how to improve the environment for OI.

Moreover, fourteen (14) interviews were conducted with employees from the chosen companies, which is fairly enough to understand their OI understanding and practices. However, the starting point was to begin with a people who we knew before. Afterwards, we continued with other interviewees that the first interviewee recommended us within this specific area. Thus, it might be possible to analyse the findings from a narrow and single point of view. All the analysis part is formed based on the viewpoints of the interviewees. Finally, the second case study company does not have headquarters in this region instead they have a division there. Hence, we were not able to interview people from the headquarters. For this reason, it is believed that the results might be analysed from a narrow perspective.

2 Theoretical Background

The purpose of this chapter is to provide insights into previous research in the related areas for this thesis, OI in practice.

2.1 Developmental steps from closed to OI in time

According to Gassman et al. (2010), OI usually begins with outsourcing to contract service organisations and then followed by strategic modes of OI. Since firms from various industries have changed their way of doing innovation from closed towards open innovation, it is of great significance to understand what constitutes those different types of innovation concepts. Hence, in order for the readers to better comprehend what OI is, it is highly important to mention other preceding strategies before the emergence of OI concept. According to Mäkipää et al. (2006), mass products are defined as closed innovation products due to the fact that those products are inflexible, standard and more importantly customers are not involved neither in R&D activities nor in production processes. On the other hand, high customer involvement and collaboration with external partners etc. in innovation process can be referred as being more open. Furthermore, according to Gassmann (2006), due to the fact that global competition has increased, it brings forth cooperation and sharing between companies' innovation processes. Also, "do it yourself" mind-set is out-of-date and instead there is an increasing adoption for opening up the innovation process.

Therefore, this chapter involves the following terms; closed innovation, partnership, collaboration and thereafter OI, certainly. This picture illustrates those steps below and detailed information can be found in the following sections.

Figure 1: Developmental steps from closed to open innovation

2.1.1 Closed innovation

Before opening the boundaries, innovation had been taken place in closed environments and had been performed by individuals, employees etc. Since the new product development process was integrated inside the company, innovation was practiced in a self-sufficient manner. According to Chesbrough (2003a), the underlying assumption of closed innovation is *"successful innovation requires control"* since there is no guarantee that other firms' technologies and ideas have sufficient quality for customers. Accordingly, a company should also control the idea creation and self-reliance is the key for closed innovation. Controlling all the innovation efforts can also enable to control the profit as well (Greatideasstarthere.com, 2014). Another highly important reason for performing closed innovation model is to secure the knowledge and competitiveness. For those reasons, companies want to have an exact control on their processes and to keep everything in-house.

The supporters of closed innovation also state that R&D is more profitable if it is kept internally from start to finish. It is stated that if something is desired to be done right then companies should do it themselves (Greatideasstarthere.com, 2014). For some industries such as military and nuclear, non-proliferation and protection of technology is very significant which makes those industries a typical follower of closed innovation concept (Gassmann, 2006).

In order to better understand what closed innovation is, those six main rules of closed innovation can be seen below:

- A firm should hire the best and smartest people.
- Profiting from innovative efforts requires a firm to discover, develop, and market everything itself.
- Being first to market requires that research discoveries originate within the own firm.
- Being first to market also ensures that the firm will win the competition.
- Leading the industry in R&D investments results in coming up with the best and most ideas and eventually in winning the competition.
- Restrictive IP management must prevent other firms from profiting from the firm's ideas and technologies (Chesbrough, 2003a).

From those six principles of closed innovation, it can be easily interpreted that companies which practice closed innovation strategy need to perform so many things by themselves such as idea generation, development and production to marketing, distribution, service etc.

As can be seen in Figure 2, innovation projects can enter to the innovation process only in the very beginning and can be developed by utilising only internal resources and competencies; and these projects can exit from the process by being commercialized in the market through the company's distribution channels. Finally, some projects or ideas can be cancelled by project

teams which are collected in internal databases. These ideas can be out of use unless innovation teams select them (Herzog, 2011).

See the traditional funnel analogy which is suitable to illustrate closed innovation.

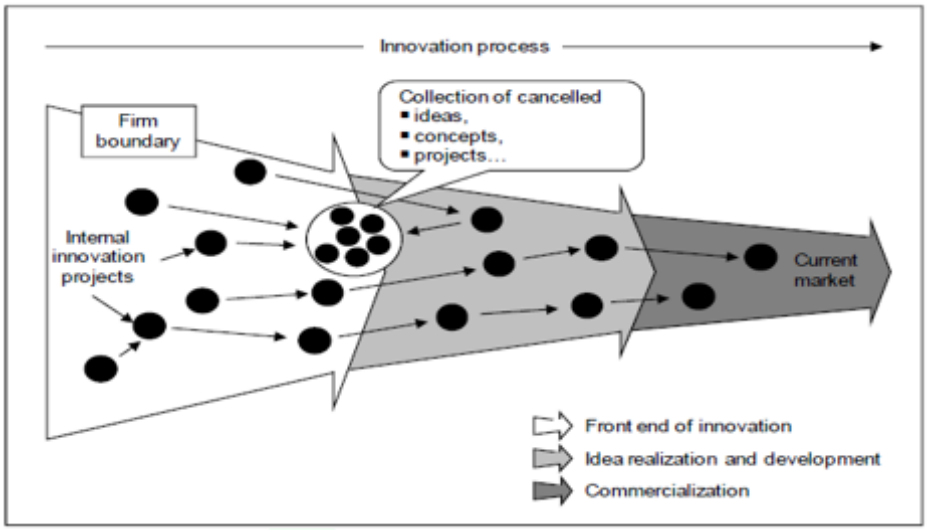


Figure 2: Closed innovation model

According to Herzog (2011), many up and coming technologies and ideas may not be explored because of focusing inward. Wolpert (2002) argues that it is due to the fact that companies are concerned about their IP ownership and also the belief that no firm knows what how to utilise the new research findings and opportunities.

Last but not least, according to some scholars, there are some drawbacks of closed innovation: According to Chesbrough and Appleyard (2007), closed innovation forces companies to take position against their competitors. Hence, it causes companies to hamper competition between them by creating barriers. Furthermore, closed innovation lacks of utilising potential external sources which they do not possess. Instead, it has emphasis on ownership and control for their strategic success which they have already possessed. However, according to Chesbrough and Appleyard (2007), external sources such as surrounding networks, volunteer contributors etc. are able to create value for companies. Furthermore, Chesbrough and Appleyard (2007) state that in order for firms to sustain the competitive advantage, value creation and value capturing are of great importance. Closed innovation gets behind in OI since it either underestimates the open invention value or ignores the importance of creation and capturing value. Since openness is expanding to various industries and it is given that open strategies are able to balance closed innovation with the promise of OI, firms attempt to be updated and they start to construct open strategies.

2.1.2 Partnership

As the costs of R&D and production continued to be increased, companies realised that they have to open up their business in order to remain competitive (Trott and Hartmann, 2009). Since the 1970s, companies have been trying to find partners and strategic alliances so as to act together for the benefit of all parties (Vyas et al., 1995). Inkpen and Dinar (1998) also support the strategy of having partners as a way of taking external knowledge. In line with this viewpoint, Rothwell and Zegveld (1985) believe that partnership has given to companies the benefits of shortening of the technology cycle as well as the opportunity of having a more global technology.

As a result, organisations started to incorporate the "octopus" strategy, which is a strategy based on spreading the network of the company, instead of the "go it alone" strategy, which focuses on the internal R&D (Trott and Hartmann, 2009, p.719). Chesbrough and Schwartz (2007) support that external partnerships allow organisations to achieve even more things. As part of the partnerships, there are the co-development relationships. In order for those relationships to be successful, the business objectives should be defined and the business models should be aligned for all the involved members. Once the context of the partnership is determined, the organisations can grasp many benefits from the partnership (Chesbrough & Schwartz, 2007). In the following paragraphs, the supplier and customer relationships are highlighted. According to Huang et al. (2003), organisations can benefit a lot if they involve their suppliers and customers in the development process from the early phases.

On the other side, OI creates the environment for individuals and organisations to be actively involved in the creation of mutually advantageous solutions. Put it simply, OI suggests an active collaboration between the parties and sharing IPRs whereas collaboration and cooperation are the relationships between an organisation and a defined group of its stakeholders (Wazoku.com, 2014). It is of great importance to emphasise that OI has a longer perspective comparison by cooperation and collaboration. Consequently, OI works well with cooperation but works even much better with collaboration (Järrehult, 2011).

a. Supplier partnership

The supplier partnership takes place between the main company and its suppliers. According to Stuart (1993), the partnership with suppliers could have a long-term planning horizon which includes information sharing, common interests and the companies are interdependent. However, some partnerships are short-term and after each project they decide for the next one. Although it is believed that the partnership with suppliers has a lot of benefits, it is time and cost consuming to investigate which supplier is the best for the company. Some of the long term benefits could be the reduce of risk and better understanding of the system, the reduced cost of the R&D structure, the product sales gains and the higher product quality (Stuart, 1993; Yu et al., 2001). The company is part of a bigger system; a piece in the supply chain. Therefore, the information

inside the company is just a part of the whole picture. This is, according to Yu et al. (2001), the main benefit of partnership with suppliers, namely, to share the part of information that each company knows and at the end to build the total system. As a result, all the companies involved in the partnership benefit and have more knowledge about the system, thus they reduce the risk (Yu et al., 2001).

b. Customer Involvement

As a specific type of collaboration, **customer involvement** should be included. It is a collaboration between the organisation (internal developers) and its customers. According to Khalid and Helander (2003); von Hippel (1998), customer co-design is a process which enables customers to state their product needs and to perform the product realisation process via mapping their needs into the physical domain of the product (noted in Mäkipää et al., 2006). In this type of collaboration, customers are able to choose from an infinite set of options or even able to extent the options and even can invent the new ones and as a result the company can benefit from this information coming directly from the customers, without losing any time (Piller et al., 2005).

2.1.3 Collaboration

New product development was a closed process, as mentioned earlier, which involved only a few employees within the organisation. However, this tendency undergoes a change towards external collaboration and firms have started to utilise it for almost every step of their production process (Nelson, 1990). One of the reasons of this tendency is that existing solutions are not enough for the customers anymore and there is a need for new solutions and offerings in order to satisfy the customer needs (Tseng and Piller, 2003). There are some ways for firms to gain new knowledge such as involving customers in the development process or developing group creativity and so on. Despite the fact that involving customers in the process has many advantages (von Hippel, 2005), on the other hand, it has some drawbacks since customer perspective can be limited in terms of they may not be capable of developing the best products for the market (Antikainen et al., 2010). Furthermore, single customer viewpoint cannot be a criterion for firms to develop products. Thus, the method that needs to be followed should be to acquire collective thinking in order for firms to increase their innovation performance. It is a more efficient method to apply than the former, since collective thinking does not focus on a single individual customer perspective, instead it focuses on the team/group perspective which enhance the efficiency of individuals (Ahonen et al., 2007).

Important to emphasize, is to distinguish the differences between cooperation, coordination and collaboration since it is so easy to end up with a conceptual confusion between those three. To begin with, according to Thomson (noted in Thomson & Perry, 2006, p.23), collaboration is "*a process in which autonomous actors interact through formal and informal negotiation, jointly creating rules and structures governing their relationships and ways to act or decide on the issues that brought them together; it is a process involving shared norms and mutually beneficial interactions".* Collaboration requires to create something new and everybody is responsible for bringing something in the process. Bardach (1998) indicates that collaboration is valuable when

it turns out to better performance and lower costs for the organisation. It is an iterative process which means if the expectations of the participating organisations are congruent then they will commit as a reciprocal manner and will continue on their mutual commitment. However, if the commitment is not reciprocal then the parties will renegotiate or reduce their commitment in the collaboration. So, it is a cyclical process of renegotiation (Ring & Van de Ven, 1994). As one can understand from the definition above, collaboration requires much more collective action than cooperation and coordination. Gray (1989) further explains that both cooperation and coordination can be a part of an early phase of collaboration but the difference is collaboration is a longer term integrated process.

The dictionary meaning of **coordination** is "*the act of making all the people involved in a plan or activity work together in an organized way".* So, it is the way to make different parts or people to work together. On the other hand, **cooperation** refers to *"the process of working or acting together"* (Järrehult, 2011). The involved parties in cooperation share the same resources and find commercial benefits because of sharing the similar resources. However, the parties have different goals to achieve. Moreover, cooperation is a temporary situation where it is terminated when the goals of the parties are achieved. Even though it *"may achieve individual ends, it must be an additional shared outcome which is separate from the individual ends"* for parties (Thomson, noted in Thomson & Perry, 2006, p.23). On the other hand, each of the involved parties in collaboration offer different sufficient resources in order to achieve a common goal. Hence, the main difference in collaboration is having common goal to achieve whereas in cooperation involved parties aspire to achieve their own individual objectives. Another difference between cooperation and collaboration is that in the former one parties share the common competences due to the sharing similar resources but in the latter one the competencies are complementary. Hence, in collaboration, the parties have more value than one party could do it alone. Finally, trust issue is a big difference between those two concepts. In collaboration trust is a must and parties cannot participate just in order to achieve their own goals. However, in cooperation there is no need for too much trust instead fairness is needed in the sense of knowing that each party will invest resources as it is agreed upon from the beginning (Järrehult, 2011).

Having defined the differences between those terms, it is also important to mention some points of view of the difficulties of collaboration. First of all, collaboration just to collaborate or achieving only individual objectives rather than mutual ones generally ends up with failure. Thus, *"do not collaborate unless you are willing to thoughtfully consider and educate yourself about the nature of the process involved"* since collaboration process is complex as well as costly in terms of time and energy (Thomson & Perry, 2006). Moreover, according to Wood and Gray (1991), despite collaboration provides a more predictable environment in many ways, it might also increase the complexity of the environment since it creates new dependencies between the parties. For this reason, collaboration is fragile and hard to do.

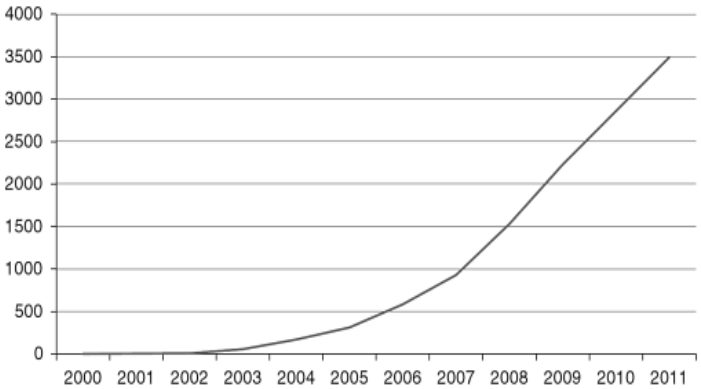
Lastly, according to Winer and Ray (1994), there are four challenges of this collaboration journey: (i) bring people together, (ii) enhance trust, (iii) confirm the vision and, (iv) specify desired results. It is very important to bring the "right" people together and to make partners trust to each other in order to have a successful collaboration. Holding effective meetings and involving everyone in those meetings are keys for enhancing trust. It is also of great significance to shape the divergent goals into common benefits. Otherwise, conflicts between self-interest can occur and it might not be possible to move in one direction. Finally, the statement of desired outcome is vital since it reminds parties to stop, look around and decide the next action.

2.2 The field of Open Innovation

This part will include definitions of OI from different years, the comparison between traditional and open models and will continue with the benefits and challenges of OI.

According to Chesbrough (2003a); Christensen et al. (2005); Gassmann (2006); Vanhaverbeke (2006); West and Gallagher (2006), one of the most discussed topics in management research is OI in the last decade (noted in Chiaroni et al., 2010). According to the search in 2011 done by Chesbrough, there were 13 million responses on the OI field which shows that it is a concept that have gained a huge interest, much has been written about OI and it has been gone viral rapidly in the last seven years since 2003 (noted in Chesbrough and Euchner, 2011). However, according to Gassmann (2006), despite the significant improvements of the comprehension of OI notion, there are still some questions and/or gaps that are necessary to answer (noted in Chiaroni et al., 2010). For instance, one of the gaps that needs to be investigated is the definition of OI. It is a concept that needs to be further defined.

Furthermore, according to Google Scholar, six thousands citations have been made to the book *OI* (Chesbrough, 2003a) since its publication (Chesbrough et al., 2014). Academic and practitioner journals also have been inspired from that book which finally created an intention for an edited volume by Chesbrough, Vanhaverbeke, and West (2006). The Figure 3 below shows the wide publicity of the "OI" concept.



The citations for "OI" in Google Scholar to the Chesbrough (2003a) book can be seen as growing in the Figure 3. As can be seen in the Figure 3, there has been a slowdown in the last years but the Figure 3 represents some thousands of contributions each year.

Figure 3: Annual citations for OI in Google Scholar. Source: Chesbrough et al. (2014)

2.2.1 Definitions of OI

Since innovation is identified as the main driver in order for firms to sustain a high profitability and competitive advantage (e.g. Drucker, 1988; Christensen, 1997), the academic literature has a focus on "how to innovate" and "how to manage innovation processes". The new focus is on the model for the management of innovation which is based upon company needs to open the innovation processes and utilise both internal and external technologies (Elmquist et al., 2009). The term "OI" is first coined by Henry Chesbrough with the publication of his book in April, 2003. He defined OI as *"a paradigm that assumes firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology"* (Chesbrough, 2003a).

Thereafter Chesbrough et al. (2006, p.1) defined it as *"the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively.* Hence, OI proposes that significant ideas can stem from outside of the company as well as inside of the company and those ideas, both from inside and outside, can be commercialized in the market. For that reason, it is of great significance to put emphasize to external ideas together with internal ideas (Chesbrough et al., 2006).

In the book Open Services Innovation by Chesbrough (2011), OI is defined as *"Openness generally refers to ways of sharing with others and inviting their participation"*. Therefore, openness is defined as a more specific form than the earlier work of Chesbrough on innovation. In those books, openness is not only a good thing for society but also a new approach to trigger higher profit for the innovative firms (Chesbrough et al., 2006).

Finally, according to Chesbrough et al. (2014), very recently OI is defined as *"a distributed innovation process that involves purposively managed knowledge flows across the organizational boundary*".

The given definitions above are presented only from Chesbrough's different books since he is referred as the "father" of the OI concept. Other scholars generally cite Chesbrough's work in their articles. However, in the following sections there will be some other definitions which belong to different authors.

2.2.1.1 Open Innovation Categorization

According to Enkel, Gassmann and Chesbrough (2009) there are three core processes that can be differentiated in OI: **inbound or outside-in process, outbound or inside-out process and coupled process.** The first one necessitates to establish relationships with external organisations such as suppliers, customers and external knowledge sources etc. in order to enhance the innovativeness of the company (Laursen & Salter, 2006; Lettl et al., 2006; Piller & Walcher, 2006) to gain access to their technical competencies. This process shows the significance of the innovation networks since not only knowledge sources such as suppliers, clients etc. but also a large degree of other sources such as non-customers, partners, and non-suppliers are also utilised

in outside-in process (Enkel & Gassmann, 2007). The second process describes the introduction of ideas to the market in order to gain profit and IPR selling through the transferred ideas to the exterior environment. As a result, the objective of this process is to externalize information and innovation for providing ideas to market and/or other companies faster than the company could do it internally. Consequently, the company can enhance its boundaries in different segments by utilising joint ventures, spin-offs, hence generating more profit than before (Gassmann & Enkel, 2004; Lichtenthaler & Ernst, 2007). Finally, the last process describes the co-creation with main partners by joint ventures, alliances etc. in order to be more successful. Establishing coupled process combines these previous two processes (the outside-in process and the inside-out process) in order to increase the innovation performance of the company through gaining external knowledge and then introducing it to the market (Enkel et al., 2009).

The picture which illustrates those processes can be seen below:

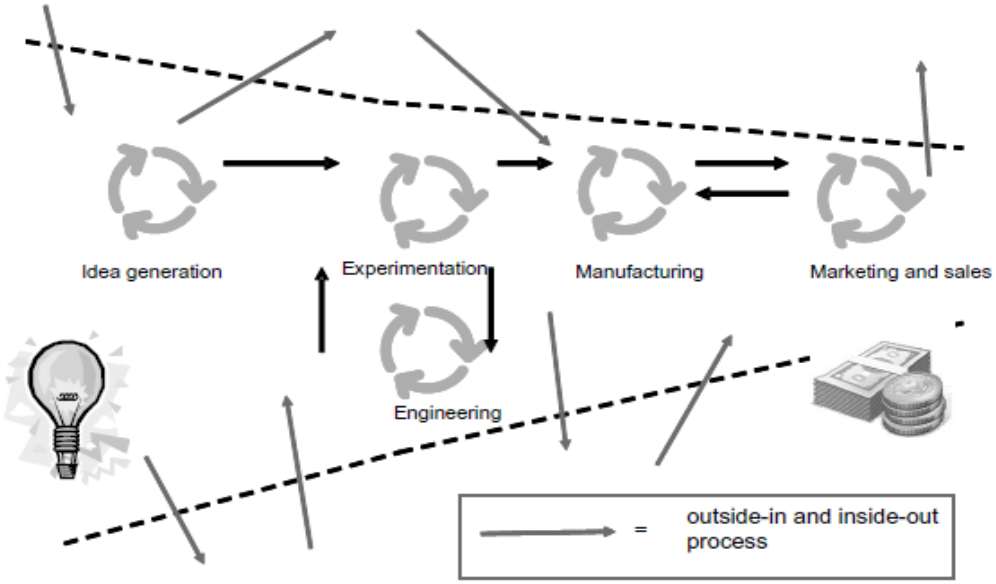
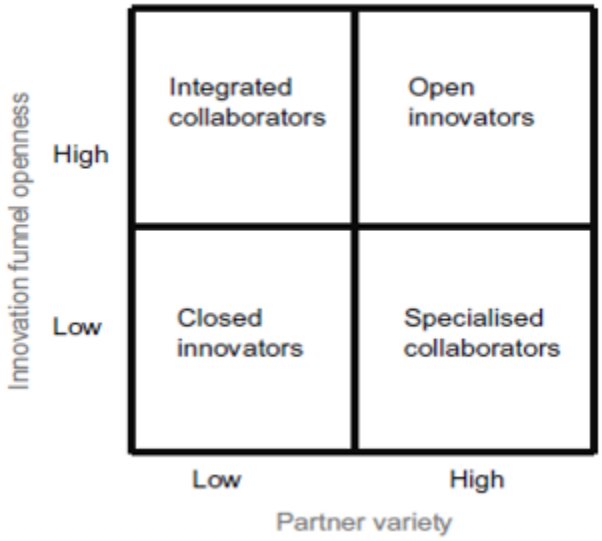


Figure 4: The inbound and outbound process. Source: Lazzarotti & Manzini (2009)

According to Fine (1998), industries have clockspeeds which refers to that every industry has a different evolution rate based on their product, process or organisation. For instance, information industry is one of the fastest clockspeed industry since according to Fine (1998), *"its products can have half-lives measured in hours, if not days"* (p. 6). From the other side, semiconductor industry has a slower clockspeed that is measured in years rather than months. Finally, automobile industry has even slower clockspeed because the car models change in every 4 to 8 years. According to Enkel et al. (2009), faster and medium clockspeed companies utilise inside-out process whereas out-licensing strategies are utilised only by large multinational companies. The coupled process is utilised in all sizes of firms which have substantial resource allocation (Enkel et al., 2009).

2.2.1.2 Different Collaboration Modes of OI

According to Lazzarotti and Manzini (2009), there are two different types of variables that shows the degree of openness of a firm. These are the number of the partners with that the company collaborates with and the number of the phases of the OI process which the company opens to external parties. If these two variables are crossed then four different modes of OI (in other words; four basic ways to collaborate) can be described as *closed innovators, open innovators, integrated collaborators and specialised collaborators.*



This framework by Lazzarotti and Manzini (2009) demonstrates that for some innovation activities being completely open may not be the only and most proper choice, instead different degrees of openness can also be applied as well as the closed option. Based on this framework, "*the more partners the company has, the more "open" its innovation process" (p. 616)* and also "*the more phases of the innovation process in which the company accesses external sources, the higher the level of openness of the innovation process" (p. 617).*

Figure 5: The four modes of OI. Source: Lazzarotti & Manzini (2009)

Each of the type of the collaborations have different characteristics as follows:

- **The open innovators model** refers to companies which involve many different partners that has an effect on the innovation funnel. Hence, this type of companies are able to manage a large set of relationships. Furthermore, open innovators aim to technological leadership and it necessitates a reasonable amount of R&D spending (Freeman, 1982; Trott & Hartmann, 2009). They also internalise their research and development activities but they perceive OI concept as complementary to their internal R&D instead of perceive it as a substitute. According to the empirical data of Lazzarotti and Manzini (2009), open innovators pursue radical rather than incremental innovation which is also in line with the previous literature (Lettl et al., 2006; Lichtenthaler, 2008).

- **The specialised collaborators** model refers to firms which are able to collaborate with many various partners but focus on a single point of the innovation funnel. For instance, collaborating with different partners such as suppliers, customers, experts etc. for the idea generation phase of the innovation process. According to the empirical data of Lazzarotti

and Manzini (2009), specialised collaborators are very similar to open innovators but with some slight differences: They also look for technological excellence with a high level of R&D intensity (Freeman, 1982; Trott & Hartmann, 2009) as open innovators but they do not have so intense internalisation of R&D activities as open innovators. As a result, specialised collaborators focus on incremental rather than radical innovations but it still necessitates an intense R&D (Trott & Hartmann, 2009) but on the contrary a lower degree of openness (Lichtenthaler, 2008). They perceive some risks regarding OI such as the requirement of too many resources etc. and so they are in tendency to limit relationships to a small number of phases of the innovation process (Lazzarotti & Manzini, 2009).

- **The integrated collaborators** model refers to firms that open the whole innovation funnel but to a few types of partners such as suppliers, customers etc. For integrated collaborators, technological leadership is not the essential objective but still they look for technological excellence. Moreover, they focus on incremental innovation rather than radical ones just as specialised collaborators. Finally, they open their innovation process but very carefully in terms of they involve their suppliers, customers and a few types of partners that they already know and trust. As a result, they cannot be referred as an organisation for OI (Lazzarotti & Manzini, 2009).

- **The closed innovators model** refers to firms which access external sources of knowledge just for a single phase of the innovation funnel. For instance, accessing to external knowledge in the NPD process. Closed innovators prefer to invest into their internal research and development activities in order to avoid extra cost and risks. Hence, they perceive openness as a costly and risky activity. As a result, they prefer to work in-house and invest their all resources such as money, time, people etc. internally on innovation. Hence, R&D risk is not too high and their technological partnerships involve only a few parties with a long-term relationships based on trust (Lazzarotti & Manzini, 2009).

2.2.1.3 OI Principles

According to Chesbrough (2003a, 2003b), OI models underlie six different principles, see the figure below:

	Closed innovation principles	Open innovation principles
i	The smart people in our field work for us.	Not all of the smart people work for us so we must find and tap into the knowledge and expertise of bright individuals outside our company.
ii	To profit from R&D, we must discover, develop, produce and ship it ourselves.	External R&D can create significant value; internal R&D is needed to claim some portion of that value.
iii	If we discover it ourselves, we will get it to market first.	We don't have to originate the research in order to profit from it.
iv	If we are the first to commercialize an innovation, we will win.	Building a better business model is better than getting to market first.
v	If we create the most and best ideas in the industry, we will win.	If we make the best use of internal and external ideas, we will win.
vi	We should control our intellectual property (IP) so that our competitors do not profit from our ideas.	We should profit from others' use of our IP, and we should buy others' IP whenever it advances our own business model.

Source: Chesbrough (2003).

Figure 6: Principles of OI

The problem here is according to Trott and Hartmann (2009), comparing closed and OI principles as above, cause misinterpretation of closed innovation. It makes very easy to disaffirm closed innovation models. Trott and Hartmann (2009) discuss that Chesbrough is being inaccurate and misleading because of behaving offensively to progressive companies who have developed research and development management and spent so much resources on it.

In the following chapters, different scholars' perspectives on OI is further analysed in order for the readers to be able to see different viewpoints and ideas.

2.2.2 Open Source Innovation

It is of great importance to include open source innovation within the scope of this thesis since open source software development is a "private-collective" model of innovation. In order to better comprehend OI phenomena, including Hippel's views for open source innovation can be helpful. Collaborative product creation which is referred in the literature as open source innovation can be defined as *"volunteers who program to solve their own as well as shared technical problems, and freely reveal their innovations without appropriating private returns from selling the software"* (von Hippel & von Krogh 2003, p.209). Wikipedia and Open Directory Projects are good examples of it and they consist of more than ten thousand contributors (Glott et al., noted in Ehls, 2014). Hence, open source is the concept that volunteers can develop a product and freely reveal it for the public use (Hars and Ou, 2001).

The important point to emphasize for the scope of the thesis is "openness" in terms of the boundaries of the firm and its products. The open source phenomenon differs from the classical product development concept which is for sale to customers in terms of goods and services. On the other hand, for open source, users are the consumers who use the product and at the same

time, are the producers who develop the product. Put it differently, they are able to produce the core elements of the product, to recommend some new features, to test and to give feedback and also to provide user assistance (Ehls, 2014). Hence, this type of products can be referred as "open" and they are the public goods due to being non-rivalness and non-excludable (Baldwin & von Hippel 2011, p. 1401).

From economic-legal perspective regarding the intellectual property rights, *"the license waives the principal rights assigned to the product creator by copyright law and grants users the right to access, modify and redistribute the creation instructions"* (Fosfuri et al., 2008).

It is also of great significance to analyse open source from an organisational studies perspective associated with "OI". According to Bogers and West (2012), open source is an external source for innovation and is a good way to commercialisation. Moreover, in order to have efficient innovation process, firms should take into consideration co-operation beyond their boundaries. External innovation enable them to take in knowledge and also take-out knowledge which they cannot use inside the company. Openness puts emphasis on "the permeability of firms' boundaries where ideas, resources and individuals flow in and out of organizations" (Dahlander & Gann 2010, p.699).

Last, but not least, there are three classes of motivation of open source innovation. First of all, it is direct utility for the individual or one's employer. The second motivation is the intrinsic benefit from the job. For instance, it can be skill learning, personal fulfilment and so on. The last one is signalling which is meaning to gain respect from the colleagues or employers etc. (West & Gallagher, 2006).

2.3 Benefits of OI

According to West and Gallagher (2006), OI is not just use of external sources such as competitors, customers, etc. but is a change in management and especially management of innovation (Chesbrough, 2003a; Gassmann, 2006). It is not enough only to collect external information, the important part is to integrate this knowledge into the company's processes (Koschatzky, 2001). Accordingly, if the company does not know how to implement and formulate the external knowledge based on the company's needs, then there is no benefit for the firm.

The founder of OI concept, Henry Chesbrough (2003a, p.xxvi) supports his position with the argument that *'Not all the smart people work for us. We need to work with smart people inside and outside our company'*. Thus, companies need to expand their knowledge base and find alliances in order to exchange knowledge and learn from others (Koschatzky, 2001). The most essential advantage of OI is the expansion of information coming to the company.

According to Koschatzky (2001), the firms which keep all the innovation process inside the company have some limitations and in the long run, such as time and cost. Therefore, they lose their connection with the market and especially with customers, since they will not have the opportunity to follow the speed and needs of the market. Accordingly, a benefit of OI is **(i) the expansion of knowledge** coming from external actors. It is vital for companies to expand their knowledge base in order to increase their innovativeness and the only way is by collaborating with others (Enkel et al., 2009). As a result, companies have a pool of ideas coming from different perspectives and they can choose those which are more appropriate for their business.

Except from surviving in the long run, as said before, companies also want to fortify a competitive advantage in the market (Porter, 1985). Especially for the large organizations, the next benefit of OI is vital. While with the traditional model organizations were waiting for their R&D to create some new ideas, they were losing essential time to launch new products or services to the market (Chesbrough et al., 2006). OI's second benefit is **(ii) the opportunity to reduce the time** by having a range of new ideas coming from other actors. Some authors believe that established companies are incompetent to satisfy customers' demands and in parallel, anticipate future disruptive technologies (Christensen, 1997). Large firms have not built a proper infrastructure for big innovations, breakthroughs, instead they rely on other players to support those (Leifer et al., 2000). From the other side, small firms and start-ups have less bureaucracy, they are more flexible and they can change constantly based on market demands and emerging technologies (Lynn et al. 1996). Therefore, large companies are using OI in order to be closer to the market and extract some information from the smaller (Chesbrough et al., 2006). However, small organizations and start-ups also have many disadvantages, such as lack of resources and lack of competencies, thus they utilise the benefits of OI to increase their innovation process (Chesbrough et al., 2006). As a result of the lack of competencies, small companies cannot scale up their business and use large organisations as a way to gain knowledge and resources for improvements.

Further, closed innovation is becoming obsolete, since the R&D cost in an organization is constantly increasing, the time of development is becoming slower and from the other side, the returns on it are not equal because of the growing competition in the market (Vanhaverbeke et al., 2008). Therefore, OI is a way for companies to **(iii) make their development process more flexible** and less linear and as a result they reduce the cost of R&D, speed up the process and at the same time exploit the benefits of external ideas.

A modify OI model is by opening the boundaries of the divisions of the organization without using ideas beyond their organizational boundaries (Chesbrough et al., 2006). This is one way to leverage the resources of the company, by minimising the risks. Consequently, the company can share information and increase its knowledge, but without the danger of knowledge leakage (Trott & Hartmann, 2009). There are examples of companies which have monthly meetings between their senior leaders for information exchange (Chesbrough et al., 2006).

2.4 Challenges of OI

The OI model is controversial and those who believe that OI is "old wine in new bottles" (Trott & Hartmann, 2009) have raised some areas for discussion. From its definition, OI encourages companies to be more open and use external sources for their innovation process (Chesbrough, 2003). As a result of this openness, some challenges are emerged.

2.4.1 Intellectual property

One of the challenges that companies confront when they are engaged with OI activities, is the IPR strategy. As Alexy et al. (2009) highlighted, the IPR strategy of the company can either destroy or support the OI process. For some companies the answer is clear from the beginning, *"no patents no talk"* (Alexy et al., 2009). These companies do not even start a conversation with someone outside the company without a patent. A paradigm of this policy is 3M. According to them, there are many legal issues when they use an idea coming from someone outside the company, therefore they want to secure and understand better the idea, based on the patent it already has (3M, 2015).

According to Chesbrough et al. (2006), companies hesitate to follow the model of OI because they are worried about company's intellectual property ownership. Chesbrough et al. (2006) has an extensive discussion about the openness in the standard creation. There are three point of views. First, those are who believe that open is a system in which everyone can participate in the standard creation process. Second, there are the advocates of the perspective that a standard is open when everyone is free not only to create the standard, but also to implement and expand it. Third and last point of view is coming from those who believe that everyone who implement the standard should have equal right and terms (Chesbrough et al., 2006). However, another management challenge of OI generates, since the company may discover something innovative while working with OI, which will not be owned by them, therefore they will contribute their IP in the absence of financial returns (West & Gallagher, 2006).

The main question is whether or not IP is dangerous for OI attempts (Alexy et al., 2009). Companies can leverage their IP, with some conditions. One suggestion, according to Alexy et al. (2009), is for companies to balance their open and proprietorial strategies. Moreover, IP can benefit the company by generating revenues coming from licensing and in parallel support the collaboration with other actors. Licensing strategies not only bring new incomes into the company but also give freedom to act for firms. Finally, companies should be more flexible and less strict to their IP's (Alexy et al., 2009). According to Lichtenthaler et al. (2007), OI is recommended as a fruitful opportunity for new business potentials such as selling and licensing unutilised intellectual property rights to external parties. However, if companies are still focus on protecting their IP, then the opportunities for fruitful collaborations and OI engagement, will be really limited.

Not all companies have the same opportunities in OI collaborations. Alexy et al. (2009) created a matrix in order to highlight the different approaches the companies should follow based on two characteristics, knowledge distribution and technological environment.

Figure 7: Different approaches to collaboration. Source: Alexy et al. (2009)

For the former characteristic, companies are divided into oceans and puddles, where oceans are the companies that can have many potential external partner, while puddles should choose from a small range of options. The latter characteristic is divided into calm or turbulent, where in the calm environment the technology is moving slower and without any unexpected problems, while the opposite is in the turbulent environment, where uncertainty is present and variety of ideas are competing to solve problems.

As can be seen in Figure 7, the combination of calm and puddles creates an environment of closeness, where the companies should protect their IP. From the other side, the total opposite is the turbulent oceans, where companies have better conditions to open up their boundaries and exploit the benefits of collaboration, by giving up some time their IP.

2.4.2 Transaction Cost issue: TRUST

Trust is a significant issue within OI concept since it is a must in order to establish an effective collaboration and thus for OI as well. It is due to the fact that companies, which are not able to internalise their research requirements, need to trust external parties so as not to be exploited through misuse of the access to information (Hoecht & Trott, 1999). According to Giddens (1990); Humphrey and Schmitz (1998), trust can be defined as *"an agent exhibits trust when he/she has no reason to believe that the trusted other will exploit this opportunity"* (in Hoecht & Trott, 1999, p.259). According to Zucker (1986), there are three ways to produce trust between the parties and in the following part, very briefly, these ways will be explained since it is of great significance for the OI concept how to create trust between the collaborating partners.

- **Process-based,** trust is linked to past or expected exchange,
- **Characteristic-based,** trust is linked to a person, based on characteristics (i.e. family background),
- **Institutional-based,** trust is linked to formal structures, depending on individual or company specific attributes.

When it comes to R&D collaboration, according to Sitkin and Roth (1993), institutional-based trust and legal safeguards cannot be relied on for intangible knowledge protection against abuse. Since making contractual arrangements for each little step throughout the development process can cause uneconomic delays, "goodwill trust" should be applied there. According to Sako (1992), goodwill trust depends on mutual commitment, the trustee should be trustworthy in terms of avoiding unfair taking advantage even if such opportunities arise.

According to Hoecht and Trott (1999), there are some factors that influence the choice of the strategy of firms such as its innovation environment, market position and its resources etc. Basically, there is a close link for firms between its "internal capacity" and "external collaboration". Hence, firms may rely on their internal research and development activities and may trust their own manpower which is referred as introspective strategy. They may follow a complementary acquisitive strategy which means either to purchase the technology or hire the expert staff. Moreover, firms may follow dyadic cooperative strategy as joint venture, cooperative projects or they may rely on research networks which is called as extrovert strategy. Deciding on which strategy to choose depends on the industry the company is in. For instance; in mature industries, inward-looking strategies are more appropriate with incremental technology development. On the other side, it has become a necessity for knowledge intensive industries to be open, even with the knowledge leakage risk nearby.

The amount of risk increases from introspective to extrovert strategy due to decreasing control and monitoring. Through internalisation and legal instruments such as legally binding agreements between companies (cooperation contracts, patents and IP rights etc.), it is possible to increase the power of control mechanisms (Hoecht and Trott, 1999). Although such internalisation mechanisms propose control over risks such as knowledge leakage, it might be inefficient since legal expedience tends to be too slow and costly to proceed in an efficient way (Deakin and Wilkinson, 1998; Liebeskind and Oliver, 2000). Fortunately, companies do not have to rely on only hard control mechanisms but can rely on also social control mechanisms. For firms who follow more outward-looking strategies need to apply social control mechanisms. Reputational concerns are of great significance for self-disciplining mechanisms for individual professionals when social control mechanisms apply (Garsten and Grey, 1998). The important point to emphasize is that no company rely on only one form of mechanism. Nevertheless, self-autonomy of the employees brings some substitution of direct monitoring for social control and also trust will be essential (Hoecht and Trott, 1999).

2.4.3 Time issue

As it is very explicit, opening the innovation process may necessitate important efforts, time and also trial and error to perform it as a proper way (Inova, 2012). According to Lazzarotti and Manzini (2009), the cost of collecting and assessing the ideas flowing inside the company from outside, is very high and sometimes the company has to reduce the number of the ideas in order to make the process faster. Except of the number of ideas, another challenge for the OI concept,

could be the effort and time to understand and communicate with the external actors (Laursen & Salter, 2006). The norms, culture, process etc. of the other organisation may be different than those of the company and as a result, some time will be spent in order to find the balance between them. Even when the ideas are not so many and the companies can communicate and work together, there is a chance that the ideas come at the wrong time in the company or are not being useful for the company (Laursen & Salter, 2006).

Nevertheless, internal research and development can be expensive and time-consuming whereas open collaboration proposes a fast and agile way to respond to the needs of the market (Inova, 2012). It is of great importance to actively scout technology in the external environment rather than waiting for innovation to be in-house developed. A deeper understanding of existing and emerging technologies can enable companies to be as much quicker and efficient as possible (Inova, 2012). Finally, also Huston and Sakkab (2006) advocate the benefits of OI by illustrating successful stories of OI and how the companies were able to lower product development costs and launch their products faster at the market. Therefore, it can be seen that OI is not always a benefit or challenge as far as the time is concerned, but is depends on the criteria of each case. When innovation can be generated internally, then is better solution for the company. However, innovation cannot be always generated by the company itself and then OI is the solution. As a result, establishing partnerships is both vital but at the same time could be a time-consuming issue. The important question to be answered is whether firms should do it by themselves or not (Huizingh, 2011).

2.4.4 Knowledge Leakage

Moreover, since they use external sources for their innovation process, they are less defended to knowledge leakage (Trott & Hartmann, 2009). Therefore, an essential question is emerging. Why would firms contribute resources to projects that will benefit others, including their competitors (West & Gallagher, 2006)? The model of OI is recommended for companies which want to expand their knowledge and engage in collaboration with other alliance companies, in order to be able to gain knowledge and collect more information (Trott & Hartmann, 2009; Inkpen & Dinar, 1998). However, the risks of those collaborations should be taken into consideration. Information leakage is an important challenge for companies (West & Gallagher, 2006). In order to cope with this problem and result in successful exchange of knowledge, the organization should choose carefully its partners and respect the independency of each of the other alliances (Hoecht & Trott, 1999). Since knowledge sharing is usually linked with knowledge leaking, firms should not only share some information with their alliances, but also have common goals and trust between them (Norman, 2004). Without trust, companies should create some structural mechanisms, in order to control their partners and this may result to less information sharing. Thus, the collaborative companies should build their relationship based on trust and they will reduce the risk of knowledge leakage, as well as they will grasp the benefits of the collaboration (Norman, 2004).

2.4.5 Not Invented Here (NIH) Syndrome

Another important challenge that companies should take into consideration is the role of their own R&D department when using OI. Large established firms have built their R&D department with the thought of having a competitive advantage when they create innovative products or services inside this department (Chesbrough et al., 2006). Hence, another question is raised. How does OI affect the competencies of an organization that, until now, had created everything internally (Chesbrough et al., 2006)?

Not invented here syndrome in the R&D community is one of the difficult challenges in that regard and it can be defined as *"the tendency of a project group of stable composition to believe it possess a monopoly of knowledge of its field, which leads it to reject new ideas from outsiders to the likely detriment of its performance"* (Katz and Allen, 1982, p.1). Hence, engineers after being stable for many years tend to pay no attention to the possibilities from outside that may bring new, fresh and novel ideas inside to the group. Those people who have been working together for a long period of time separate themselves from the outside world for technical information and communicate less with other professional colleagues both within and outside the organisation. The fact is that those groups have to get and process information from the external world in order to be updated and to learn current technologies. It is rarely that projects members can have all the required expertise and information in order to complete the project successfully on time. Hence, it is of great importance to acquire new technical ideas and information from many different partners from outside of the organisation (Katz and Allen, 1982).

According to several scholars, there is inverse relationship between group tenure and project performance. According to Shepard (1956) who was the first who presented some evidence regarding this issue, he found that performance raised up average tenure but then performance decreased with long time of group stability. In line with that according to Pelz and Andrews (1976), optimum group tenure falls at around four years. As a result, communication is expected to decline within the time for R&D projects teams. Taking into consideration that performance varies with project tenure, then it is probably likely that technical communication with the outside world will also be declined. Members of such R&D project teams will care less about the external resources, knowledge and ideas while relying on more their own competence and expertise (Katz and Allen, 1982).

2.4.6 Top management commitment

Another issue regarding OI challenges, is about the top management commitment to OI. It is vital for an employee to feel that (s)he has the support of the top management, in order to feel secure (Rodgers et al., 1993). Top management commitment is strongly connected with the success of a program. The stronger the commitments, the stronger the possibility of success (Rodgers et al., 1993). However, according to Jensen and Murphy (1990), top management is more indulgent to innovations that are in line with the current strategy of the company and more biased to innovations that are out of the strategy's scope. Chesbrough and Appleyard (2007)

highlighted the difference between open innovation and traditional business strategy, since OI is a new type of innovation that proposes more open approaches to innovation, therefore they believe that OI is very difficult and rare to coexist with the strategy of the organisation.

Furthermore, Ahmed (1998) indicates that there are some characteristics that differentiate highly innovative firms from less innovative ones in terms of top management commitment. For instance, for highly innovative firms, top management ensures innovation projects to get the required support from all levels inside the organisation. Secondly, top management is committed for financial and emotional support for innovation in highly innovative firms and so on. Thus, it is clear that top management has a vital role either in hampering or in enhancing innovation inside the organisation.

2.4.7 Degree of Openness

One more question to be asked is about the degree of openness of the company. How open the company should be? Should be too open (Elmquist et al., 2009)? It can be seen in some companies that are implementing OI, although they opened up their boundaries towards other companies, they lost the communication inside the firm (Trott & Hartmann, 2009). Furthermore, Hacievliyagil et al. (2007) support this phenomenon, by highlighting the decrease of knowledge flow inside the organization. Another risk except from the knowledge loss, is the higher coordination costs and higher complexity. While adding in the acquisition the investigation for the appropriate partners and the risk of not find them, there are significant hazards for the company (Enkel, Gassmann & Chesbrough, 2009). As said before, since companies do not want to jeopardize their competences and competitive advantage, they should analyse all these risks and find the most suitable, for them, way to utilize OI by minimizing the cost.

2.5 What is not OI? : Different viewpoints and critiques on OI

Begin with, the readers may think why this part did not take part under the heading of challenges of OI because different viewpoints show that there is a lack of common definition of OI which can be defined as a challenge. Thus, it is of great significance to clarify the reasons why this is a separate heading in order for readers to prevent the probable confusion. The main reason is that the different viewpoints of various scholars regarding the concept is discussed rather than only defining OI. Therefore, different definitions can be found in the previous parts whereas in the following parts, different viewpoints in association with the concept is discussed. Thus, it is aimed to show to the readers what OI is not. Second, one of the research questions is formed so as to find out the different viewpoints on the concept. Since it is a main research question for this thesis, it is better to make it a separate heading for drawing attention to that issue. Lastly, it needs to be separated from the challenges part due to the fact that those are below not challenges per se instead just some critiques of different scholars. Hence, it might be not fair to refer them as challenges.

While performing an extensive literature review, it is noticed that there are different viewpoints and critiques on the OI notion. Some scholars have strong opposition against this concept and therefore the book "New frontiers in OI" by Chesbrough et al. (2014) was even in need of including a part for responding to those critiques.

In the literature, there are two main arguments presented against OI concept. First of all, scholars (i.e. Trott and Hartmann (2009) and Mowery (2009)), have argued that OI in fact is not a new phenomenon and not a novel insight within the innovation literature. Second critique that comes forward is that OI is a new phenomenon which explains something new. However, Groen and Linton (2010) propose that this new phenomenon is possible to be through already established concepts. In the following parts, these critiques will be discussed in detail.

First of all, according to Trott and Hartmann (2009), OI concept is just a repackaging of the findings that presented forty years before on the innovation management literature. They support the argument by giving examples from the previous literature such as the network model of innovation by Rothwell and Zegveld in 1985. They pointed out the importance of utilising external knowledge for the innovation process. Furthermore, Thomas Allen's work on "gatekeepers" in 1969 also emphasised the significance of external sources in order to acquire knowledge. Therefore, as it can be seen, companies have already realised the prominence of the external knowledge for their research and developments departments. According to Trott and Hartmann (2009), it is obvious that many authors have been put emphasis on the need for extroversive focus for research and development divisions. Moreover, some authors have been conducted research on collaborations between companies. For example, information leakage problems were discussed earlier by Hoecht and Trott in 1999 corresponding to open and closed innovation.

As mentioned earlier, there are six principles with regard to closed innovation strategies that presented by Chesbrough (2003a, 2003b). Trott and Hartmann (2009) also state that Chesbrough misrepresents the innovation management position today and accused him by creating fallacy for closed innovation strategies which simplifies to undermine these strategies. They further criticise Chesbrough due to the fact that there are existing firms who have spent remarkable money for their own research and development processes.

Secondly, Mowery (2009) discusses that industrial research and development experienced structural change in 1970s. Based on the argument in this article, large corporations decreased the number of the central R&D laboratories through enhancing their dependency on external knowledge sources such as alliances and acquisitions of other companies etc. In order to acquire quick technical expertise in various areas, fast moving US IT companies placed dependence on acquisitions and mergers in 1990s. Nevertheless, the acquisition investments do not appear in the R&D statistics. Despite knowledge outsourcing activities were included in R&D spending reports before by the firms, they are no longer reported in their R&D spending. Therefore,

Mowery (2009)'s detailed analysis shows that industrial innovation process has changed over the past forty-fifty years. He also expresses that in knowledge-intensive industries, vertical specialization increased because of the entrance of many smaller firms who forced incumbent firms to displacement. However, vertical specialization relied on market relationships and increased role of the firms specializing in the upstream phases. Both of the characteristics structure the emergent industry of the late 19th-century, therefore "*OI itself may not be an entirely novel phenomenon"* (Mowery, 2009, p.18).

Finally, according to Groen and Linton (2010), supply chain comprises anything OI comprises and they raise a claim that OI *"hinders growth in research and understanding"* (Groen and Linton, 2010, p.554). This is because supply chain centres upon value creation by reaching beyond the organisational boundaries involving customers, suppliers and other stakeholders. Since OI matches the same meaning that supply chain has; they argue that OI may create barriers that hampers the communication between academic groups. Therefore, Groen and Linton (2010) bring forward that either the concept OI should be modified or the term supply chain should be in use instead of OI since supply chain is an older term and has broader utilisation. Nevertheless, according to Chesbrough et al. (2014), this critiques stem from the definitions. To put it simply, innovation is related with creation of new products, processes etc. whereas supply chain is the management of existing products and processes throughout the value chain. Furthermore, Chesbrough et al. (2014) argues that OI concept has more innovation actors comparing with supply chain. As an example, universities, spin-offs, business models, IP management etc. are not included by supply chain concept. Hence, it may better to read cautiously what the authors bring forward about the new concept OI.

2.6 Applications of OI

As can be seen from the previous paragraphs, OI is a concept mainly discussed theoretically. But even if OI is the perfect model in theory, companies need to be convinced for the practical benefits of the model, in order to follow it. As a result, some applications of OI are presented.

2.6.1 Previous research on OI's adoption drivers

In order to identify how the companies perceive OI and how do they participate in it, it is essential to wonder *why* companies turn to OI paradigm. In a research performed by Mortara and Minshall (2011), 18 companies that were engaged with OI activities, were participating. The reasons and the ways they participated were analysed and the findings are quite exciting. According to Mortara and Minshall (2011), companies can be divided into four categories, (1) OI conscious adopters, (2) OI ad-hoc adopters, (3) OI precursors and (4) OI communities of practice. The categorization was based on the reasons and the ways these companies chose to implement OI.

In the first category, *"OI conscious adopters"* are found companies mainly from Fast Moving Consumer Goods (FMCG) industry. In this category, the companies started to implement OI

because they saw it as a trend (Mortara and Minshall, 2011). They wanted to support innovation and forward growth in this sector and they noticed that the outperformed companies turned to OI. The way of following OI was focused on the inbound process. A small team of managers was responsible to find alliances and to successfully implement the process.

The second category, the *"OI ad-hoc adopters"*, did not implement OI for the whole organization, but instead they used it in special occasions, for some specific processes or products/services (Mortara and Minshall, 2011). Examples of this category are companies participating in the aerospace and defence sector. Those companies wanted to open up their innovation process, in order to correspond to customer demands. The process of openness in concerning collaboration with strategic partners and universities, mostly for inbound activities.

Moreover, in the third category according to Mortara and Minshall (2011) are found the *"OI precursors"*. For these companies, OI was the only option, since they experienced changes in their environment and they confronted disruptive technologies. For that reason, they chose to open up their sources and use both inbound and outbound processes. They used external actors, such as partners, other companies, universities, etc. for their inbound activities, while at the same time, they out license as part of their outbound activities.

Finally, the last category is *"OI communities of practice"*. This category lacks of companies and as a result, the conclusions are vulnerable. The reasons to participate in OI model for this category are the difficult innovation targets and the competitive environment. They focused on inbound activities and they collaborate with universities and suppliers (Mortara and Minshall, 2011).

2.6.2 Applications of OI in different industries

So as to understand the practical implementation and the effects of OI in companies, some specific examples of companies, from different industries, are presented.

2.6.2.1 Finmeccanica, Aero-Space & Defence Industry

The Finmeccanica Group is the leader in the Aero-Space & Defence industry and the sixth worldwide actor in the Defence Electronics market (Rogo et al., 2014). The focus area of this Group is to develop continuously new technologies. In order to retain its central position in technological and industrial activities, the strategy of Finmeccanica was to be continuously updated and as a result they were seeking new potential opportunities (Rogo et al., 2014).

Finmeccanica developed the strategic and innovative organizational structure, named MindSh@re, the purpose of which, was the cooperation with other actors such as research centres, universities, suppliers etc. in order to create useful knowledge that can be transferred into the production chain (Rogo et al., 2014).

As can be seen in Figure 8, MindSh@re was divided into seven key elements, which represented the social and relational dimensions they wanted to work on (Rogo et al., 2014). Consequently, the participants could identify their capabilities to innovate and compete against their rivals.

The research identified some areas to be leveraged so as to increase the OI process. The outcome was that some areas are more appropriate for OI than others (Rogo et al., 2014). One of the advantages of OI is the unlimited sources of knowledge could be used in the innovation creation. However, according to Rogo et al. (2014), leadership and management orientation are determinant factors for the success of the process, since not only the planning phase is important, but also the implementation of the concept.

Figure 8: Seven key elements of MindSh@re. Source: Rogo et al. (2014)

2.6.2.2 Procter & Gamble (P&G), Consumer Goods Industry

P&G was one of the first companies experimenting with OI. First, P&G was operating with the traditional closed innovation model (Dodgson et al., 2006). After a while P&G realized that it was more efficient to engage more sources for the innovation process, therefore they moved to an internal integration process which included external entities, such as customers, suppliers and other knowledge sources. (Laursen and Salter, 2004). Those external actors were vital for P&G's innovation creation.

In June 1999, P&G introduced a new strategy which purpose was the increase of innovation, *Organisation 2005* (Dodgson et al., 2006). The main goal was to connect more people and create a collaborative environment in the company. In order to emphasize the change of thinking, they renamed the R&D (Research and Develop) department to C&D (Connect and Develop). As Dr Mike Addison highlighted at a Connect and Develop Symposium in February 2003, *'Innovation is all about making new connections. Most breakthrough innovations are about combining known knowledge in new ways of bringing an idea from one domain to another'* (Dodgson et al., 2006, p337). In the climate of collaboration, P&G organized an event, *Innovation 2000* and invited researchers, employees and external suppliers.

Except from the development of Connect and Develop strategy, P&G followed the OI model by creating Technology Acquisition Group (TAG) (Dodgson et al., 2006). This group was

responsible for the licensing to and from P&G. As part of the new strategy P&G was licensing out their technologies as well as licensing in patents from external sources, in order to increase their knowledge base (Dodgson et al., 2006).

Last but not least, IvT was another kind of technology has been important to P&G's strategy. All these strategies that P&G followed and the tools they used, helped P&G to develop innovation capabilities (Dodgson et al., 2006).

2.6.2.3 High Technology Industry

Another example of industry which has successful OI use is the high technology industry where companies such as Cisco, Intel and Microsoft, succeed by using external research (Chesbrough, 2003a). According to West and Gallagher (2006), there are four approaches for OI in open source:

1. Pooled R&D

This category is about the firms that donate IP to the open source project and in the same time collaborate with other companies in order to increase the benefits for all parties.

An example of the pooled R&D is the Mozilla web browser project that was created by Netscape in 1998 (West & Gallagher, 2006). The purpose of the browser was to be a technology provider for companies, such as Netscape, who would commercialize their open source code. Further, firms like IBM, HP and Sun collaborated with the Mozilla web browser project in order to ensure the continuous of the project and that the following releases would be compatible to their systems. The main outcome coming from the pooled R&D is that companies which have a common goal, collaborate for the development of a technology and then competing for the sales of their products. As a result, the whole industry benefits from the collaboration (West & Gallagher, 2006).

2. Spinouts

The second category of OI in open source is the spinout. In this context, the definition of spinout is the switch of an internal development project to an independent open source project. The reason behind this movement is that the company may have an important IP that can be chained with other products and services and therefore would be essential for other companies to own it (West & Gallagher, 2006).

The example for this category is coming from IBM and the Java programming language, developed by Sun Microsystems in early 1996 by two IBM researchers (Capek et al., 2005). The name of the project was Jikes and it was released in December 1998. Jikes was an open source platform which allowed external programmers to extend and improve it. After some years, IBM was the host of the project website but the development was done by external programmers (Capek et al., 2005).

3. Selling Complements

According to Teece (1986) there are many complements that could be proven of importance for a product and they are not necessarily products but they could be services or processes as well. Those services and processes may even be invisible to the customers.

For instance, Apple Computer decided on 2002, to build its own web browser in order to be available for its customers. Thus, they created Safari and OS X. Safari was built upon Konqueror web browser's libraries and the goal of OS X was to create a new open source project in order to share its modifications of the BSD Unix code (West & Gallagher, 2006). Apple has used open source and contributed to its changes, but the company did not release the rest of proprietary code for the browser and the operating system (West & Gallagher, 2006).

4. Donated Complements

Finally, the last type of OI in open source is to donate complements. In other cases, firms make their money off of the core innovation but seek donated labour for valuable complements.

A paradigm of this is the Avalanche Technology Cooperative that was founded in 2001 so as to bring together IT adaptations developed by users of the IT business that would allow companies to integrate different packages such as PeopleSoft and SAP (West & Gallagher, 2006).

2.6.2.4 Automotive Industry

"Volvo Group is currently one of the world's largest manufacturers of trucks, buses, construction equipment, marine engines and aerospace components" (Kuschel et al., 2011, pp. 5-6).

In 1999 Volvo realized the importance of developing vehicle services as services became the new trend in automotive industry. Nevertheless, Volvo did not possess the R&D capabilities to develop alone those services, therefore they decided to expand their boundaries and use some external sources (Kuschel et al., 2011). Volvo decided to spin-off its ideas on vehicle service development together with a Swedish telecom operator and a global telecommunication equipment manufacturer. The collaboration resulted to WirelessCar.

However, soon the expectations started to become disconnected from reality, as from the first offer to an external car manufacturer, Volvo faced a tremendous development cost (Kuschel et al., 2011). According to CEO, in the spin-off company, *"That was when I recognized that our platform was not open enough and we had built too much of a system solution adapted to [legacy Volvo Group vehicle IT platforms] that was not generally applicable."*

Volvo and the other two companies started this collaboration having in mind that they attempt an OI initiative. The contribution of the external aid was limited, since the IT platform was not open enough (Kuschel et al., 2011). The purpose of WirelessCar was to share different communication platforms which would facilitate the creation of vehicle services. It proved to be more

complicated than it was designed. As can be seen in the Appendix 2, WirelessCar mostly follows the OI principles but generally in a weak weight (Kuschel et al., 2011).

2.7 Connecting the dots

The theoretical framework presented above is the basic tool of this thesis in order to comprehend and then be able to analyse the behaviour of the investigated companies towards OI concept. The literature review is structured based on the main research questions. Each chapter gives the opportunity to the reader to learn about what has been told from different scholars and authors about the area of investigation. From theory, it is aimed to contribute by having various perspectives of different authors as a support of the statement that OI has lack of common definition. The different viewpoints shows to the readers that there is a lot of discussion around the definition and content of the concept.

The first chapter illustrates the transformation of companies' strategies from closed to OI and the steps between those concepts. It is essential to illustrate and explain the different concepts between closed and open innovation, since there are some steps between these two. Companies could not jump directly from close to open innovation without passing from the intermediary concepts such as cooperation and collaboration. Moreover, the analysis of those concepts give the opportunity of distinguish OI from the other concepts and understand the core differences between them.

Further, the second chapter addresses the definition of OI. The literature review regarding definitions will be used in the analysis and discussion part in order to highlight the difference between the definitions given by authors and interviewees. After presented a number of different perspectives of OI, some applications of OI are included in order to show some specific practical examples of companies which attempted to work with OI. The applications provide an insight regarding the reasoning behind some successful and unsuccessful paradigms.

Last part and third research question is about the utilisation of OI, where a variety of industries are analysed and also two of the examples (automotive and telecommunications industries) are selected because of their relevance to investigated industries.

3 Methodology

The following chapter aims to present the methodology used to research how large companies define, interpret and utilise OI concept within their company. Since the study's design affect the quality of the research result, it is of great importance to include this part. Therefore, this chapter will introduce research strategy, design and process, data collection, data analysis and research quality. Finally, it will have a discussion of the quality of the research.

3.1 Research Strategy

Research strategy represents the general orientation of the research that forms two different clusters as either quantitative or qualitative. It is of great significance to understand the differences between those two approaches while establishing research strategy. Quantitative research is more appropriate when a measure of how many people think, feel or behave in a certain way is needed. Since it uses statistical analysis to determine the results, it is more about collecting numerical data for explaining a particular phenomenon and particular research questions can be immediately suitable. From the other side, for qualitative research, it is much more difficult to find research questions immediately from the beginning that suit very well, it needs further iterations (Bryman and Bell, 2011). A qualitative research is also suitable to generate new knowledge and for deeper understanding. Because the purpose of the thesis is to have an in-depth understanding and to find out insights of interpretation of OI; qualitative study is preferred and used.

Lastly, quantitative research is often linked to deductive strategy where hypotheses are generated and translated into researchable entities afterwards. On the other hand, an inductive strategy is associated with qualitative research where theory is generated from the data (observations and findings) rather than confirmation of the existing theory. This study entails to utilise an inductive strategy since the aim is to explore the area and identify the patterns of OI concept through using the collected data which will end up with a conceptual framework (Bryman and Bell, 2011).

3.2 Research Process

The research strategy frames the processes of a study, and for this the research process proposed by Bryman and Bell (2011), see the Figure 9 below, and is found appropriate.

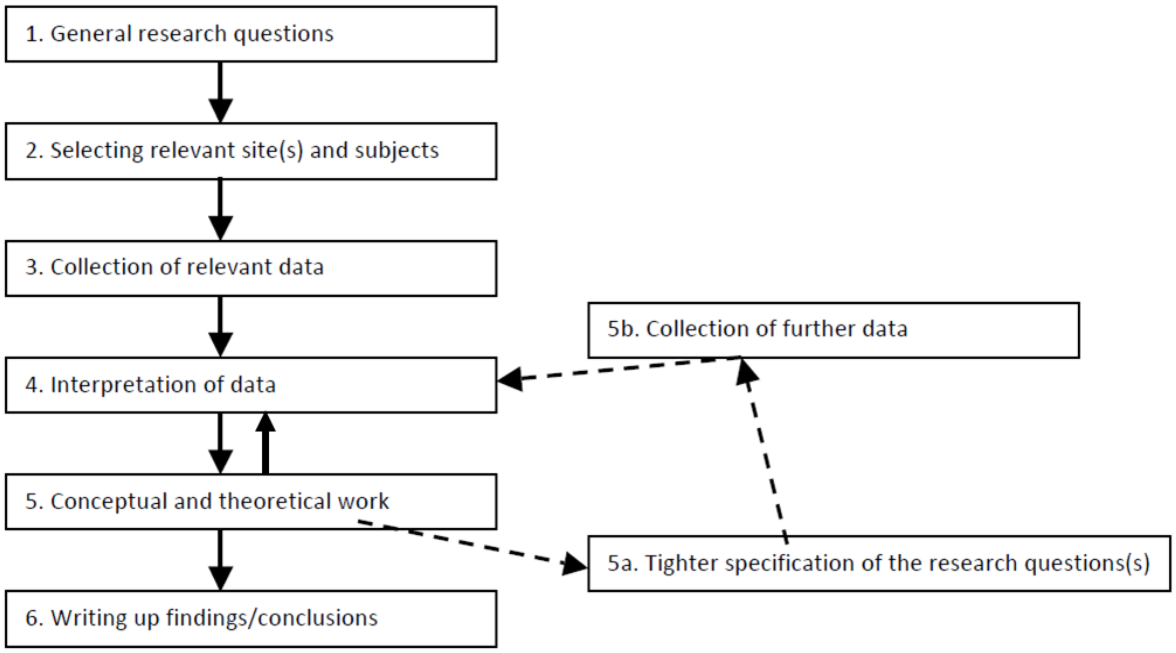


Figure 9: An outline of the main steps of qualitative research. Source: Bryman & Bell, 2011, p.390

Due to the fact that this study follows an inductive approach, the process started with an exploratory phase where the research topic and research questions were formulated since they form the purpose of the study. This was done with initial meetings at Chalmers University of Technology with the supervisor. Having decided the research questions, it is of great importance to select relevant subjects in terms of the scope of the study and then collect the relevant data from chosen companies. Afterwards, data analysis follows and a conceptual framework is created based on the results since most qualitative researchers emphasise that theory emerges out of the collection and analysis of data. Even though this process seems to follow a linear manner, it is significant to emphasise that it is an iterative process since some phases are revisited, researchers can go back and redefine the research questions and even collect more data if necessary. (Bryman and Bell, 2011). For example, after fifth step it may require to collect some further data and then interpretation of data follows. Finally, it results in writing up the conclusions as usual. As mentioned, those followed steps usually intend to generate conceptual frameworks rather than testing of theory that is specified in the beginning of the study.

3.3 Research Design

According to Saunders et al. (2009), the research design is the general plan of how researchers intend to answer the research question(s) which will include objectives of the study, specify sources from which data will be collected and finally consider the constraints of the study such as accessing to data, time and money constraints etc. It also represents how the data is going to be organised and analysed. Furthermore, it is important to have valid reasons for the selected research design since it is able to validate a research by the assessor in terms of why the research is being conducted in a particular organisation and in a particular department and also why some specific staff is chosen for interviews within that organisation (Saunders et al., 2009). According

to Vogt et al. (2012), design is fundamental since all the next steps flow from the selected design and this choice is closely associated with the research question(s). There are some research designs that researchers can follow depending on their research questions and Bryman and Bell (2011) proposes five different types of research designs as follows: experimental design, cross-sectional or social survey design, longitudinal design, case study design, and comparative design.

The case study approach is one of the most popular and widely used design types in business research (Eisenhardt and Graebner, 2007). It is decided to use a case study research as an overall methodological approach for the empirical investigation. As suggested by Eisenhardt and Graebner (2007), this is a very powerful method to build an in-depth understanding of a complex phenomenon which necessitates to answer the "how" and "why" questions (Yin, 2003). A basic case study also requires a detailed analysis of a single case and it can be either a single organisation, a single location, a person or a single event (Bryman and Bell, 2011). Moreover, Yin (2003) states that case study designs are appropriate to apply when researchers intend to include different contexts that are thought to be significant for the studied concept. Since the purpose of this research is to develop an understanding on the interpretation and utilisation of OI concept, case study design seems to be the most appropriate type for this research. However, there will not be a single organisation to analyse but instead two different large established organisations will be interviewed within the scope of this thesis. Therefore, multiple-case study design is considered to be appropriate in order to meet the purpose since it will allow an in-depth examination of each case.

3.4 Data Collection

In order to allow us to get deeper understanding of OI concept, qualitative research strategy is chosen and information is gathered based on semi-structured interviews with the two chosen companies. In total, 14 interviews (seven interviews with company A and seven interviews with company B) were conducted and the detailed information such as the roles of the interviewees and the company they belong can be found in Appendix 4. To begin with, a relevant person from innovation department was chosen for interview in each company. Then, in each interview, the interviewee was asked to recommend another person to interview which make quicker to get in contact with relevant persons. Thus, in total 14 interviewee were reached to get their ideas. The reason behind conducting interviews is that this method allows interviewers to have a personal communication with the subjects instead of surveying which is a more distant approach. Furthermore, interviews give the opportunity to the researchers to see the reactions of the interviewees, assess their behaviour, and ask follow-up questions so as to have an in-depth exploration of the topic. Therefore, the outcome is more concrete. According to Rogo et al. (2014), interviews during the investigation process are inconvenient since the time needed for interviews, the collection and analysis of data, is a time consuming process. Nevertheless, Rogo et al. (2014) claim that interviews are the only way to achieve a good quality of learning about improvement of OI processes.

In semi-structured interviews, researchers have a list topics and questions to be included. However, it is possible to skip some questions or to ask following up questions where the interviewee may explain underlying reasons or reasons behind his or her viewpoint. Therefore, semi-structured interviews are considered to be suitable to fulfil the purpose of the thesis.

Furthermore, semi-structured interviews gave us the advantage of being together; one was taking notes and the other one was asking questions. It allowed us to discuss and have in-depth exploration on the answers. The interviews were also recorded and then transcribed which prevented to lose any important information. Finally, the interviews were in English. However, we do not think that it has any impact for the thesis since the employees were fluent and confident in English.

3.5 Data analysis

During the research study, a very large amount of data is collected through the interviews, transcripts and observations. Working with large data is not an easy and straight process since it might be difficult to decide which information is useful for the research project and which could lead to be out of scope as well. Thus, a lot attention is needed for the data analysis part. According to Eisenhardt (1989), there are some possible risks with the analysis of data since people are the poor information processors. This is because of the possibility of having biases based on the limited collected data. Researchers also may be influenced by some of the interviewees in some way that can lead to draw wrong conclusions or may be lack of evidence which can lead to have some analysis that does not fit with the remaining findings. Therefore, all collected data through interviews is transcribed immediately after each interview in order to prevent information loss. Moreover, the transcripts are re-visited several times as recommended by Bryman and Bell (2011) which gives the opportunity to listen them for the second time and prevents to be biased. Furthermore, after transcribing, we discussed the findings not only by ourselves but also with our supervisor several times in order to secure the knowledge together.

3.6 Quality of research design

The quality of a chosen methodology is usually assessed by two criteria: reliability and validity, where those criteria are divided up into internal and external issues. In a research study, it is of great importance to have validity and reliability in order to allow others to replicate and evaluate the results. Nevertheless, since this is a qualitative research, there has been some discussion among qualitative researchers associated with the suitability of these criteria. Moreover, some authors who support the relevance of the criteria further discuss that the meanings of the terms may need to be changed. The issue of validity measurement seems not to be relevant due to the fact that qualitative research does not pay so much attention in the first place to measurement. Hence, the issue of validity may have little connection in qualitative studies (Bryman and Bell, 2011; Saunders et al., 2009). Following parts have more details on the qualitative research criteria.

3.6.1 Reliability

The issue of reliability refers to consistency of the findings such as whether data collection techniques generate consistent results; generate same results on other occasions; or can be observable by other observers etc. (Saunders et al., 2009). Furthermore, Bryman and Bell, 2011 divides reliability up into parts as external reliability and internal reliability. The former one refers to replication of a study and admittedly it is a difficult criterion in qualitative researches. It is due to the fact that freezing a social setting or circumstances of an initial study to replicate it is not possible. However, there are some solutions to overcome this problem. By adopting a similar social role that is adopted by the initial qualitative researcher can be a solution in order to overcome this problem. On the other hand, the latter one refers the extent to which the observers agree about what they see and hear when there is more than one observer in a qualitative study (Bryman and Bell, 2011).

According to Saunders et al. (2009), there are four threats to reliability: subject or participant error; subject or participant bias; observer error; and observer bias. In order to overcome those threats, it is of great importance for the researcher(s) to study interview techniques in advance and to study related literature before the interviews in order to ask the right questions. Moreover, researchers should provide the purpose of the study to the interviewees beforehand; and in order for the interviewees to create trust, they must be ensured that the end-results of the study will be sent to them and so on. There are other actions that are needed to be taken in order to achieve those reliability threats for qualitative research which are proposed by Saunders et al. (2009) in the book.

3.6.2 Validity

According to Saunders et al. (2009), validity refers to whether or not the findings are about what they appear to be about. This concept is divided up into two parts again as internal validity and external validity. The former one means whether or not there is a congruence between the observations and the theoretical part that is developed. Hence, it can be considered as a strength for qualitative studies since participation in a social setting over a long period of time enables researchers to obtain high level of match between observations and the theory. In order to achieve internal validity, it is of great importance to double check whether or not all the questions are asked to the interviewees that is necessary in order to comprehend the procedures and processes in a correct way.

External validity refers to the generalization of the findings across other related social settings (Bryman and Bell, 2011; Saunders et al., 2009). Unlike internal validity, this concept creates some problems for qualitative research because of the tendency to employ case studies and small samples. In general, single case studies can seldom provide results which can be applied to other social contexts than its own (Bryman and Bell, 2011).

3.6.3 Ethical Considerations

One vital aspect of this research concerns the ethical considerations. Interviewees' protection from being exposed is essential. Hence, anonymity is promised and personal information are excluded from the thesis. After the anonymity was promised, all the interviewees were expressed their thoughts more freely, which is also the purpose of having interviews. If the interviewees were feeling uncomfortable to share their thoughts, the results would be incomplete. Thereby, in appendix 1, the interview guide is presented without the responses of interviewees. Except from the individuals, also the companies' names are not revealed in the thesis, due to the fact that both companies want to keep their business and strategies protected.

4 The Empirical Study

This section will present the findings generated from the interviews conducted with managers and employees from and/or related Innovation department.

The empirical study started with interviews; with two companies involved from different industries, operating in different sectors of activities and including only large established companies. However, the name of the companies will not be disclosed, instead will be mentioned as Company A and Company B.

Company A

Company A is a large established multinational company in the automotive industry and the global presence involved around 100.000 employees in 2008. In 2000s vehicle services were seen as a new revenue streams for automotive industry (Kuschel et al., 2011) which showed to company A that R&D capabilities were necessary to be extended. The way for doing this was looking outside of the organisation's boundaries. As an example, it was believed that telecommunication industry had so many know-how that was needed for them. As a result of this belief, the company decided to spin-off its vehicle service development ideas with a telecom operator in 1999. This example shows that company A pays attention to new technologies in order to create new values for customers and also to capabilities and know-how that is not acquired. Since the world is a fast-changing place, company A always thinks to be several steps ahead and so they say that *"how could we be enhancing your life in the future?"* This is very clear that innovation is important for them. They aim to look for new values that can be added to the vehicle that is important for their customers. According to company A, self-driving vehicles will be a challenge in the future because of the concept of the vehicle will change. However, company A is already running those vehicles that can able to drive themselves on the public roads. They state that *"your vehicle becomes your private chauffeur, and you can do other things in your vehicle than merely driving it"* which shows us that they pay attention on technology revolution and try to be one of the industry leaders in automotive industry.

Furthermore, company A cooperates with partners such as customers, governments and vehicle companies for a safer and more sustainable society in finding new innovative solutions in the areas of safety and environment.

Company B

Company B is a multinational telecom company and a world leader in fast-changing environments of communications technology with more than thirty thousand granted patents. Their mission is to transform the society, through mobility. They state that *"we are seeing a fundamental change in the way we communicate, socialise and make decisions together".* In order to achieve those objectives, innovation is a great importance for company B. They state in their web-site that they have a long history of innovation and are the pioneers of next generation technologies for a better quality telecommunications.

For each of the companies A and B, depending on their organisation, the R&D and/or innovation manager and also the employees working in the area of R&D and innovation has been interviewed. The questions in those interviews appertained:

- The company's perception regarding OI phenomenon;
- The way and type of the company's participation in OI projects and settings and the reasoning behind it;
- The attitude in association with innovation collaborations and networks in terms of objectives, most relevant partners, the expectations, utilisation and final outcome for those collaborations;
- How to create, sustain and improve trust between those collaboration parties;
- The perceived risks regarding OI such as intellectual property rights.

The interviews enable us to comprehend and compare the company's innovation processes and how they rely upon external sources of knowledge and technology. As it is expected, the ways of perceiving and utilising OI practices, and opening the innovation processes have some differences between the companies. In the following part, the findings from the companies are presented.

4.1 Company A - The Innovation Model

To begin with, this company has utilised Chesbrough theory in order to raise the awareness inside the organisation. They also aim to design different activities within the whole group and to improve the innovation capabilities. Hence, they are able to explore what is that they actually do today and what they could do more in the future. Moreover, they mapped some of their innovation processes, based on the funnel of Chesbrough.

Based on the information from the interviews, company A divides their OI activities into two main parts as **"Ideation"** and **"Concept Development Process".** Within ideation phase, they have 5 different OI activities as Innovation Jams, Customer Co-creation, Innovation Labs & Creativity Workshop, Idea Competitions and Global Technology Scouting. Inside of concept development process phase, they have Intellectual Asset Management, Virtual Companies & External Incubation, Venture Capital, Licensing and Spin-in & Spin-out Strategies.

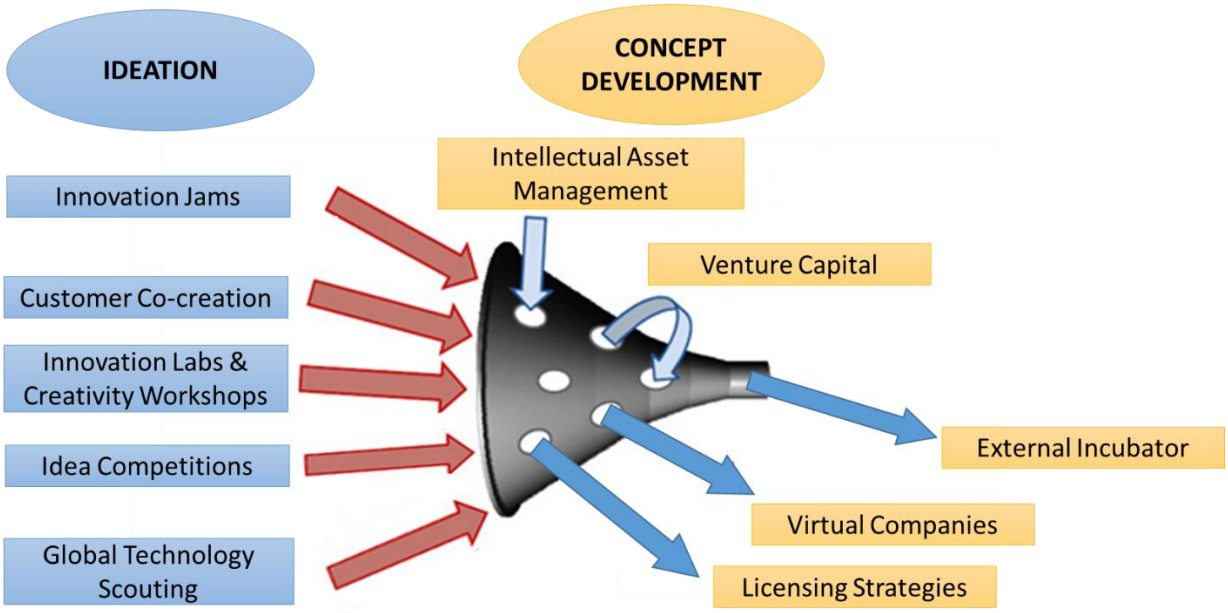


Figure 10: The innovation process of Company A

4.1.1 Ideation

Ideation is practiced for creating ideas and concepts within the organisation. In this early phase of idea generation, company A pursues pushing idea generation internally in a virtual fora, named innovation jam. **Innovation jam** is an open web-platform that they invite a lot of people within the organisation in order to push them with the aim of generating new ideas for a given specific challenge the company has. They have also tried this concept with some partners but it was complicated and challenging because of intellectual property rights in terms of who will own the rights of the generated ideas at the end. Hence, they stopped to perform innovation jams with the external parties and instead perform it within the organisation.

Company A also perform **customer co-creation** activities which they involve the key customers in the development process in order to reveal their covert and overt needs. For instance, it is reasonable and efficient to involve truck drivers in the cabin development process since they are the daily users of this product. Hence, they can put into words their needs but the ones that are latent and very difficult to express, may be even impossible, can be revealed through those creative workshops together with the customers. Furthermore, customers usually are not so sensitive about the written agreements and patents, instead they want to use a better product. On the other side, co-creation with suppliers is different, because the patent discussion is always an issue between the parties. Hence, it makes the collaboration with the customers easier than suppliers.

For **innovation labs and creativity workshops**, the company tries to set up creative spaces such as labs, both internally and externally (i.e. Lindholmen Science Park has specific labs) and they meet with their partners and other stakeholders there in order to generate new ideas together. **Idea competitions** are one of the examples and is supposed to bringing in ideas by involving

universities and researchers through idea competitions. The main purpose of this activity is that when the company realises they have a problem or issue which requires to find solutions, the fact is that the solution might not necessarily lay out inside the organisation. Hence, they have the opportunity to involve outside world (i.e. academia) so as to bring ideas in. This process can take place either in the beginning of the funnel or in later stages of the innovation funnel.

The fifth element of the ideation process is **technology scouting** where they look for different sources of information; it could be grey sources as reading something in the newspapers and/or publications within the specific area etc. in order to make their knowledge more mature. These are about five people within the organisation from Advanced Technology and Research department. Those people look at the outside world in terms of what is the brand new technologies, who is able to solve their problems, who are the best providers and can they connect with them somehow? Hence, this is one way of getting connected with the best technology competence from the outside to bring them in.

4.1.2 Concept Development Process

Within the scope of the concept development process, company A collaborates with external partners. They try to find the best partners to utilise the competence that they have; it could be the best universities or suppliers. The reason for performing this process more open is to get hold of some of the supporting competences to outside the company's borders, and also to detect new concepts outside their borders.

They have **intellectual asset management** which they work together with consultants. There is usually a kind of hinder between the company and outsider parties such as partners, suppliers etc. since it is difficult to be sure on what is allowed to share and what kind of rules are applied. The intellectual asset management area aims to define what kind of tangible and intangible assets the company has such as patents, software codes, and tacit knowledge and so on. They try to scrutinize more in a pragmatic way in terms of what assets the company has and how to control them in order to be sure on what is allowed to share. This asset management is of great significance since the fear for sharing company knowledge with other parties can hinder an efficient collaboration and can end up in a situation where it is not collaboration instead just giving away things which are not really important for the other party. Collaboration means to give and take something convenient, so it is important to understand the own assets.

They have also **virtual companies** and a strategy for collaborating with **external incubators**. They have the possibility for the ideas to put them external incubators that they cannot take care of within the organisation which are really interesting (i.e. Gothenburg incubator; Chalmers Innovation etc.). In some cases, they take in projects quite far and invested them a lot until they realise that they cannot do this inside the organisation. Nevertheless, they believe that it has the value in it since they have IP rights and patents connected to it. Hence, it might costly for them unless they do something with this idea. For such cases, they try to take things out in order for

them to be able to bring the ideas in, may be in the later stages. This strategy is called **virtual companies.** They refer this strategy as an example of OI since they take out those cases that are interesting and cannot continue inside the organisation. The ideas need to be refined further somehow. Hence, they have connected with CEO (that could be a people inside the company), then they have somebody who is responsible for taking market side – a student for example. They also need somebody else who looks at design (could be a student from design school) and somebody else who looks at product development (could be a Chalmers student). Afterwards, they run this virtual company for approximately six months and try to have a prototype that they are able to sell to customers. Then they show it to the company and try to decide whether to take this idea in. If the idea still is not good enough to take in, then they put it external incubator again and find an entrepreneur who wants to continue with it.

They also work with external ventures via **venture capital** who invest in companies on the outside that have a promise. It is for the purpose to understand the market, customers, how the ecosystem looks like and what kind of value propositions the company should offer. Afterwards, it is connected to the strategies of company A and this is another way of developing types of innovation. According to Investor Director, during the 15 years, they can understand the high disruptive technologies through the venture capital group that they cannot identify inside the company.

They not only work in the current market but also look for new markets; presently they are not good at with **licensing** business that the patent is taken inside the company and then licence out in return of money. They believe that it is a matter of future and prospect because we also see now that the vehicles become more and more connected and ICT technology comes to the vehicle, so maybe in ten year it will be important because it is a big business but for the moment it is not a priority.

For **spin in and spin out,** they take in ideas that come in from any inventor from outside. There is a group that screens the ideas and try to connect the right people from inside of the organisation. There is also an outbound opportunity for company A in terms of spin-offs; because they have their own Venture Capital Group. It is possible for them to invest in the company and provide this technology into company A but they also have the opportunity to invest in a project or in an idea which is really interesting. However, it cannot pass this gate in the funnel because it is not regular product development instead just an idea that is too good to die. Then they are able to take out ideas and skim them off which is called Venture Capital. It is one possibility of taking in and taking out: Taking in technology by investing and also spinning-off things that do not really fit with the company but could fit at a new company in their portfolio.

4.1.3 OI Definitions in Company A

At the beginning of each interview, the interviewees were asked to give their own definition of OI. The results are quoted below.

According to the Global Innovation Manager, who is responsible in managing the innovation process in Company A, OI is difficult to be defined and the reason is that in the organization they do not have a clear definition for OI. He would personally defined OI as *"Any time that you need involvement of any parties outside the company in order to take something from an opportunity to an innovation".* He believes that the organization needs some sort of OI capability to connect with the outside of the world.

Moreover, another point of view came from an employee who works with many stakeholders in order to find service driven and digitally driven innovation for all the business units of company A. His definition of OI is *"I would say collaboration with actors which are typically outside of your value chain. When you have an open or shared license or agreement. OI means that we may work with the same suppliers but we share the same benefits".* The interviewee then, framed the scope of OI, "*OI is to share the same/joint incentives with alliances. If we have a collaboration where I pay you and I get the benefits and you just get paid is not OI, it is just a normal contract".*

The third interviewee who is ideation lab manager and the global coordinator of InVolve, defines OI as interaction with external communities, companies and individuals in order to build common knowledge and to insource and outsource knowledge products or ideas. "To me open innovation could be to purchase or license novel ideas, or to outsource or divest ideas that we can or do not want to pursue ourselves. It could further be to ask e.g. suppliers to propose to us novel ideas or solutions".

Furthermore, the director of emerging technologies within advanced development organisation, gives a definition of OI as involving parties outside the company. The interviewee believes that the broader definition of OI is important for the company, *"that includes collaborations with external partners, like students, academia, research, industrial partners. In that sense, OI is crucial because we do not know everything and we need help there"*. It was also stated that OI in the sense of ideas flowing into the company from outside, is difficult for them to manage and they have not seen any benefit from this part.

The responsible for technology strategy innovation department gave the example of Chesbrough in order to explain what OI means for him. *"We have used a lot the picture of Chesbrough with the funnel, in order to design different activities within the Group in order to improve innovation capabilities".*

Last, but not least, the interviewee from the Technology Strategy and Innovation department of company A explained OI from the inside out and outside in point of view. For the inside out, it is the contribution of the company to others, *"we contribute to other projects by helping them with our knowledge and creativity"*. Also if in company A they have good ideas which are not align with their core business, they can benefit from them by developing them externally by partners, students or incubators. According to the interviewee, the outside in process is what they mostly do in company A and includes ideas coming from crowdsourcing, or students, users and so on. Finally, except from the inside out and outside in view, is also the collaboration. *"With collaborations we want to go all in the same direction, we want to create something altogether"*.

4.1.4 Engagement of OI model

During the interviews conducted in company A, we also wanted to find out how and to what extend company A engaged with OI projects and settings. In the following parts, the different types of inbound (Enkel, Gassmann and Chesbrough, (2009)) processes of OI is analysed.

4.1.4.1 Collaboration with students through APP

Academic Partnership Program (APP) is a group inside the company A, who is responsible for building the relationships between the universities and the company. APP has some parameters for choosing the universities such as competence in areas that are significant for the company. Hence, the university that possesses this competence will probably likely be a partner business university and participate in one of the idea competitions.

For example, the company wanted to have a closer collaboration with two universities in China due to the competences the universities have. Hence; the company, APP and some professors from those universities defined the scope of the project and then they set up the idea competition based on defined scope and then marketed it in these universities. The company always looks first for the new and novel ideas from the students and thinks everything else is a bonus. The price for students was an internship in the company which shows that they intends long term relationships.

4.1.4.2 Collaboration with the users through creativity workshops

The company also collaborates with their customers and users since they are the ones who use the specific product. They intend to find the latent needs of the users. This is the opposite of the explicit needs which are the ones that can be gathered when interviewed someone. According to one employee who works in Technology Strategy and Innovation, it is easier to find out user's explicit needs but there is some tacit knowledge that cannot be caught only through interviews. The best way to find those tacit needs is to ask the drivers to give their ideas regarding design and even design it together. In those workshops, they also have designers who make realise those ideas simultaneously. Hence, the drivers are able to see the results which make them encouraged and satisfied. As an example, when asked drivers what they expect from a cabin, the response was related with the tablets and gadgets inside the cabin. However, due to having designers in

the workshops and being able to design it together, the cabin was sketched differently which was not possible to find it out without this workshop.

4.1.4.3 Collaborations with the suppliers & customers

A common partner for company A is their suppliers. The reason for this choice is that they know their suppliers and they collaborate with them in general. In some cases they use their suppliers for specific projects in order to create something together with them, thus they switch relationship with them from being suppliers to partners and after the project is finished they go back to the previous relationship, they are again suppliers. For instance, if they want to develop a new technology, they work with the supplier for approximately 3 years and when the technology works, they finish the partnership. In case they want to develop something new together for new technological problems, they partner up again. According to the interviewees, it is not the first priority for the company to invite their suppliers in case of a problem. Usually they try to solve it internally and as a second step they invite their suppliers or customers to give them an input. When the company has a quality issue, they try to solve it together with the specific supplier that they have the issue. Also when it comes to city solutions they collaborate with suppliers and customers in order to generate ideas concerning the traffic safety or the city of the future. The ideation lab manager believes that in the company they do not have the history of working with member of society except from suppliers. He explains that they develop the core products and the suppliers develop the components and then they sell to them.

4.1.4.4 Collaboration with other industries: competitive cluster

Another collaborative attempt is to work with competitive clusters that are the group of companies such as large companies, SMEs, start-ups etc. and some universities are involved. They work together by way of meeting once in a month and having representatives of each company and then trying to find some areas for collaboration. For the moment, it is development projects for generating new ideas on the development. One interviewee from the technology strategy and innovation team stated that recently they had an open innovation group event for innovation processes with four people from each company. They discussed about their own innovation processes together. She also stated that the different way of thinking makes it very interesting such as the car industry is so different from the sport/ski clothes or the kitchen equipment industries. All of the different industries have different innovation processes which enable them to learn from each other. Thus, they do not only utilise OI for the development of the products or process but also for benchmarking and learning. What is more is that some of her colleagues from manufacturing department in company A, want to benchmark manufacturing processes in this cluster. They can share their processes with each other without any doubt since they do not compete with each other.

The objective of the collaboration is to capture knowledge in the related domain. Due to the fact that all the parties work in the same ecosystem and are not competitors (i.e. logistics companies); they aim learning from each other. They are aware of that they need each other in this ecosystem; under favour of the built trust, they are able to work very well together in this cluster logic.

4.1.4.5 Collaboration with multiple actors from many sectors

As discussed before, in some projects company A collaborates with more than one partner in order to have the results they want. For instance, one of the projects is about the future transportation in cities. In this project, they have different actors that come from different sectors. They aim to provide many services in the bus stop to have a more comfortable travel such as coffee, shelter and so on. The purpose for the collaboration is to test how the company's vehicles work in such an environment, to create return from operating an electrical bus, to generate new revenue from advertising, entertainment etc. and also to create new offerings for the cities.

The project includes logistic suppliers, a warehouse data management company, other suppliers who provide the automotive business, a university, their business region and citizens from many cities such as Luxembourg, London, Shanghai, etc. There are many actors who have knowledge on this area that can come together. For instance, one of their customers is participated in this collaboration since it is natural to think about the customers that they do not compete with each other. They already have a built trust and the synergy. All the participants have the same incentives. According to one interviewee from IT department, *"it is not maybe a perfect example of OI but actors come together in their non-traditional areas for future proposition".* Lastly, the plan started a couple of years before and run last year. They will start the tests in September, 2015. The testing process will last 3 years and every 6 months they will test a new business idea.

The company also has some EU level projects that are proposed and funded by the EU which require working with various partners. For instance; the EU, from a societal perspective, wants efficient transport systems in terms of less emission, less traffic jam for a sustainable future. According to one manager who is responsible from the Technology Strategy Innovation department, *"the reason is that we need to find out how this system fits into this big picture. You cannot develop a product by your own, because it does not fit with everything else, you need to be complied with the communication standards, with data exchange protocols and so on".* For the EU, it is important to appoint areas for society which needs improvement such as energy solutions, transportation solutions etc. Those areas need to be addressed in order to have a more sustainable society. These projects usually take 3 years and usually someone from the EU manages the coordination between the partners. Thus, the company does not drive the project by themselves. However, for this kind of projects, they collaborate with 20-30 partners such as telecommunication industry, OEMs as well as some suppliers for the development phase which makes it a complex type of collaboration. They have approximately 300 projects per year and they usually have 150 of these projects that require collaboration with others. When it comes to the results of this types of collaborations, it is usually the knowledge that is created together. Each partner tries to understand what others do, who and what is the best in a specific area etc. However, afterwards it is important to transform the knowledge into the product development.

4.1.4.6 Venture Capital Collaborations

Finally, Company A contains Venture Capital Group within itself who looks to the market, invests on other companies, collaborates and innovates together with them. The reason to invest on the companies is that they believe with the investment, they can maximize the value that they can get, so the commitment will be much higher as this way. In the market, if they see some products, services or technologies that are in line with the mission of the company A, then they prefer to invest on this external company in order to drive those new services to their customers. They also aware of that the new fast moving technology products and services are more attractive for their customers and so more profitable. Sometimes they co-invest with other investors and as a result they have to collaborate with them in order to create a profitable business. The success factor according to the interviewee is the common interests they share with the other co-investors. Majority of the times, company A sells the new company after some years and they make a profit from it. But in some cases, when they believe that the technology of the new company is essential for the development of their own products, they acquire the new company as a part of them.

When selecting those partners, they are so selective. First of all, they look for the players in the market, what drives the value, the criteria for the investment and the critical factors to choose the company. After the assessment, they start to meet with those companies that are in line with those conditions, after the assessment they decide which company they will collaborate with. Hence, it is an easy process to choose the partners but depends on so many factors. It can be either some companies that they know before and have some experience or it can be those that they do not have any experience before.

4.1.5 Benefits of OI

The benefits that the company believes to have been acquired owing to applying OI concept can be presented as the followings:

4.1.5.1 Creating learning

A major utilisation of OI for company A is learning different ways of working. According to one interviewee, the company have been moving from large hierarchy organisation to a free flowing organisation which is more dynamic and flexible. In terms of business, they have moved from straight line linear business model where they create and sell the product to a more collaborative business model where it is a requirement to include different actors from the beginning. Therefore, it is a new learning in terms of working with someone else from outside of the organisation and sharing knowledge between them. It is also a learning for latent needs of the users that comes to light which might be impossible to find out without collaboration. By asking to the end users to design the product, the results can be more efficient rather than by only interviewing those people. Finally, in the venture capital part of the company, they need to collaborate with external companies in order to learn about new disruptive technologies that may rise and stay connected to the market and customer needs. Without the information from outside of the company, they cannot learn about the future technologies and opportunities in the market.

4.1.5.2 Creating good quality ideas

Company A asks external actors to participate in different activities in order to get new ideas. In the example of idea competitions in universities, they want to have novel, fresh and naive ideas coming from the students. As mention by an interviewee *"is to move forward these out of the box ideas that employees don't have"*. Especially with their collaboration with students, the interviewees believe that they have the most benefits. The quality of students' ideas is really high and lot of concepts were used in the company's projects. The ideas are not going to be transferred directly to a concept, but still is a huge pool of inspiration. When the company involves the users who in this case are the drivers, is because the drivers know exactly what they want in their vehicle and they can capture the latent needs. Furthermore, when company A wants something more complex and advanced, they address the issue to their suppliers or other partners that have the knowledge and experience to help them, such as the competitive cluster.

4.1.5.3 Flexibility in the development processes

Collecting knowledge is important but company A also wants both to learn and develop something with their partners. Therefore the aspect of developing a technology or product with other alliances is essential for them. According to the interviewees, they want to build a new vehicle, thus they need the specialists to help them. Before adopting the OI model, company A was using the straight line linear business model where they created the product and then sell it, but now they are moving towards a more collaborative business model that you have to include different actors from the beginning until the end. According to one of the interviewees *"this model is more dynamic and flexible"*.

Furthermore, due to the complexity of the industry with a lot of electronics and connection of devices; according to the director of emerging technologies, they have to realise that they are not able to develop everything internally instead they need to search what kind of knowledge they have and want for the future business and then decide with whom they will collaborate with. In line with this perspective, the investor director highlighted the importance of having more linear and simple processes inside the company. Since Company A is a process oriented company, the interviewee believes that they should find a climate where they will be faster, because now the process is too long for innovation. It is believed that they sometimes should even skip the planning phase and move on directly to the development.

4.1.5.4 Branding Management

Marketing is another dimension of OI utilisation. According to one employee in the company, *"it is a fantastic marketing tool".* Furthermore, another employee stated that the starting point of OI was branding perspective instead of creating good quality ideas. However, they were not so successful in the beginning since ideas need to follow a predefined process. Thus they have started to change this mind-set.

4.1.5.5 Relationships with universities

First of all, company A has collaborations with many universities. According to one of the interviewees, the people from APP are interested in strengthen the relationship with different universities because they believe that they need students in order to gain competences and research in the domain they need. For instance, in China, company A has only sales and marketing but not engineering or R&D departments, therefore they need help from the students in order to collect some ideas and develop something new. It is also a good branding strategy since the students are able to learn more about the company. Further, they want to have close relationships with students since they could be their future workforce talent and they prefer to start this interaction to get to know people as students. According to the global coordinator of Idea competitions: *"The relationship is as important as the price".*

The closer relationship with universities also results to a benefit from a talent perspective, because the top price can be an internship in the company and they get close connection with students, PhD students in the faculty and professors. "*With universities is about to build a network of people and get to know each other, it is a cultural activity"* is highlighted by the Global Innovation Manager. Moreover, one of the interviewees expressed that students learn very fast the code of communication with the company and this is also something rewarding for them.

4.1.6 Challenges of OI

4.1.6.1 Intellectual Property Rights

One of the most common challenges for OI is the discussion of the IPR. Company A tries to solve this issue right from the beginning, before the collaboration goes further. The IP serves two purposes; the first is to block others and the second is to protect the company.

When company A collaborates with students, according to the interviewees, the discussion for the IPR is easier, since the incentive for the students is to gain an internship in the company, therefore students do not have any right on their ideas. As far as the drivers are concerned, the company again owns the IPR of the ideas coming from drivers, but the driver's name will be written in the patent as inventor together with the company. It is same for the venture capital group within the company. According to investor director, this venture capital group does not have any written agreements with the invested companies. This is because they want to innovate with the company and then utilise those products and services. Instead of this venture capital group, the related part of the company A makes an agreement regarding company's secrecy but not regarding a protection on the developed product or service. They never put constraints for their partners and IP rights belong to them, hence they are able to share this knowledge with whoever they want, even with the competitors of company A. However, in some cases, they can make some agreements such as the "right to use". Thus, their competitors might not use this solution.

The challenge is mostly when company A collaborates with inventors and other companies. In the case of inventors, company A asks them to have a patent before sharing their idea with the company, otherwise they give away their rights. Thus, the inventors are not willing to share their ideas with the company. Moreover, when company A collaborates with other companies, they try to finish the paperwork at the beginning. Even with the suppliers, according to an interviewee they are very careful, *"we work in a very collaborative manner but in a very secure way in term of agreements, licenses and contracts"*. However, some interviewees explained that the suppliers are responsible for the development of the components and in the company they only assemble the parts hence, the suppliers hold the IPR. The terms of the agreements depend on the partners, the company has different expectations from large established companies and from small start-ups, but in general they are traditional and they think a lot about the IP rights and the contracts.

Furthermore, in the question of whether or not IP improves or destroys the collaboration, the interviewees are divided. According to some interviewees, the IP issue sometimes is killing the collaboration. For instance, the company tried to involve external actors to the ideation process, but it did not work because of the IPR questions in terms of who will own what. It gets complicated therefore they prefer to keep it internally. *"The agreements are killing the trust and when they bring legal documents they shut down the collaboration"*. From the other side, some interviewees believe that agreements are essential for OI, since *"you make sure the rules of the game are clear before the game starts"*. Company A is very careful regarding information sharing due to the fact that the information that may be leaked, it could cause them a lot of damages. If a competitor learn something for the core business of company A, it could turn this information against the company.

Company A has dealt with IP problems. Some partners, for instance, did not want to share openly their codes and the company wanted to understand the reasons. According to the interviewee, this kind of collaboration is not effective because the engineers do not trust each other. Therefore in the next paragraph the trust challenge is addressed.

4.1.6.2 Trust

According to interviewees, another big challenge for OI concept is trust. Employees sometimes do not feel comfortable since knowledge leakage might be occur. Company cannot take the risk of leaking information, since some of the information sharing with partners is vital for the development phase. However, majority of the interviewees stated that trust issue is not a big deal when collaborating with students or users. For users, for instance, the motive was to invite them to the R&D centre, to listen their ideas and to make them feel that they are part of the development team. It is the same situation for students, they generally have new novel ideas and some of them are possible to be patented by the company and also they have the possibility to involve in the organisation as internship which make them satisfied and be proud. It is also the same for the Venture Capital Group as well. They make some meetings with employees from company A and the partners before investing on the companies in order to make sure that they

establish strong relationships, to build up the trust. During these meetings, they also want to ensure that all the parties share the same values and are committed. However, still there is a risk of knowledge leakage, since the students or users could share their ideas with other companies, maybe competitors and this is an important reason that trust is vital for the collaboration with other parties. The global innovation manager said that sometimes they do not even share their ideas with other colleagues in order to avoid information leakage.

On the other hand, trust is a bigger issue with suppliers or other partners. With those parties, they create some letter of intent and also those parties have signed NDAs. According to one interviewee, 1 year or more might be needed before trust is created between each other. She also states that it is willingness to do something together with the partners since they want to invest and take this risk together. Thus, building trust is a long process.

Furthermore, she continued to explain that some partners that they collaborate and develop together might create some problems in terms of the engineers do not trust each other from the beginning even though they can continue their work as before but this makes them to feel as backstabbed. Therefore, they prefer to have the agreements very carefully from the beginning to regulate this through contracts and paperwork is really clear in the beginning. As a result, any ownership discussion will not occur and all engineers can focus on doing their job. Although completing the paperwork from the beginning is not 100% possible, some regulations are known and it is significant to have lawyers at the beginning and make sure the rules of the game are clear before the game starts. In a conflict situation if there is no rule written, then it might lead to loose trust between parties. Thus, it is the balance between trust and control. If some paperwork is made to take care of the control then it is easier to build trust.

According to one interviewee from IT department, the agreements they have can sometimes kill the trust and when they bring legal documents they shut down project, and so collaboration. They do not have any written agreements from the first meeting. Once they have an idea and/or incentive, they set the contract or statement of the work. This agreement includes how they will proceed in terms of splitting the cost, dividing the revenues and so on. It is a big negotiation between them.

4.1.6.3 Time

Time is very important to company A, since they want to speed up their processes and develop their products faster. In OI projects, sometimes time is a challenge and sometimes it works as a benefit for the company.

Generally the company uses as a first step, to search answers inside the company. Therefore the Global Innovation Manager believes that they could save time and money if they started with external partners from the beginning. Also, some employees believe that they do not have the resources to develop everything internally, although the top management in some cases wonders

about why they do not develop something by themselves. The interviewee explained that *"We need so much time to do it alone. It has been 2-3 years to make the top managers understand that we have to work with others"*. As an example the interviewee highlighted the importance of the students, since from students they learn things that they did not have the time to look into.

However, OI sometimes is time consuming. For instance, company A had a project with inventors where they needed some ideas for a specific area. The process was inefficient since they had to wait one month for the proposal box with the ideas and then they realized that they did not have time to wait. Except from the time to wait until the ideas to be collected, the company needs more time to assess these ideas and also the ideas are not ready to be used, therefore they have to find a way to create a concept around them. At the end, company A may realise that the ideas might not be align with the main core business, hence they cannot use them.

Another example of time wasting is when conflicts occur between the parties. One of the employees described that *"the style of working is far democratic and slow and it becomes quite frustrating over times. The paper work is time consuming".* Moreover, since the alliances work in different companies, the speed of each company to make decisions, is very different. As a result, the company can wait weeks until the partner confirms or rejects a proposal. *"We always believe that it will go a lot faster than it really goes"*.

Last but not least, since company A is a traditional large established company, their pace is sometimes slower than the pace of their partners. As a result, it can be challenging to speed up the company. Because the partners are too fast, they do not want to wait for company A, which can be a big challenge for them.

4.1.6.4 Not Invented Here (NIH) Syndrome

NIH syndrome is one of the important challenges that the interviewees spoke of when asked. According to Global Innovation Manager, the company should always look for the good quality ideas first and stated that everybody from outside even an old people somehow might be capable of helping them with their problem. However, the internal culture of company A would not agree with that since they have a lot of experts inside the company, thus have the competence and are able to solve problems internally. He added that *"we have lots of experts in different domain and it is the case not only for us but also for heavy traditional industries".* Moreover, majority of the people within the company think that raising hands and asking for help is sort of failure and admitting that they are not good enough. Thus, that is a cultural issue needs to be overcome. He believes that people should start to raise their hands more often but he also thinks that it will take years to change this culture.

Furthermore, according to Ideation Lab Manager, it is a long journey to overcome this syndrome since it is about cultural change and requires to change the mind-set inside the company. Majority of the people inside the organisation do not want to engage with OI projects because

they want to have control. Thus, it makes them not to share so much with others. They also do not prefer bringing something which is not part of their internal development process. Furthermore, he stated that their organisation is not ready to change at least for now.

4.2 Company B: The Innovation Model

To begin with, it should be written that Company B works with embedded systems and according to one interviewee, it is much more difficult to define their OI model. OI and understanding customer needs are connected with consumer products that are used explicitly by customers. Such companies are able to know to whom they should communicate. However, company B works with embedded systems, therefore they do not have a clear view of the end user; they have variety of users and end-users. The challenge for company B, according to R&D operations developer, it is to answer this question: *"who is the user?"*

4.2.1 Ideation

In company B, they have an innovation department, called **Systems and Technology Department**, where they have a number of people appointed as innovation leaders and also with some participants from universities with some experience in design thinking. This group is responsible to facilitate others to think about innovation, how to learn design thinking, lean start-up thinking and so on. Thus, the innovation leader connects people that have been appointed to some kind of OI driver or self-appointed that wants to drive an initiative. This department is not responsible for innovation but is responsible to teach others for how to innovate. As the senior consultant expressed, *"We do not lift weights, we help people to build muscles"*!

Another type of innovation process in company B concerns the internal innovation, inside the organisation. This process facilitates the openness between the different business units of the company. One way of doing it is by organising **workshops**. They gather people from product development units and get them into the reality of the business and customers, to close the loop. According to the program manager, *"The workshop is more for an open internal innovation perspective. This strategy is more from an outside-in market perspective".* The company invites employees from different parts of the organisation together with a few external actors so as to have different perspectives. There are individual representatives for public transportation and traffic control.

4.2.2 Concept Development Process

Company B has a project (the name will not be disclosed) which can be able to create a very open environment since it is a **platform** to collaborate with other companies for mobile network. It is a way to become a mobile operator 4g, 5g connectivity and all the products will be involved. However, the difference from a regular mobile operator is the pre-released products in terms of to test prototypes, to experiment and also to connect devices that might end up in the market tomorrow. Thus, this platform allows customers to try things that makes company B to understand how their products behave in large network contents.

The aim of this platform is continuous learning in terms of what they are doing and to transform the world by doing small experiments, and also to learn how to interact with other organisations. For now, they have traditional customers for this open platform but they are aware of the importance to expanding other markets as well such as boat industry. From a system point of view, company B does not pay so much attention if the device either is a mobile phone or not. They can even attribute a vehicle as a mobile phone. However, the problem with this approach is that those different devices have totally different amount of data transmitted and different requirements for latency and service that need to be analysed very carefully.

Last but not least, company B is concerned about **cloud technologies**. The future of the cloud technologies is seen for company B as a big computing platform which will support the network functions and will support high-performance applications of the Networked Society. They do research to enable this feature since it will be secure, efficient, and what is more, will be geographically distributed. According to company B, connectivity is the future so it is one of their visions they have. Company B intends to connect vehicles as a cloud logic that will work together with an automobile company in the same region, thus they will take care of all the mobile platform of the automobile company. They state that everything will be connected; cars will drive themselves and even the city will be connected with cars and some systems. For instance, drivers can have more data concerning their driving behaviour. The same logic applies for insurance companies, where they can see drivers' behaviours and afterwards drivers will pay based on the risk while driving. Thus, for those who drive carefully, the price will be lower. It is a way of advertisement for the workshops and for insurance companies. This cloud structure is not a new system; it is a system that works in telecommunication industry for many years. It is the same logic with the car instead of mobile phones.

They work in a consultative way to find out the way will happen: so it is more than a market pull than a technology push. They work in a management consultancy kind of perspective in terms of doing strategic analysis first in order to see in what way this industry develops and where the best choices are to tackle it. Since they believe that it is an ecosystem which will be very complex in the future due to the fact that everything will be connected with the same technology, they have to collaborate with their customers, suppliers and so on. They try to have some workshops to see what they can do together with other suppliers, partners etc. According to one interviewee, *"It is a tradition of working in secrecy and hide things, but the world is moving fast and we have to change, after all we need to collaborate and cooperate rather than guard positions. It is in our DNA, in our history".*

4.2.3 OI Definitions in Company B

As did with company A, at the beginning of each interview, the interviewees of company B were asked to give their own definition of OI.

The viewpoint of the innovation leader is that OI is a buzzword. But what does it mean for him? *"OI is collaboration across different companies or organisations with the goal of developing new products and services and sort of ideas and processes. It can be collaborating with customers, with different sides of actors, municipality, large and small companies to have interesting diversity, backgrounds and being able to solve various difficulties. Social innovation is interesting with OI perspective"*.

The next interviewee, the program leader was not familiar with the definition of OI. His objective was *"The obvious is to collaborate with external, but I do not know something more. I do not know what it means to us"*. He explained that in company B they have some activities where they involve actors from outside of the company in order to bring different perspectives in. He also added that "*OI can be very close to sales engagement, it can be very close to university relationships, close to the R&D development, although I do not know about this area".*

According to the R&D operations developer, *"OI is a platform where multiple players from either the industry or society sharing the common goal and we see how to contribute in order to realise these goals. More of a sense of creating something rather than guarding its positions when it comes to IPR or patents"*.

The director business developer of company B said that there are many different definitions of OI, but for him it is non-proprietary solutions. *"From a technical side, how to expose open APIs in order to build an ecosystem and to enable it to innovate new types of solutions based on these APIs"*.

For the senior specialist, OI is "*something that multiple people contribute to a cause, common goal and the benefit is not to own the output but to use that output for whatever purpose you actually want. And also that they create something they could not do alone".*

The senior consultant and a teammate of the senior consultant expressed their opinion about OI as *"different parties get together to create something that is not really owned by them but they can use it and other can use it"*.

4.2.4 Engagement of OI Model

Company B has five different types of partnerships so as to facilitate OI activities. It is explained in detailed in the following part together with other two types of engagement that were discussed during the interviews. The five partnerships are illustrating in the Figure 11.

Figure 11: The five types of partnerships in Company B

4.2.4.1 Channel partnership

Those partnerships concern the partners that company B resell their solutions and products. In general, the company sells through their own channels, especially within telecommunication where they have very strong sales forces. However, in new industries they also work with channel partners from other companies who sell their solutions as part of the other company's solutions. The purpose is to address new markets.

4.2.4.2 Offering partnership

The other way around, is what company B calls offering partners. They resell another partner's solutions in order to make the total offering, since some customers want the big scope. In some cases, the company has missed a component that is not in their core business. Hence, they work with a partner to take the missing component and deliver an integrated solution.

4.2.4.3 Technology partnership

The company embed the software of the partner company into their software. Company B does not resell this software, but instead they buy that piece of software from the partner and they embed it in their software and then sell it. This kind of partnerships will provide to company B the opportunity of a competitive advantage.

4.2.4.4 Industry partnership

The purpose of those partnerships is to develop the whole industry. The company works with standardization organisation together with a lot of partners, because they cannot do it alone. In the specific industry one company cannot be dominant and sell everything. Therefore, they sit down together with competitors and discuss about how to set the standards and having decided

the standards, they start to compete. Hence, it is a collaboration between different companies where in some cases they are also competitors. This is a long term strategic alignment.

4.2.4.5 Ecosystem partnership

Last one is the ecosystem partnership. According to the director business developer, Apple example can apply there: they have the platform but they need partners to develop applications so as to develop an ecosystem. The platform each self does not work without the applications. The reason for the ecosystem partnership is that company B is a part of a bigger ecosystem, therefore they take into consideration not only their industry but also other not so relevant industries which belong to society. As an example of this partnership, the director business developer explained the collaboration of company B with big media players for what they call over the top applications. Those applications are totally independent from an operator. "*Before you needed an operator to build an app, now you do not need an operator at all, you can build it without them".* However, the interviewee explained that still big players such as Apple and Google need the underlying network to make the really good end service and there is where company B enters. "*These companies want to partner up with us, because they cannot change the network, so we try to give them the best network to build their services"*.

Finally, another type of partnership was discussed with the interviewees and is illustrated in the following paragraph.

4.2.4.6 The customer involvement

The project illustrated is still in the early phase, thus it does not involve many external parties yet. It is a platform where the company is collaborating with other companies for mobile network. Company B invites their customers which in this case are the operators to go to the company and try things so they can understand how their products behave in large network contents. The purpose of this initiative for company B is to run their own network so as to test how it is behaving. According to the innovation leader, they do not test their products in a large scale, therefore sometimes problems arise and they spend time to fix them. With this platform they want to test their products and shorten the time for updates. At the beginning, company B wanted to run this project internally but later on they built up the network for collaboration and they involved their customers, in order to test the function of the platform and network. The interviewee highlighted that in this project their customers are partners and as a result they have a totally different collaboration with them.

Until now, the only feedback the company had was from the defect reports, according to the R&D operation developer. Therefore, the employees were not proud of their work because the only feedback they had was negative. The problem for the company is that it is placed in the middle and they cannot hear the voices coming from outside. Now with this platform they want to change it and sit down with the customers and designers and create something together.

4.2.4.7 Personal Relationships

Two more examples of OI initiatives were discussed during the interviews. For both of them the purpose was to build relationships with other individuals from different industries.

The first event was a workshop where people from inside the company and also outside, gathered in order to discuss and meet new individuals. The schedule had some demos and presentations on issues around the company. *"The original idea was to have an environment for discussion. To discuss what we do, not sell something. Open the fortress and talk to the people outside"*, according to the senior consultant. Moreover the innovation specialist added that they wanted to show to the world who they are, *"to raise the awareness about what company B is, not only what we do, but who we are"*. The event was quite successful, from a participation perspective. However, the senior consultant said that it is not enough with one event like this, because they have to change the culture of the people, *"still some people that participated in that event they say it was interesting but we didn't get anything"*. For him this event was the first step *"The event was for example that you hate dogs and we bring a dog to see that is not killing you and step by step it will be at a certain point that you will like to have a dog".*

The second initiative was a collaboration with the concert house. The team for company B met the musicians from the concert house because with the purpose of creating ideas in order to make the orchestra one of the best in the world and in the same time finding new ways to promote it and do new things with the music. Therefore, company B contributed with their knowledge and suggested new ways of doing things. Because of this collaboration, an event with a musical and technical experiment will take place, organised by the concert house and a mobile network operator. In the question about the benefit of the company, the senior specialist explained that the discussions with the orchestra had another approach, about the communication and the society and the ways of influencing people. *"Music is communication and we work in communication and we started to think about how music is connecting brains and company B is all about connecting brains. So if people find new ways of influencing with musical pieces for example it will be a benefit for the company as well".*

4.2.5 Benefits of OI

The benefits that company B highlights as the most rewarding part of the OI concept are presented in the following part.

4.2.5.1 Creating Learning

A major benefit from applying OI is learning. Company B collaborates with many different parties, thus it is a learning process for them. They collaborate with multiple stakeholders, they learn from each experience and then they try to apply it to other areas. According to the program manager, the benefit is that they learn other industries that are new for them. As a result, he believes that if they can learn from their alliances and they manage the system complexity, they will have a business opportunity. Another point of view comes from the senior consultant who believes that with OI they become more skilled and they learn more. Thus, the organisation can

use their skills and experiences for its benefit. According to the director of business developer, even when they fail, they learn from their mistakes and they should continue to try until they succeed. He stated that if they do not try, they will never change.

4.2.5.2 Creating Good Quality ideas

Another benefit while working in OI settings according to the interviewees, is that people from different industries are gathering to generate new ideas and solutions with quite diverse backgrounds. According to the innovation leader this is challenging and rewarding as well. With OI the company can identify different interesting ideas that are coming from individuals from different industries that have a whole different way of thinking. The senior specialist said "When you have a purpose, ideas are useful and they are the starting point when you want to design concepts on those ideas". He also believes that OI helps to get inspiration from other parties, because inside the organisation the employees are used to one way of working and sometimes they do not think differently.

4.2.5.3 Flexibility in the development processes

According to the interviewees, the discussion and collaboration with external partners makes the development process faster. The senior consultant believes that "*if you discuss with others you will go faster wherever you want to go"*. When company B involves customers and other organisations into the testing process, the feedback and corrections are coming directly to them and they have the opportunity to launch faster a product or service and with better quality.

4.2.5.4 Better understanding of their products

Another benefit for company B is about the way they see their products. With OI they find new ways to use and perceive their products. As a company, they have a way of thinking and the other organisation has another way of thinking. But when they collaborate and they find a third option that they could not find alone, then is pure innovation according to the R&D operations developer. Because then they combine existing knowledge to find an unknown solution or discover an unknown problem.

Moreover, they can test and see the functionality of their products in a larger scale than before. They involve other organisations to also test company's products and give a direct feedback before the product is launched to the market. Thus, the last benefit of OI appears, that the company feels proud of their products. They can see creations in use out to the world and see their contribution. If they do not interact with other members of the society, they are unable to understand the needs and the functions they should develop for the market.

4.2.5.5 General good

As part of the ecosystem and part of society, company B wants to contribute for a better future. Although the company needs to have revenues in order to be successful, they try not forget that the general good is something important. Therefore, they investigate new ways of communication and OI is a tool to bring them close to other irrelevant with them industries. For instance the alliance with the concert house is an effort towards this goal. Some of the questions

addressed from the interviewees were: How can digital communication and mobility helps out? What new ways the company has to think so at to do something novel that the market needs?

4.2.6 Challenges of OI

4.2.6.1 Embedded system industry

A challenge for company B according to the interviewees is that they do not have a clear view of whom the customer is and this creates a problem while implementing OI because they do not have enough information and feedback from the clients. According to the R&D operation developer, there are three layers. In the centre is the system that company B is developing. On the outside layer there are things that are probing, testing and visualising. In the third layer there are the things that can be connected such as mobile phones, cars, sensors and so on. When the company connect them all, they have the stimuli, response and logic. However, in order to learn how all this system is connected, the company should have the information coming from the customers. As said before, this is a challenge, because the customers do not reveal all the information. As a result company B has to search and generate solutions by their own.

4.2.6.2 Trust

The most common answer in the question "what are the challenges of OI?" is about the trust. Most interviewees agreed that it is always about communication. In order to have something happened at the end, the company has to involve in the process dedicated people that everybody can trust and they can communicate. Individual relationships is really important factor, whether or not the employees involved in the project want to work with the other individuals from the other organisation. According to the R&D operation developer, NDA helps to create trust. However, he believes that OI should work without papers, *"We have to build social trust. I trust you because we are sitting here for the greater good, to find a solution together that we could not find alone".* The problem is that companies do not know how to build social trust.

4.2.6.3 Time

Another challenge for company B is how to make things progress, since every organization has different pace and every individual has different motives. When the company organise a workshop for instance, some individuals have a big ego and they want to find something for their ego aspect in order to collaborate with others. Some people who have done many years research on the field, believe they are the experts and when they come to the meeting, they want to ensure that they continue to be the experts. As a result, the outcome of the workshop is not the expected and the time spending for it was a waste of time. Moreover, as the interviewees mentioned, when they collaborate with start-ups they spend more time since the working style is different. However, when collaborating with large organisations they may face the problem of high bureaucracy and as the innovation leader highlighted *"the lack of bureaucracy is the speed"*.

4.2.6.4 Collaboration with start-ups

Another challenge for company B is when they collaborate with start-ups. Although some interviewees believe that the start-ups are the real innovators, they have some difficulties to work

with them individually. Since company B is a big company, it requires a more of an ecosystem or developer community approach. Moreover the way of working and the speed in large companies is totally different than this in start-ups, thus when the company brings the non-disclosure agreements, the collaboration with the start-up starts to have some problems. From the other side, the large companies understand better the rules of the game and company B feels that they match in size, hence they better understand each other.

4.2.6.5 Not obvious benefits - top management questioning

Lastly, OI benefits are not always visible from the beginning. Sometimes when the outcome is not a product or a technology development, top management is questioning the utilisation of OI concept. The senior specialist expressed that *"Some parts of the organisation are treated OI as features and should be a return of interest"*. The senior consultant added *"They are wondering why we spend time talking with people outside the company. They do not understand that if I speak with the same people they will not give me something new"*. As they explained, sometimes top management has a problem when they use their skills for something else rather than their job. OI has great benefits, but maybe not from an obvious money perspective. Sometimes the initial idea may end up somewhere completely different and the companies could win some secondary effects. This is something that usually happens to municipalities or health care, which they work with social innovation.

4.2.7 Intellectual Property

For company B, the IPRs are not such a challenge. Since the company operates in the telecom industry, it is difficult to secure the technology with patents because until the technology be secured, the next technology will be emerged. Therefore, the interviewees of company B have not spoken about the information leakage. They believe that everyone can use the same information and having different outcome. However, for some projects the company has signed non-disclosure agreements before getting into details. There are two types of NDAs; the first is company's NDA which includes the purpose, the scope and the type of information that cannot be shared with others. This is an agreement between the companies involved in the collaboration. In really sensitive cases, there is a personal NDA, individually, that everyone who enters the collaboration signs so as to ensure that every information generated from the collaboration cannot be shared with the rest of the world. In this case, company B wants to secure the risk of information leakage, since the content of the collaboration is important and they do not want to show to other members of the community what they are doing.

The intellectual property strategy is a controversial issue for company B. Some of the interviewees believe that NDA helps to create trust. However, some interviewees believe that OI should not include agreements and legal papers. The innovation leader thinks that is an alibi to kill a project for IP reasons. The purpose of OI is to have trust to the other parties, otherwise the collaboration will not be shown successful. According to some interviewees, even if a project is revealed to competitors, why should the competitors trust their idea? Moreover they believe that

everybody has ideas, ideas are free but the challenge is how to implement it. The challenge is how to build the trust and the collaboration.

Finally, one more point to emphasise is, as we observe from the interviews, it is a benefit for company B rather than a challenge. This is because company B utilises outbound activities in terms of IPR selling via the transferred ideas to their exterior environment. Therefore, it is a way for company B to generate profit through providing ideas to other companies that they could not do it internally.

5 Analysis and Discussion

This chapter aims to analyse and discuss our findings. Using the empirical data that is collected from interviews, the analysis and discussion is drawn by the support of the theoretical part.

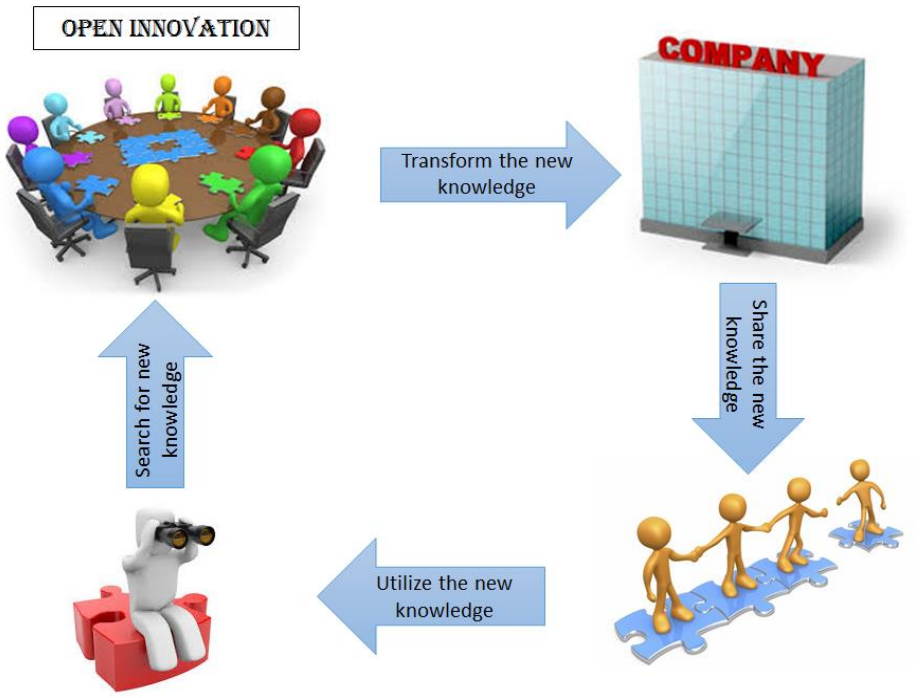
5.1 Remarkable topics to be analysed

In the analysis of the collected data from the interviews, some important topics are found to be the most important ones. Those areas are chosen to be analysed in the following parts.

5.1.1 Lack of common definition and how to do OI

First of all, when asked to interviewees what OI is, there was a short time of silence, majority of the times, for thinking and they started with stating that is difficult to define OI. They even expressed that in their organisation, they do not have a clear definition of it. For this reason, some of the interviewees were insecure while explaining their personal thoughts. This situation demonstrates that there is a lack of common definition of OI and also knowledge in association with how to do OI (Huizingh, 2011). This shows the gap between theory and practice. It may be very straightforward in theory but when it comes to practice, there are some questions that are still unanswered. For instance, what are the differences between collaboration and OI? If a project would start with non-disclosure agreements then where is the openness of it? How open is the innovation?

Furthermore, another discussion could be around the different viewpoints of the scholars in the literature. For instance, Rothwell and Zegveld (1985) put emphasis on the value of external knowledge for innovation process. Similarly, the gatekeeper theory by Thomas Allen (noted in Trott and Hartmann, 2009) highlights the importance of external sources for getting knowledge. Thus, there have been already some studies on the significance on external parties' involvement for gaining knowledge by many various scholars. For this reason, in our opinion, we could not say that OI is a totally new concept defined by Chesbrough. However, on the other hand, we disagree with Groen and Linton (2010) on the issue that supply chain includes everything that OI includes. We are not the experts on supply chain area but still we could comment that OI is something more than supply chain. In this regard, we agree with the concept of Chesbrough (2014) and think of that OI has much more innovation actors than supply chain. For instance, spin-offs, universities, IPR issues are the examples that does not exist in the supply chain management literature, as far as we observe. All in all, the conclusion that can be drawn is that there are a lot different ideas and viewpoints on OI that leads to a lack of common definition on OI concept.



As can be seen from the Figure 12, the authors create a theoretical framework based on the theory as well as empirical findings. According to this figure, first of all, companies are suggested to find areas for innovation and the need for new knowledge that will come from external parties. Having identified the purpose of the engagement, companies should choose their partners and discuss about the specific topics.

Figure 12: The steps of OI process

Two options could be generated from the discussion, either they could produce something in common and benefit from the common use of the product which is in line with Wazoku.com (2014) and the common IPR, or acquire new knowledge from the perspective of their partners which is in line with Enkel et al. (2009). For this step, it would be better if more than one employee of each company could join to the discussion (based on the interviewees), in order to have a better understanding and different perspective of the discussion. Therefore, it would be recommended to involve three or four employees and preferable from different departments of the organisation. After the end of this step, every involved employee should go back to their companies and share the new knowledge with the rest of the organisation, as suggested by the employee from Technology, strategy and innovation department. Thus, the companies will utilise OI by capturing the created value of the new knowledge as formulated based on their needs. As a last step, companies could find more areas for discussion or improvements and they should gather again with the same or other partners in order to start the next discussion.

Last, but not least, as mentioned briefly in the theoretical part, the citations for the book Chesbrough (2003a) of OI has been increasing since the last decade that can be seen from the graph. It could be considered as a proof that the awareness and the adoption of OI concept have been increasing. Thus, it conduces toward some questions in mind. For instance, as the awareness of the literature in association with this phenomenon has increased, it could be the same for companies as well. As far as we observe from the two interviewed companies, they are

aware of the OI concept but they do not know exactly what the concept is and how to implement it. Therefore, it could not be wrong to deduce that firms perceive it as a trend that so many firms have already started to implement OI (Mortara & Minshall, 2011). It might make some firms feel under pressure to apply this concept just because the others have. Thus, we believe that firms fail in the implementation process of OI since they do not realise the fact that each setting is different from each other and a success story for a setting cannot be a guarantee for another setting to be successful.

In the following part, the differences between these concepts and also an in-depth discussion is further given based on the empirical data and literature above.

5.1.2 Misapprehending between concepts: partnership, coordination, cooperation, collaboration & OI

In this section company A and company B are analysed independently since we want to show for each example the interviewees gave us, whether or not they have used the term OI in a correct way. Thus, all the given examples are discussed individually in order to keep a better structure and avoid misconceptions.

5.1.2.1 Company A

When the interviewees were asked to give a specific example of OI activity they participated in, majority of times the answer was the collaboration with academy, a specific university that is in the same region with them. It can be seen that for company A, there is a tendency to involve students in the early phases of ideation in order to collect novel and fresh ideas from the students. However, we have to take into consideration the possibility that the interviewees might think it is a simple example to describe what OI is in order for us to understand better. Nevertheless, we can say that in company A, employees believe that student involvement can be judged as OI. From one side, in the early phase of the product development, the sources behind innovations are limited, in some cases it is sometimes only one source and usually come from users, suppliers or universities (Laursen and Salter, 2006). Align with this perspective, the company may not involve many different parties in the idea generation phase.

From the other side, another aspect of OI is about the co-creation and the mutual benefit generation for all parties. As a result, OI should be equally utilised from all the participants. However, in the example of academy, the prize for students is an internship in the company, hence the students do not benefit from the development of the idea in terms of the IP rights on their idea. Of course, for both sides, it is a very good deal, since both sides give and take something in return. However, this transaction can be defined more as co-operation since according to Järrehult (2011), in co-operation the involved parties seek to achieve their own individual objectives. In this case, the company collects a pool of ideas and the students may win the internship. Furthermore, if we consider parameters such as common goal, work and create something together and also the long term horizon, then it could be classified more as co-operation but not OI.

Another example of OI according to the interviews was regarding the involvement of users into project. The main purpose of this type of involvement is to reveal the tacit needs of the users and co-create the product. However, as can be seen before with the students, the same pattern exists with the users where their ideas can be used from the company and the users benefit from the better product that the company will produce. In this case, the benefit for the users is long term and their involvement in the idea generation phase will facilitate their daily life. Also the relationship of the company with the users is long term, since the users in this case are the drivers who drive the company's vehicles. Therefore, this type of involvement cannot be seen as cooperation but as collaboration. According to Bardach (1998), the collaboration presupposes that both sides have commitment and create something together that they could not develop by themselves. This is exactly what happens in company A between the drivers. Furthermore, based on the interviews, it can be stated that company A prefers to work with users, because there is no IPR or the difficulty of trust. This is in-line with Järrehult (2011) who believes that in collaboration, the parties cannot be involved just in order to achieve their self-interests instead they have to build trust between them and work together.

Moreover, as can be seen from the interviews, company A invites customers and suppliers into the development phase. The empirical findings are recalled, where the interviewees said that customers usually are not so sensitive about the written agreements and patents, instead they want to have a better product. On the other side, co-creation with suppliers is different, because the patent discussion is always an issue between the parties. This is again an evidence of the strategy of company A, which prefers to work with individuals who are not interested about IPR discussions. Nevertheless, the OI concept implies that companies should have open shared IPRs (Chesbrough et al., 2006) and it is something that does not exist in company A. Thus, this kind of involvement could be named as partnership with customers and suppliers, or according to Vyas et al. (1995), strategic alliances, in order to work together for mutual benefits. The company is part of a bigger system, is a piece in the supply chain (Stuart, 1993) and as a result it is normal to involve other parts of the supply chain into their development. We can claim that company's involvement of customers can be considered as customer feedback and not open innovation, except if the company creates and shares something with them. The understanding of customer needs is not equal to OI.

In the case of EU funding, company A is involved in coordination. As said before, coordination is the organised way of action where all the involved parties are working together. In the example of the EU projects, company A and the other members have the same issue to solve but probably each company has something different to achieve in terms of knowledge. Since it is a very complex area, not all the members work together and discuss, but they have someone that communicates and coordinates them. Again the different parties sign agreements in the beginning.

On the other hand, there is one very important point to be discussed. As explained deeply in the empirical findings, company A has competitive cluster that different partners from different various industries (not competitor industries) come together and exchange their knowledge and ideas. We should say that it is a very good example of OI since these different participants generate knowledge in the end. It does not necessarily need to be for a problem they have. Instead they just come together because they feel that they need some more capabilities in a specific area but do not know what it is. Hence, in the end of the collaboration it is an opportunity to create knowledge that is new for the participants and each of them can later on transform it into their innovation processes. We must say that it is a fairly good example of OI for company A. However, since we got such an information only from one interviewee out of 7, we ought to state that they are still in the searching phase in terms of they try and fail, sometimes succeed and have been more open but sometimes just frame them as OI.

5.1.2.2 Company B

Company B also has some examples of OI that can be discussed on whether or not they fulfil the OI requirements.

First of all, the five types of partnerships are used in order to facilitate OI activities. Nevertheless, the way that company B operates those partnerships seems more of a regular partnership between different parties of the value chain, rather than OI. According to Wazoku (2014), collaboration and cooperation is between an organisation and a defined group of its stakeholders. In the particular example, the stakeholders are the customers and suppliers and since the company has not created something with them, it cannot be said that this is an OI example. However, the paradigm of the ecosystem partnership could be closer to what OI is.

Moreover, as seen before in company A, the customer involvement cannot be judged as OI but rather it is partnership in the setting that company B is using. Essentially, it works as a direct feedback for the company and not as an OI setting. As an example of customer feedback for company B is the platform they have built in order to test their products and services. Although they want to involve customers and users into the project, for the moment they use the platform only as a tool for direct feedback.

Another example of OI engagement given from the interviewees of company B, was the event for discussion. The purpose of this event was to open up the boundaries of the company and show to the rest of the world what they are doing and who they are. But is this project OI? We would dare to say no, it is an event. However, the interviewees that illustrated this example, also told us that they do not see this event as OI, but rather as an environment of sharing and discussion. They see it as the first step towards a more open organisation. Because the problem begins from the inside of the company, where some employees still are not aware of what the company represents. If the people outside company B do not understand what the company is doing maybe that is because the people inside the company do not understand either. There is no

common understanding on where they are going in terms of innovation. As a result, they are much more in the searching phase. In line with the event paradigm is the concert house collaboration. While discussing with the members of the orchestra, the interviewees explained that they learned many different things and they got inspiration. However, we are addressing the question, is it enough? Can they continue in this unstructured way of doing things?

On the other hand, it is important to include any attempts company B performs that can be referred as OI. As explained in detail in the empirical findings, company B has a vision regarding connectivity through cloud technologies. In this project, so many partners will collaborate for a better transport system in the city, things will be connected such as traffic lights, the vehicle itself, the insurance companies, the workshops and so on. For instance, if something is wrong inside the vehicle and a signal appears on the screen then it will be possible to find the closest workshop. Similarly, based on the driver behaviour, insurance companies will be able to decide for the next period payment i.e. charge less if he is a careful driver. Some of these features are already exist today but the point is all these features will be connected in one single platform. Hence, it will require a collaboration including all the relevant parties and they will create knowledge in order to have a better and more sustainable society. This is an example of ecosystem partnership according to the findings and it can be related with the Mozilla web browser project that was also an ecosystem effort. As far as we observe, it is a very good example of an OI and it can be deduced that company B is on a good track towards openness. However, it is still just a vision and not a current activity. Thus, it is fairly true to say that they are still in the searching phase of OI.

5.1.2.3 Summary: Outstanding facts from those engagements

All in all, as can be seen from the various examples of the engagement, there is a misapprehending of the concepts for company A. As far as we observe, they are very good at in various projects such as product development but they may just put a label on it as OI. However, they try to do the same thing that they were doing before. It is just "boxing" it. Hence, they will probably say that here is the value of it in the end but the important question to ask if this is really it. It is maybe due to the fact that they have been too fast in try to boxing in without really understanding how to do OI, what this is and how to translate it. As soon as they start to act in an OI setting, it is very difficult to go outside and to do it differently. It is very much they would like to be innovative. Hence, they try desperately to be more involved in OI without knowing what it is and they have been exploring. It is not true to put the label as OI but do very much the same. In our opinion, that could be one reason why large companies fail to apply OI.

On the other side, for company B, it can be discussed that they are more in the searching phase. They have been trying different ways of applying OI but without understanding exactly how to do it. Therefore, the outcome could not be enough for the organisation. Company B seems to understand the importance of meeting people from other industries and they are more interested in social innovation. One factor that might explain the more chaotic environment of company B

is that they faced with enormous changes during the last years. They have totally changed their core business and thus they might have been still trying to cope with those changes. As a result, they may dare to put their fingers in the ground, but in our opinion, they are still in the searching phase.

Both companies need to understand that there is not only one recipe and also should come to an understanding what is OI for them and how do they do this? They realised that a lot of companies are very good at doing OI and in particular if the companies are in the software industry with involving their customers and having the open source then it is something that should be interpreted differently that is not applied to some other companies. OI is something very special for different settings.

5.1.3 Human side of OI

5.1.3.1 Individual transition towards a more open attitude

As far as we observe, there is a lack in the literature that there is also human side of OI in terms of this requires an individual change as well. The mind-set of the people in the organisation needs to be changed. When asked to interviewees about the general situation regarding OI in the organisation, the answer was they see themselves as a traditional company, they try to open up their boundaries but since the people inside the organisation do not support OI logic instead they believe they have the necessary competences in the organisation. They believe that they can do it by themselves and also according to the interviews, the first step when they want to solve a problem is to solve it internally and when they realise that they cannot succeed, then they use external resources for help. Furthermore, we found out that very few interviewees brought up OI examples in a correct manner in the organisation, hence what could we expect from this and how could it be possible to talk about OI concept? We should also take into consideration that these findings are based on our small study in which fourteen employees were interviewed. However, this is a sample that shows a trend towards the problem of understanding OI, even for the employees that are interested and involved in OI activities. It can also be discussed about the percentage of the employees involved in OI, since it is very clear that in the two companies, OI is not a priority and only few employees attempt to work with OI. It is maybe needed to have much more employees that dare to go outside and understand where the limits are, where is the border and what they can do? Afterwards, it is important to opening up the minds as well. For instance, when you participate in OI settings and in particular if you are going to be here for quite some years, then it is significant to understand *"why I am here, how do I measure the value of participating?"*

5.1.3.2 Top management involvement

Another aspect to discuss regarding OI is top management involvement. Sometimes, it is possible for the top management not to see the value of it since OI is something that is not directly about money. This is a very difficult issue in terms of how to value it. For some organisations, the results from the OI collaboration can be a great value by top management even

though it is impossible to put the dollars immediately. On the other side, it may not be conceived as something as valuable and even more top management might decide to cut the project since they do not see the value of it. The value could be the better understanding of their needs, which is absolutely a great value but is not realised. According to Rodgers et al. (1993), without the commitment of top management, an initiative is almost certain that will fail. Employees feel more secure to embark on new things while they know they have the support of their managers. Therefore the success of an initiative is directly linked to the top management support (Rodgers et al., 1993). Moreover, the problem in this case is that OI is a new experiment with no clear results and as discussed by Jensen and Murphy (1990), top management usually supports ideas and innovations that are in line with the current company's strategy. However, if they do not want to support OI, top management should think other options in terms of what they are going to do. Is there any faster way to do it? As a result, the expectations of different levels of the organisation can vary from what it can be actually leveraged and then it may result with a mismatch. Also, the value is not measured in the same way by others. Something that is very important to somebody cannot be necessarily important for others. Hence, the individuals, who are going to participate in, need to understand these difficulties. They need to think about these issues from the beginning. It could be good to set up the teams from different departments of the organisation since it is wiser. They can discuss together with various viewpoints and could see the value of it before going and asking to top management commitment. Although, top management commitment and understanding is crucial for the success of an OI project (Rodgers et al., 1993), we should not neglect the organisational structure and architecture of it. As we observed in the automotive industry's example, when innovation processes fail to deliver, companies blame the management and the organizational strategies. Instead, in the Volvo paradigm is the system architecture and information infrastructure themselves that hampered the initiative's openness (Kuschel et al., 2011).

5.1.4 Trial and Error

As can be seen above, both companies are in an experimental phase for the moment, while they try a lot of different methods but first they need to understand what it is and how to apply OI. It is good to try something new, and even the result is a failure, it is still a learning. The important point is not to be afraid of failing instead to learn from the mistakes. One of the interviewee stated that *"if you succeed even just one time out of million trial, it is still a win because it is a trial and error process".* The logic should be to try and then learn, it is easier to make more mistakes while working alone than in a team since there are more viewpoints to discuss and find an optimal solution. Thus one can say that OI might avoid firms from making mistakes and also reduce the time for corrections.

5.2 Benefits and challenges

In the following chapter the benefits and challenges of OI will be discussed. The chapter is divided into two sections, first the commonalities between the two companies are highlighted and then the differences between them.

5.2.1 Commonalities

5.2.1.1 Creating Learning

The first common issue between the two companies is the learning process as a benefit of OI. Both companies use OI in order to learn something from external sources, however they have different needs in terms of what they want to learn from their alliances. According to Koschatzky (2001), the exchange of knowledge and learning is the most important benefit of OI. Company B highlighted the importance of learning different industries and be inspired from other individuals, while company A uses OI as a tool to learn other working styles and perspectives. Further, company A mentioned the learning process concerned the customer and user needs and also the awareness of disruptive technologies, which is something also supported by Christensen (1997). Although we totally agree with the literature, we believe that it is of importance for the companies to understand before engaging with OI activities, the reasons that they want to involve. Otherwise, the produced knowledge will not be used in the maximum scale and companies will lose some of the benefits of their efforts. As can be seen in chapter 2.6.2, the main reason for Finmeccanica Group to participate in the Mindsh@re initiative was in order to have access to unlimited sources of knowledge. The success story of Finmeccanica Group was result of the variety of the participants and the clear purpose of the project. This example can be paralleled with company's A creation of the competitive cluster, since the main goal of this cluster is to share knowledge and discuss about society issues without necessarily create something concrete at the end. In terms of R&D the competitive cluster is oriented towards research and not development.

5.2.1.2 Creating Good Quality Ideas

Another aspect of utilisation of OI for both companies is the collection of good ideas from external actors. Supporting this belief, Chesbrough et al. (2006) discussed the importance of OI in the idea generation stage, where companies have to move fast in the market in order to survive in the competition. Company A is involved in more idea generation projects especially with students. However, for both companies their relationship with suppliers and customers is essential for the initial phase of idea generation. Moreover, company B believes that individuals from other industries could be proven useful in the idea collection phase, since they have a different viewpoint. As discussed before, companies should realise first the reasons they want to collect the ideas, in order to prevent themselves from irrelevant and useless outcomes. Companies may need more time in order to collect and assess all the ideas (Lazzarotti & Manzini, 2009) and in the end not have the wanted outcome.

5.2.1.3 Flexibility in the development process

Another common view and use of OI for the two study companies is the flexibility in their development process. Company A highlighted this benefit more than company B but also an interviewee from company B believes that OI can force the development faster. Leifer et al. (2000) discussed about the structural limitations of large companies, which result to a need of external help regarding innovation. In company A, the interviewees agree with Leifer et al.

(2000) since they believe that their current model is more linear and slow, while OI can help them to move towards a more flexible and collaborative model. The only argument we can raise here is that the OI is not the only needed ingredient for achieving flexibility in the development, but rather it is one of many. If companies only use open innovation in their early phases and then return in the company and follow the traditional way of working, then OI is not fulfilled its purpose. This is something that we observed while conducting the interviews; both companies open their boundaries in order to take the inspiration they need and then they close again so as to continue their processes.

5.2.1.4 Trust Issue

In the other hand, companies have some same challenges. The most important and highlighted from every interviewee was the trust issue. It is really challenging for both companies to create and retain the trust between themselves and the other parties. Hoecht & Trott (1999) describe the importance of trust while working in OI settings. Without trust we believe that OI cannot exist since the ultimate purpose of the concept is to share information and exchange knowledge without the need of an agreement. However, for some interviewees, agreements create trust since they believe that they clarify the rules of the game and then they feel comfortable to share. However, some other interviewees claim that OI cannot be achieved through papers. According to Zucker (1986) there are three ways to create trust between different parties. The first is the process-based and it depends on the experience that the parties have between them. According to the findings, company A believe that trust is a long process and they may need more than a year to trust the other party. As far as we understand, this belief is logic, since companies may exploit OI for only their benefit. Therefore, company A sometimes prefer to work with those who have already have worked in the past, either suppliers or companies they believe are more trustworthy. The second way according to Zucker (1986) to build trust is the characteristic-based and it is about the personality of the alliance. Company B endorses this way, since they believe that individual relationship is always important, whether or not the one wants to work with the other. Also an interviewee from company B stated that trust is something that exists between individuals, since they work for the same goal for something important. Finally, the third way is according to Zucker (1986) the institutional-based, which is linked with formal structures. Although this way is advocated by many employees from company A and B respectively, we could question this method due to the fact that trust cannot be generated by structures and rules, trust is something that the participants have to feel. It is not something one can negotiate or put into a contract; it needs to be built between people. Therefore, the result of the institutional-based way is to secure the OI's content, but not because of trust but because of delimitation.

5.2.1.5 Time issue

The last common challenge that we need to discuss is about the time spent in OI. Is it time saving or time consuming?

As far as we can observe from the interviews, both companies believe it can be a benefit and a challenge as well, based on the environment of the OI setting. There are many issues that can go

either right or wrong. For instance, when two companies are working together, the incentives should be the same, the priority should be given equally from both companies to the project and every employee should be committed to it. If we take into consideration Laursen & Salter (2006), companies need time to communicate with each other and understand their culture etc. Also, the pace of the companies should be in parallel and the decision time should be short. According to the findings, in many cases, the companies lose time because of the different speed. Especially, when they collaborate with small companies or start-ups, because of the different size they have, many times they are slower than the start-ups. However, even when they work with large companies, they have differences in speed and company A is in general slow, according to the findings. Even the decision of the partner could be time consuming, since according to Stuart (1993) the company should ensure that the partner is trustworthy. However if the company is not engaged in any kind of OI activity, again it can be time consuming due to the lack of information. Piller et al. (2005) support this opinion by discussing the time saving of having a direct feedback from your customers. Therefore, the use of OI is a benefit in this case. Moreover, when the company has a problem to solve, according to an interviewee from company A, they spend a lot of time trying to solve it internally and after some months they try to take the help of the externals. Koschatzky (2001) and Chesbrough et al. (2006), also believe that OI reduce the time of development for companies.

We cannot say that time is a benefit or a challenge for OI. Probably it is both. If companies depend only on their R&D to create something new, then the process is time consuming and OI is a benefit. However, as far as we are concerned, the environment will never be perfect and something will go wrong in the collaboration. Hence, the companies will lose some time and spend more time than they expected. Of course, another aspect is that the ideas are not taken directly from the outsiders to the development phase; companies have to assess and then formulate the ideas in a way that could be useful for them. At the end there is a risk to realise that the collected ideas were not suitable for the company's business and therefore cannot be used in the moment. We conclude that OI is time consuming but is the only option for companies to continuously generate innovation.

5.2.2 Differences

5.2.2.1 Different industries matter

As can be seen from the description of the two companies, the industries they participate in are totally different, therefore they have different environment and their decisions are taken based on different parameters. For instance, in company B the technology changes very fast and they are not willing to consume their time with IPR issues instead they aim to progress together with the new technology and not lagging behind in competitors. However, company A is in an industry which is more traditional and slow moving than the company's B industry, thus they depend on the written agreements in order to start a collaboration. Those are obvious findings from the interviews and it may require further analysis in association with why this difference exists between different industries.

If we take into consideration the different drivers of adoption for the two case study companies, we can see the difference in the industry they participate. From one side, there is company A which operates in the automotive industry and from the other side is company B, which participates in the telecom industry. As a result, the different industries make the companies to have different incentives regarding the reasons they adopt the OI concept. If we follow the Mortara and Minshall (2011) study, we can claim that company A is the *"ad-hoc adopters"* and company B is the *"OI precursors"*. Company A uses the OI concept for specific innovation processes, but they cannot open up their boundaries for their core business products, regarding the engine for instance. Therefore, this is align with what Mortana and Mishall (2011) claim about this type of adoption, in which companies open up their organisation in special occasion and for specific processes. This is because, as said before, the core business development of company A is vital and they do not want to jeopardise the secrecy of this development. This part is the main competitive advantage of company A, however we believe that in the future, companies would find other ways to compete and not based on their product development. Moreover, the category of *"OI precursors"* is the most appropriate for company B, since they changed so much their business in the last years and the industry is moving very fast. As a result, they cannot stay still and as Mortara and Minshall (2011) highlighted, OI is the only option for them. Finally, it can be seen that company A uses more the inbound activities, while company B uses both inbound and outbound, which is in line with their adopting drivers.

Other issue to be discussed for company B could be the fact that there are so many various players in the game: users and end-users such as purchasing, administering etc. so many different users are in the game. As can be found in the empirical findings, according to one interviewee in company B, it is more difficult for them since they do not work with customer products instead work with embedded systems. Therefore, this situation makes harder to decide with whom to talk. On the other hand, for company B the end-users are clearer, so they are able to better analyse the needs of their customers since it is known with whom to talk.

Last, but not least, it is highly important to highlight that automotive and telecommunication industries are analysed which are competitive. However, it needs to be emphasised that OI can be suitable for mature industries as well. It could help companies which in the mature industries to be more innovative and thus survive. Otherwise, without any innovation effort, they might be forced to die. However, it will not be further analysed since it is out of scope of this thesis.

5.2.2.2 IPR issue

IPR is one of the main differences between those two companies that is noticed during the interviews. First of all, for company A, IPR is an important issue that needs to be solved from the beginning. Thus, they can decrease the possibility of having problems concerning IPR. After the agreements are done and make the environment "secure", then they start to collaborate with the partners. The empirical data is in line with the ideas of Alexy et al. (2009) that they might kill the

project from the beginning if some IPR doubts exist; *"no patents no talk"*. A reason for this behaviour is that company A is afraid of the possibility of knowledge leakage. For the company, it is essential to keep the information inside the organisation, in order not to be taken by competitors. According to Hoecht & Trott (1999) and Norman (2004), the way to tackle this problem is to carefully select your partners and trust them. From the other side, for company B, IPR issue is not a big deal. For some projects, they also have non-disclosure agreements that is believed to create trust between the parties. However, according to one interviewed manager, the vital part for telecommunications industry is to implement the idea but not the idea itself. Thus, they do not pay so much attention whether competitors take their idea or not unless they implement it in a same way as company B. This is in line with what Chesbrough et al. (2006) discussed, that some organisations believe that openness itself is a system in which everyone can participate in the standard creation process. Thus, we could say that these are different viewpoints regarding IPR by each company and the importance is to understand why this difference is emerged. It might be, as mentioned earlier, because the companies belong to different industries. For company A, for instance, the engine of the vehicle is a core business that is of vital and is rejected to share the knowledge with anybody else outside of the boundaries. In this case, company A cannot take the risk of knowledge leakage. On the other hand, there are other cases as well that company A does not pay much attention on IPRs issue. For instance, Venture Capital Company of Company A collaborates with some partners and they do not lay down criterion for IPR. That means the supplier company are able to share this developed technology with other companies as well. This is due to the fact that Venture Capital Company just intends to maximize their output with this collaboration.

5.2.2.3 Not Invented Here (NIH) Syndrome

NIH syndrome can be another point to be discussed. In line with Katz and Allen (1982), we realised that there is a tendency in company A that *rejects* new ideas from outsiders since it is believed that the required competence is already in the organisation. However, it should be emphasised that it is not the situation for the whole organisation but as far as we observed, this is approved by the majority of the employees. Some interviewees even expressed that some employees think of raising hand and asking for help is a failure. It is good to trust to R&D department but it is undeniable fact that the environment change very fast and it is impossible to have all the required competence inside. It is a new time that necessitates companies to collaborate with the others in the ecosystem in order to better innovate.

5.3 Further Points

This part includes the areas that are not as of high importance as the remarkable topics above but still we think that it needs to be discussed.

To begin with, as can be observed from the empirical findings, the case study companies utilise the outbound processes of OI differently. Company A practices outbound activities in terms of spin-offs via the Venture Capital Company. Thus, this is the way for them to generate profit. On the other hand, as far as we understand from the interviews, company A does not sell their IPRs as compared with company B who sell their IPRs a lot and make so much profit in a year. Some of the interviewees from company B have stated that it is a good business to generate revenue by selling their IPR. In line with that, some of the interviewees from company A also showed us that they are aware of the importance of IPR selling as a new business for making money and also stated that it maybe is a good idea to start utilising outbound activities of OI as IPR selling. The difference might be again related with the difference industries they are involved in. The industry company B is involved maybe is a more suitable one for selling IPRs. It needs to be further analysed with more data.

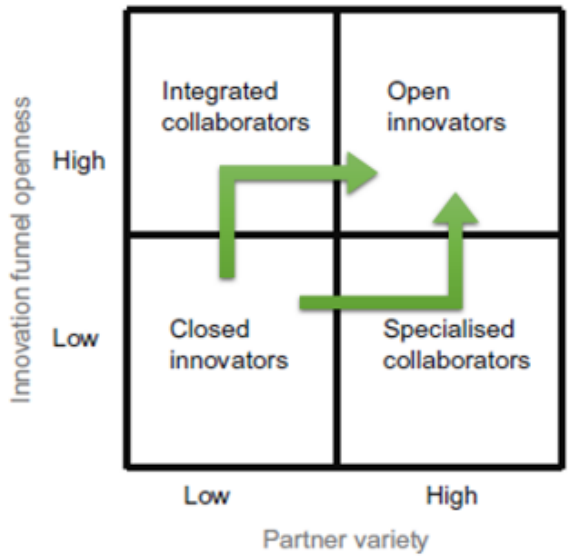


Figure 13: The four modes of OI. Source: Lazzarotti & Manzini (2009) (modified)

Secondly, as can be seen from the Figure 13, there are two types of innovators and two types of collaborators. In order to close the gap from closed to open innovators, companies should choose a path to follow. The two options are either the integrated or the specialised collaborators. If we take into consideration Lazzarotti and Manzini (2009), they describe what those two types of collaborations are. According to the findings that we collected, it is hard to say that the two companies we analysed, are following the one or the other path. It is obvious that both companies have been trying to adapt a more open strategy. However, they have not decided yet which solution is best for them. In one hand is the integrated collaborators, which have opened the whole innovation funnel, but only for few partners that they know and trust. From the other hand, the specialised collaborators prefer to have variety of partners but in one part of the innovation funnel. As we observe, the two focused companies are in the middle of integrated and specialised collaborators. Both companies have some partners in more than one parts of the innovation funnel. Maybe it

would be better to decide and follow a specific strategy, in order to move faster in their goal. Furthermore, firms need to understand the differences between the two collaborators strategy. They also need to be aware of that there is not only closed and open innovators model instead there are other collaborators models between. It cannot be crossed from closed to open innovation in one leap and we believe that firms even do not know how to cross from one to another model.

Finally, it is important to emphasise, as can be seen from the benefits part of OI, there are some certain positive outcomes of OI if the definition and the way how to do it is known. However, it needs to be also stated that OI is utilised for the greater good which means that firms are a part of a bigger society and they have to collaborate to improve the society. Thus, OI should be think of for sharing and for societal innovations.

6 Conclusions and Further Research

6.1 Conclusions

The purpose of this chapter is to conclude the results of this research study. Therefore, in this section the three research questions will be answered and the main conclusions will be discussed. Furthermore, some recommendations will be given to the companies, in order to improve the OI concept in their organisations and some areas for further investigation will be highlighted.

The first research question is regarding how large companies define OI. As far as can be observed from the previous chapters, the two case study companies have some misapprehensions towards the correct definition of OI that comes from the scholars. Both companies want to improve the OI concept in the organisation, however they do not have a totally clear view about how to do it, because they do not know exactly what OI is. This problem arise from the combination of both theory and practise, since we observed the lack of common definition in the literature. Even the authors that work on OI concept are unsure about the characteristics of the concept. As we realised after this research, OI is something bigger than collaboration with external parties, it needs trust rather than written agreements. As a result, OI is something new for companies and especially large established companies that are afraid of the knowledge leakage and information sharing are prone to keep their current way of working. However, we see that OI is a concept that creates benefits for all the included members and companies would like to be a part of it.

Moreover, coming to second research question that concerns how and to what extent the companies participate in OI, we can understand that companies want to experiment with different things in order to find the one that suits them more. However, there is a link between the understanding and practicing OI, because if the companies have a wrong view about OI definition, they will follow wrong ways to apply it. In the discussion we analysed the different examples that the companies gave us during the interviews and we realised that the majority of them were not OI examples but rather cooperation or collaboration. Of course, we identified some correct examples of OI, coming from both companies, therefore we can say that they understand that they should open up their boundaries more. On the other hand, we should mention the difference in their industries and how this influences the process and decision making in the organisation. Company A is a more traditional company that wants to secure some parts of the development process, therefore cannot apply OI methods to the whole organisation. However, company B is part of the telecommunication industry, where changes occur in daily basis and they have to be faster and more efficient so as to survive. As a result we can see the difference in the IPR strategy, for instance. Company A still struggles with the NDA's and IPR's, where company B does not have the same attitude. As we mentioned in the discussion, as far as we are concerned, the OI concept is present where the written agreements are not. Hence, both companies should continue trying different ways until they find the optimum. Another difference in the way they

apply OI, is about the degree of structure they have for OI. Company A is more structured than company B regarding OI. In company A they have a department for OI and they have processes that follow and people responsible for this in the organisation. From the other side, in company B, the process of OI seems more flexible and unstructured, where individuals take the initiative to work with OI, by working extra time, independently from their main job responsibilities. This results to different benefits and challenges for those companies. Company A puts a lot of effort on structuring OI and sometimes labels some projects as OI while they are not and company B bases its OI to individuals and not organisational strategy. As we said before, we only base our conclusions on the data we collected and we cannot generalise them to the whole organisation, but still it is a behaviour observed by the researchers. Having said that, it is clear that the two companies follow different paths in order to increase their OI participation and they are still in the searching phase. However, both companies enjoy some benefits of OI that can be seen in the next paragraph.

The last research question intends to find out the utilisation of the participation in OI and the seen results of it. From the findings, it is crystal clear that there are some positive outcome of OI such as creating learning and good quality ideas and the flexibility in the development process. Despite the noticeable benefits of OI, the significant found conclusion is the understanding and reasoning behind the implementation of OI is important rather than simply implementing it just because it is popular and applied by majority of the firms. Otherwise, it is not so possible to be successful in the implementation of OI concept since the generated knowledge will not be utilised in the maximum scale and they may fail in the transformation process of the knowledge for the company. In line with that, another benefit of OI is to create good quality ideas. The same point needs to be pointed out that firms have to be aware of the reasons they want to collect the ideas since it is probably likely irrelevant and even useless ideas may rise as an outcome. Another point to conclude can be OI is a concept that is used mostly in the early phases of innovation funnel. Thus, it might be a mistake to open the boundaries in the early phases but to close the funnel again after having the required new ideas and inspiration. Then, OI cannot completely fulfil its purpose.

6.2 Recommendations and Further Research

In the light of all these information above, the authors state that there is not only one recipe for OI but it depends on the type of the organisation. Thus, it is of great importance for firms to know the characteristics of the organisation, to be aware of their capabilities as well as their needs and reasoning behind OI engagement. Furthermore, it is an apparent fact that it is not an easy straightforward process since it necessitates cultural transformation inside the organisation. The mind-set of the people in the organisation needs to change in order to apply and take advantage of OI in a proper way. The firms need to work outside in a new way purely for the reason that it creates a good business but not because firms should collaborate with external parties. Thus, it is important to find out the value proposition for themselves for the OI engagement. Another recommendation can be regarding the top management. It is of great

significance for top management to be committed and they should feel that it is really necessary and beneficial for the organisation. This is one of the prerequisites for the improvement of the organisation. Finally, it can be seen from the previous sections that one of the limitations of OI is that the organisations do not realise the value of the concept in terms of money. Hence, we can say that in order to convince the rest of the organisation that OI is valuable, a success story in terms of profit, would be a starting point. If OI can be profitable for the company, more employees would be engaged with OI activities and top management would be more supportive to this attempt.

For further research, in our opinion, this OI phenomenon could fade away when the companies find out that OI is not a medicine to cure all diseases inside the organisation and what is more, R&D is only one of the possible inputs for innovation process, but by no means the only one (Hoffman et al., 1998). As a result, it would be recommended to consider OI as a concept which is still in progress and needs further investigation. OI will create many changes into the companies and that is why the companies, which want to follow the OI concept, have to embrace it with an open notion.

Last, but not least, this research centred upon only large established companies. In order to have well rounded results, a further investigation is needed to understand the behaviour of SMEs as well as start-ups. It would be of great importance to comprehend whether or not, the behaviour of the companies towards OI varies based on the size of the company (Huizingh, 2011). Moreover, this thesis was focused on two large companies and during this limited time, fourteen employees were interviewed. In order to crosscheck the results, more interviews are needed to be conducted with employees and managers from those companies, even more than one interview with a same interviewee. Therefore, it would be more accurate with more interviews which would give the opportunity to validate the findings. We also believe that based on what we know today, we would ask different questions to the interviewees. For this study, we tried to analyse some pre-defined topics regarding OI concept. For instance, we investigated some challenges of OI and trust is found out as one of them. However, we could not further analyse what it would be if trust is broken. Thus, we believe that still there are some areas for further investigate. Finally, it is highly recommended for further research to study more large established firms from different industries other than automotive or telecommunication. This is because of the fact that different industries may have different behaviours and implementation of OI and thus different findings may arise.

7 Reference List

3M, (2015). *Submit your idea.* [online] 3M. Available at: http://solutions.3m.com/wps/portal/3M/en_US/Submit/YourIdea/ [Accessed 8 Mar. 2015].

Ahmed, P. (1998). Culture and climate for innovation. *European Journal of Innovation Management,* 1(1), pp.30-43.

Ahonen, M., Antikainen, M. and Mäkipää, M. (2007). "Supporting collective creativity", *European Academy of Management (EURAM) Conference Proceedings,* IDEAD, Paris.

Alexy O., Criscuolo P., Salter A. (2009). Does IP Strategy Have to Cripple OI? *Sloan Management Review* 51(1), pp. 71-78.

Almirall, E. and Casadesus-Masanell, R. (2010). Open versus closed Innovation: A model of discovery and divergence. *Academy of Management Review*, 35(1), pp. 27-47.

Antikainen, M., Mäkipää, M. and Ahonen, M. (2010). Motivating and supporting collaboration in OI. *European Journal of Innovation Management,* 13(1), pp. 100-119.

Baldwin, C. Y., and Hippel, E. A. von (2011). "Modeling a Paradigm Shift From Producer Innovation to User and Open Collaborative Innovation," *Organization Science* (22:6), pp. 1399–1417.

Bardach, Eugene. (1998). *Getting Agencies to Work Together: The Practice and Theory of Managerial Craftsmanship.* Washington, DC: Brookings Institution Press.

Bogers, M., and West, J. (2012). "Managing Distributed Innovation: Strategic Utilization of Open and User Innovation," *Creativity and Innovation Management,* 21(1), pp. 61–75.

Bower J. L. and Christensen C. M. (1995). Disruptive technologies: Catching the wave. *Harvard Business Review*, 73(1) (January–February), pp. 43–53.

Bryman, A. and Bell, E. (2011). *Business research methods.* Oxford: Oxford Univ. Press.

Capek, P., Frank, S., Gerdt, S. and Shields, D. (2005). A history of IBM's open-source involvement and strategy. *IBM Syst. J.*, 44(2), pp.249-257.

Chau, P. and Tam, K. (2000). Organizational adoption of open systems: a 'technology-push, need-pull' perspective. *Information & Management*, 37(5), pp. 229-239.

Chesbrough, H. (2003a). *OI: The New Imperative for Creating and Profiting from Technology*, Boston, MA: Harvard Business School Press.

Chesbrough, H. (2003b). *OI: The Era of OI,* Sloan Management Review, 44(3), (Spring):35-41

Chesbrough, H. (2004). Managing OI. *Research Technology Management*, 47, pp.23-26.

Chesbrough, H., Vanhaverbeke, W. and West, J. (2006). *OI: Researching a New Paradigm Oxford*. Oxford University Press.

Chesbrough, H. and Appleyard, M. (2007). OI and Strategy. *California Management Review,* 50(1), pp. 57-76.

Chesbrough, H. and Schwartz, K. (2007). Innovating business models with co development partnerships. *Research-Technology Management*, 50(1), pp. 55–59.

Chesbrough, H. (2011). *Open services innovation.* San Francisco, CA: Jossey-Bass.

Chesbrough, H. and Euchner, J. (2011). Managers at Work: The Evolution of OI: An Interview with Henry Chesbrough. *Research-Technology Management,* 54(5), pp. 13-18.

Chesbrough, H., Vanhaverbeke, W. and West, J. (2014). *New frontiers in OI.* Oxford: Oxford University Press.

Chiaroni, D., Chiesa, V. and Frattini, F. (2010). Unravelling the process from Closed to OI: evidence from mature, asset-intensive industries. *R&D Management,* 40(3), pp. 222-245.

Christensen, C. (1997). *The innovator's dilemma.* Boston, Mass.: Harvard Business School Press.

Christensen, J.F., Olesen, M.H. and Kjaer, J.S. (2005). The industrial dynamics of open innovation – evidence from the transformation of consumer electronics. *Research Policy,* 34, pp. 1533–1549.

Dahlander, L., and Gann, D. M. (2010). "How open is innovation?" *Research Policy,* 39(6), pp. 699–710.

Deakin, S. and Wilkinson, F. (1998). *Contract law and the economics of interorganizational trust.* Oxford: Oxford University Press.

Dodgson, M., Gann, D. and Salter, A. (2006). The role of technology in the shift towards OI: the case of Procter & Gamble. *R&D Management*, 36(3), pp.333-346.

Drucker, P.F. (1988). "The coming of the new organization", *Harvard Business Review,* 66 (1), pp. 45-53.

Eisenhardt, K. M. (1989). Building Theories From Case Study Research. *The Academy of Management Review,* 14(4), pp. 532-550.

Eisenhardt K. M., and Graebner, M. E. (2007). 'Theory Building from Cases: Opportunities and Challenge', *Academy of Management Journal,* 50(1), pp.25-32.

Elmquist, M., Fredberg, T. and Ollila, S. (2009). Exploring the field of OI. *European Journal of Innovation Management,* 12(3), pp. 326-345.

Ehls, D. (2014). Open Source Innovation. In *Joining Decisions in Open Collaborative Innovation Communities* (pp. 7-42). Springer Fachmedien Wiesbaden.

Enkel, E. and Gassmann, O. (2007). In: *Driving OI in the front end*.

Enkel, E., Gassmann, O. and Chesbrough, H. (2009). Open R&D and OI: exploring the phenomenon. *R&D Management,* 39(4), pp. 311-316.

Fine, C.H. (1998). Clockspeed: Winning Industry Control in the Age of Temporary Advantage. Reading, MA: Perseus Books.

Fosfuri, A., Giarratana, M. S., and Luzzi, A. (2008). "The Penguin Has Entered the Building: The Commercialization of Open Source Software Products," *Organization Science* (19:2), pp. 292–305.

Freeman, C. (1982). *The Economics of Industrial Innovation.* 2nd edition. London: Frances Pinter.

Garsten, C. and Grey, C. (1998), *Trust and post-bureaucracy*, paper presented at the 14th EGOS Colloquium, Maastricht, 9-11 July.

Gassmann, O. (2006). Opening up the innovation process: towards an agenda. *R&D Management,* 36(3), pp. 223-228.

Gassmann, O. and Enkel, E. (2004). Towards a theory of OI: three core process archetypes. Proceedings of the R&D Management Conference, Lisbon, Portugal, July 6–9. pp. 1-18.

Gassmann, O., Enkel, E. and Chesbrough, H. (2010). The future of open innovation. *R&D Management,* 40(3), pp. 213-221.

Giddens, A. (1990). *The consequences of modernity*, Cambridge: Polity Press in association with Blackwell.

Gray, Barbara. (1989). *Collaborating: Finding Common Ground for Multiparty Problems.* San Francisco: Jossey-Bass.

Greatideasstarthere.com, (2014). *Great Ideas Start Here – Quartet Blog » What is Open Innovation? What is Closed Innovation?*. [online] Available at: http://www.greatideasstarthere.com/2014/01/what-is-open-innovation-what-is-closed-innovation/ [Accessed 4 May 2015].

Groen, A. and Linton, J. (2010). Is OI a field of study or a communication barrier to theory development?. *Technovation,* 30(11-12), p.554.

Hacievliyagil, NK, J-F Auger, Y Maisonneuve and D Hartmann (2007). The position of virtual knowledge brokers in the core process of OI. *International Journal of Knowledge*, Technology and Society, 3(5), 47–60.

Hars, A., and Ou, S. (2001). "Working for Free? Motivations for Participating in Open-Source Projects," in *Proceedings of the 34th Annual Hawaii International Conference on System Sciences (HICSS-34*, Washington, DC: IEEE Computer Society, pp. 25-39.

Herzog, P. (2011). *Open and closed innovation. Different Cultures for Different Strategies.* Wiesbaden: Gabler.

Hippel, E. V., & Krogh, G. V. (2003). Open source software and the "private-collective" innovation model: Issues for organization science. *Organization science*, *14*(2), pp. 209-223.

von Hippel, E. (1998). Economics of product development by users: the impact of "sticky" local information. *Management Science*, Vol. 44, No. 5, pp. 629-644.

von Hippel, E. (2005). *Democratizing Innovation*, The MIT Press, Cambridge, MA.

Hoecht, A. and Trott P. (1999). Trust risk and control in the management of collaborative technology development. *International Journal of Innovation Management*, pp. 257-270.

Hoffman, E., McCabe, K., Smith, V., 1998. Behavioral foundations of reciprocity: experimental economics and evolutionary psychology. *Economic Inquiry*, 36(3), pp.335-352.

Huang, G., Mak, K. and Humphreys, P. (2003). *A new model of the customer–supplier partnership in new product development.* Journal of Materials Processing Technology, 138(1-3), pp. 301-305.

Huizingh, E. (2011). Open innovation: State of the art and future perspectives. *Technovation*, 31(1), pp. 2-9.

Humphrey, J. and Schmitz, H. (1998). Trust and inter- firm relations in developing and transition economies. *Journal of Development Studies*, 34(4), pp. 32-61.

Huston, L. and Sakkab, N. (2006). Connect and Develop. *Harvard Business Review*. 84(3), p58-66.

Inkpen, A.C. and Dinar, A. (1998), Knowledge management processes and international joint ventures, *Organization Science*, 9(4), pp. 454-468.

Inova, (2012). *OI - Not just a catchy phrase, proof from P&G that it really works - Inova, software technology due diligence.* [online] Available at: http://www.inova-software.com/open-innovation-not-just-a-catchy-phrase [Accessed 4 May 2015].

Järrehult, B. (2011). *OI: To Cooperate or Collaborate –That is the Question | Innovation Management*. [online] Innovation Management. Available at: http://www.innovationmanagement.se/2011/08/08/open-innovation-to-cooperate-or-collaborate-that-is-the-question/ [Accessed 5 Mar. 2015].

Jensen, M. and Murphy, K. (1990). Performance Pay and Top Management Incentives. *SSRN Journal*. 98(2), 225-264.

Katz, R., & Allen, T. J. (1982). Investigating the Not Invented Here (NIH) syndrome: A look at the performance, tenure, and communication patterns of 50 R&D Project Groups. *R&D Management, 12*(1), 7-20.

Khalid, H. and Helander, M. (2003). Web-based do-it-yourself product design. In Tseng, M. and Piller, F. (Eds.). *The customer centric enterprise.* New York/Berlin: Springer, pp. 247-265.

Koschatzky, K. (2001). Networks in innovation research and innovation policy – an introduction. In: Koschatzky, K., Kulicke, M. and Zenker, A. (eds), *Innovation Networks: Concepts and Challenges in the European Perspective*. Heidelberg: Physica Verlag.

Kuschel, J., Remneland, B. and Kuschel, M. (2011). OI and control: a case from Volvo. *IJNVO*, 9(2), p. 123.

Laursen, K. and Salter, A. (2004). Searching high and low: what types of firms use universities as a source of innovation?. *Research Policy*, 33(8), pp.1201-1215.

Laursen, K. and Salter, A. (2006). Open for innovation: the role of openness in explaining innovation performance among U.K. manufacturing firms. *Strat. Mgmt. J.*, 27(2), pp. 131-150.

Lazzarotti, V. and Manzini, R. (2009). Different modes of OI: A theoretical framework and an empirical study. *International Journal of Innovation Management,* 13(04), pp. 615-636.

Leifer, R., McDermott, C. M., O'Connor, G. C., Peters, L. S., Rice, M. P., Veryzer, R. W., and Rice, M. (2000). *Radical Innovation: How Mature Companies Can Outsmart Upstarts.* Boston, MA: Harvard Business School Press.

Lettl, C., Herstatt, C. and Gemuenden, H.G. (2006). 'Users' contributions to radical innovation: evidence from four cases in the field of medical equipment technology. *R&D Management,* 36, 3, pp. 251–272.

Lichtenthaler, U. and Ernst, H. (2007). External technology commercialization in large firms: results of a quantitative benchmarking study. *R&D Management,* 37(5), pp. 383–397.

Lichtenthaler, U. (2008). Open innovation in practice: An analysis of strategic approaches to technology transactions. *IEEE Transactions of Engineering Management,* 55(1), pp. 148–157.

Liebeskind, J. and Oliver, A. (2000). *From handshake to contract*. Oxford: Oxford University Press.

Lynn, G., Morone, J. G., and Paulson, A. S. (1996). 'Marketing and Discontinuous Innovation: The Probe and Learn Process', *California Management Review,* 38(3), pp. 8– 37.

Mäkipää, M., Ahonen, M., & Mäntymäki, M. (2006). Developmental steps from closed innovation to open innovation. *Increasing Customer Involvement Through Mass Customization and Customer Co-design. University of Tampere, Tampere*.

Mortara, L. and Minshall, T. (2011). How do large multinational companies implement OI?. *Technovation,* 31(10-11), pp. 586-597.

Mowery, D. (2009). Plus ca change: Industrial R&D in the "third industrial revolution". *Industrial and Corporate Change,* 18(1), pp. 1-50.

Nelson, R. (1990). U.S. technological leadership: Where did it come from and where did it go? *Research Policy,* 19(2), pp. 117-132.

Norman, P. (2004). Knowledge acquisition, knowledge loss, and satisfaction in high technology alliances. *Journal of Business Research*, 57(6), pp. 610-619.

Pelz, D.C., and Andrews, F.M. (1976). *Scientists in organizations* (rev. ed.) Ann Arbor, Mich.: Institute for Social Research.

Piller, F., Schubert, P., Koch, M., and Möslein, K. (2005). Overcoming Mass Confusion: Collaborative Customer Co-Design in Online Communities. *Journal of Computer-Mediated Communication*, Vol. 10, No. 4.

Piller, F.T. and Walcher, D. (2006). Toolkits for idea competitions: a novel method to integrate users in new product development. *R&D Management*, 36(3), pp. 307–318.

Porter M. E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*. New York: Free Press.

Ring , Peter Smith , and Andrew H . Van de Ven . 1994 . Development Processes of Cooperative Interorganizational Relationships. *Academy of Management Review* 19 (1), pp. 90–118.

Rodgers, R., Hunter, J. and Rogers, D. (1993). Influence of top management commitment on management program success. *Journal of Applied Psychology*, 78(1), pp. 151-155.

Rogo, F., Cricelli, L. and Grimaldi, M. (2014). Assessing the performance of OI practices: A case study of a community of innovation. *Technology in Society*, 38, pp. 60-80.

Rothwell, R. and Zegveld, W. (1985). *Reindustrialization and technology*. Armonk, N.Y.: M.E. Sharpe.

Sako, M. (1992). *Prices, quality, and trust*. Cambridge: Cambridge University Press.

Saunders, M., Lewis, P. and Thornhill, A. (2009). *Research methods for business students.* New York: Prentice Hall.

Shepard, H. (1956). Patterns of Organization for Applied Research and Development. *J BUS*, 29(1), p.52.

Sitkin, S. and Roth, N. (1993). Explaining the Limited Effectiveness of Legalistic "Remedies" for Trust/Distrust. *Organization Science*, 4(3), pp. 367-392.

Stuart, F. (1993). *Supplier Partnerships: Influencing Factors and Strategic Benefits*. International Journal of Purchasing and Materials Management, 29(3), pp. 21-29.

Teece, D. (1986). Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. *Research Policy,* 15(6), pp.285-305.

Thomson, A. and Perry, J. (2006). Collaboration Processes: Inside the Black Box. *Public Administration Review*, 66(s1), pp. 20-32.

Trott P. and Hartmann D. (2009). Why "OI" is old wine in new bottles. *International Journal of Innovation Management,* 13 (4), December 2009.

Tseng, M. and Piller, F. (2003). *The Customer Centric Enterprise. Advances in Mass Customization and Personalization,* Springer, Berlin.

Vanhaverbeke, W. (2006). *The interorganizational context of OI.* In: Chesbrough, H., Vanhaverbeke, W. and West, J. (eds), OI: Researching a New Paradigm. Oxford: Oxford University Press.

Vanhaverbeke, W., Van de Vrande, V. and Chesbrough, H. (2008). Understanding the Advantages of OI Practices in Corporate Venturing in Terms of Real Options. *Creativity and Innovation Management,* 17(4), pp. 251-258.

Vogt, W., Gardner, D. and Haeffele, L. (2012). *When to use what research design.* New York: Guilford Press.

Vyas N.M., Shelburn W.L., Rogers D.C., (1995), An analysis of strategic alliances: forms, functions and framework, *Journal of Business & Industrial Marketing*, 10(3), pp. 47-60.

Wagner, E. and Hansen, E. (2005). Innovation in large versus small companies: insights from the US wood products industry. *Management Decision,* 43(6), pp. 837-850.

Wazoku.com, (2014). *OI vs. Crowdsourcing vs Co-creation*. [online] Available at: http://www.wazoku.com/blog/open-innovation-vs-crowdsourcing-vs-co-creation/ [Accessed 5 Mar. 2015].

West, J. and Gallagher, S. (2006). Challenges of open innovation: the paradox of firm investment in open-source software. *R&D Management*, 36(3), pp. 319-331.

Winer, M. and Ray, K., (1994). *Collaboration Handbook: Creating, Sustaining, and Enjoying the Journey*, Amherst H. Wilder Foundation, 919 Lafond, St. Paul, MN 55104.

Wolpert, J. D. (2002). Breaking out of the innovation box. *Harvard Business Review*, 80 (8), pp. 77-83.

Wood, D., and Gray B. (1991) . Toward a Comprehensive Theory of Collaboration. *Journal of Applied Behavioral Science*, 27 (2), pp. 139–62.

Yin, R.K., (2003). *Case Study Research: Design and Method*, London: Sage.

Yu, Z., Yan, H. and Edwin Cheng, T. (2001). Benefits of information sharing with supply chain partnerships. *Industry Management & Data Systems*, 101(3), pp. 114-121.

Zucker, L. (1986). Production of trust: institutional sources of economic structure, 1840-1920. *Research in Organisational Behaviour*, 8, pp. 53-111.

8 Appendices

Appendix 1: Interview Guide

Interview Guide
Background
1. Can you tell us about your position in the company? Can you describe your work?
2. For how long have you been working in this specific department?
Open Innovation (definitions of the engagement)
1. How would you define open innovation?
2. Is this company engaged in open innovation projects or settings? Can you please describe one of them briefly?
a. What type of projects were they?
b. What are the reasons of doing this engagement? If you think in terms of R&D, where were you in that scale? (i.e. create knowledge or develop something better)
c. How long does the project take and how many people from the company involved in? From one or several departments?
i. Have you decided a time frame for the project from the beginning? Was it a closed date or open date like continues as long as you need until you fulfil the purposes?
d. Do you have long experience in this participation?
e. Are you the one who started it or are you the one who was asked to join?
f. How many partners did you collaborate with? Who were they such as customers, suppliers or consultants etc.? Do you have previous experience with the collaboration partners?
g. Who decided to initiate this collaboration? Head of R&D or somebody else?
h. Why did (s)he choose the specific alliances?
i. How much did you work in the collaboration? How did you discuss to create the trust and contribution?
j. How did it work? Did you sit together every day or did you meet in a regular basis?
k. How well was regulated? Was there any written agreement? How did you split the cost, revenue etc.?
l. How did the company improve the collaboration?
Open Innovation (utilisation)
a. Did you attempt to sell your IP or licensing out?
b. What are the most important things you would like to achieve? It can be more knowledge in an area; it can be expanded to other areas or industries? (Such as spin-offs, IP selling, licensing, etc.)
c. Have you ever had any problems with your IP Ownership?
2. What was the most challenging thing during the participation?
3. What was the most rewarding thing during the participation?
4. What were the expectations of the company for open innovation practice?
5. What were the benefits and/or utilisation by practicing open innovation?
6. What was the final outcome with practicing open innovation?
a. Were the results equal to your expectations, where were you in the scale?
b. Were you satisfied with the open innovation practice?
i. Why yes/no?
Open Innovation - closure questions
1. Do you have any ideas or suggestions for how to improve the open innovation utilisation in the company?
2. Do you have any other comments that you would like to add?
3. Did you expect some other questions that we did not ask?
4. Do you have any recommendations to us? (Add and/ or modify some other questions etc.)

Appendix 2: Closed and OI principles in relation to the WirelessCar case

Closed Innovation principles	L	Volvo case with WCar	R	Open innovation principles
The smart people in our field work for us.		The triad did assume that by opening and forming Wcar synergies would be greater than if they only would have formed and controlled a strategic alliance.	XX	Not all the smart people work for us. We need to work with smart people inside and outside our company.
To profit from R&D, we must discover it, develop it, and ship it ourselves.		Wcar should be the driver for R&D, backed up by the external R&D from the triad participants.	XXX	External R&D can create significant value: internal R&D need to claim some proportion of that value.
If we discover it ourselves, we will get it to the market first.		Even though Volvo had great experiences in vehicle services, it was obvious that additional knowledge would strengthen the development.	XX	We don't have to originate the research to profit from it.
The company that gets an innovation to the market first will win.	X	Wcar was set-up with an assumed business model and had no intent to change that business model.		Building a better business model is better than getting to market first.
If we create the most and the best ideas in the industry, we will win.		Wcar were merging ideas from the triad organizations, however, less from other organizations.	X	If we make the best use of internal and external ideas, we will win.
We should control our IP, so that our competitors don't profit from our ideas.		Wcar has opened up for other players to contribute to usage and improvements of Next Generation Telematics Protocol.	X	We should profit from others' use of our IP, and we should buy others' IP whenever it advances our own business model.
The X signifies the summarized and weighted view of WirelessCar (WCar) in relation to Closed and Open innovation principles. X in L column illustrate more of Closed innovation and X in column R more of Open innovation principles (XXX = strong weight, X = weak weight).				

(Source: Kuschel et al., 2011, p.7)

Appendix 3: Summary of the benefits and challenges in terms of similarities and differences

The table below summarises the section 5.2, with commonalities and differences, benefits and challenges.

	Similarities	Differences
Benefits	Creating Learning	
	Creating Good Quality Ideas	
	Flexibility in the Development Process	
Challenges	Trust Issue	IPR Issue
	Time Issue	Not Invented Here Syndrom

Appendix 4: Information about the interviewees

Role/ Responsibility	**Company**
Global innovation manager	Company A
Responsible for service driven and digitally driven innovation	Company A
Ideation lab manager	Company A
Director of emerging technologies	Company A
Responsible for technology strategy innovation department	Company A
Technology Strategy and Innovation	Company A
Investor director	Company A
Innovation leader	Company B
Program leader	Company B
R&D operations developer	Company B
Director business developer	Company B
Senior specialist	Company B
Senior consultant	Company B
Innovation specialist	Company B