

Innovation domains

Dimensions of controlled
& uncontrolled and
internal & external



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Abstract

In this harsh digitalised business landscape firms are feeling an increased pressure and demand from the environment to keep up with the fast changing pace of innovation. As a response, incumbent firms are engaging themselves in different kinds of innovation domains in order to capture innovations and generate ideas that better meet user needs and desires in a strategic manner that forms new value. Past research has focused on how firms capture innovations in a single innovation domain, but no known research has had a holistic perspective where they focus on firms engagement in all identified innovation approaches together. The authors of this thesis has created a conceptual framework that combines the innovation domains into a single model. It represents the innovation domains in two dimensions: controlled & uncontrolled and external & internal. The model has been used as a guide for the data collection, and as a lens for the interpretation of the collected data. The data has been gathered from qualitative semi-structured interviews as well as from qualitative secondary data sources. The theoretical contribution of this thesis is the created framework and its development with two new innovation domains, and the practical contribution consist of the models illustrating the incumbent firms adoption and balance of the innovation domains.

Keywords: Closed innovation, open innovation, shadow innovation, outlaw innovation.

Abstrakt

Företag känner idag ett ökat tryck och efterfrågan i ett allt mer utmanande och digitalt affärslandskap, att hänga med i den snabba utvecklingen och den snabba takten av innovation kräver allt mer. Som svar engagerar sig företag i olika sorters innovationsdomäner för att fånga upp fler idéer och innovationer som bättre möter användarnas behov och viljor på ett strategiskt sätt. Tidigare forskning har fokuserat på hur företag har fångat upp innovationer i en innovationsdomän, men ingen forskning har haft ett holistiskt perspektiv där de fokuserar på företagets engagemang i alla identifierade innovationsdomäner tillsammans. Författarna av denna uppsats har skapat ett konceptuellt ramverk som kombinerar innovationsdomänerna i en och samma modell. Ramverket presenterar innovationsdomänerna i två dimensioner: kontrollerat & okontrollerat samt externt & internt. Det ramverket har använts som en guide för datainsamlingen samt som en lins för dataanalysen. Den empiriska datan har samlats in från kvalitativa intervjuer, samt från kvalitativa sekundära datakällor. Det teoretiska bidraget som denna uppsats bidrar med är det teoretiska ramverk och dess utveckling med två nya innovationsdomäner. Det praktiska bidraget består av modeller som på ett enkelt sätt illustrerar företags engagemang och balans av innovationsdomäner.

Nyckelord: Stängd innovation, Öppen innovation, Skugginnovation, Illegal innovation.

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1. Introduction

In the most recent years, organisations are finding themselves operating in a harsh digitalised business landscape where fast and unpredicted change and development are considered the norm (Pessi, Hadzic, Saariko & Magoulas, 2013; Burns, Neutens, Newman & Power, 2009). In this digitalised world, firms are feeling an increased pressure and demand from the environment to keep up with the fast changing pace of innovation (Burns et al, 2009). Although this digitalised world creates the possibility for firms to develop a shared vision on how they are to best utilise the digitalisation in order to generate the most value (Rathi & Kalani, 2015; Schmidt, Drews & Schirmer, 2016). The digitalisation has also generated change and disturbances on the market that forces the entrenched companies to shift from an incremental phase to an innovative phase (Alvarez & Barney, 2007; Schmidt, Drews & Schirmer, 2016). And since it's long known that firms that doesn't comply to these kind of changes tend to die (Utterback & Abernathy, 1975), leaders in large firms are now looking for innovation as a means for survival through differentiation and competitive advantages (Brown, 2008). They feel the need for innovation for survival since the digitalisation has lead to an increase in competent individuals and small startups that compete with the large entrenched companies with new and different business strategies (Kelly, 2014; Utterback & Abernathy, 1975; Cuesta, Ruesta, Tuesta & Urbiola, 2015). But innovation is not easy. Large firms finds it difficult to come up with new ideas as well as deciding which projects to fund and focus on, and they often find themselves spending enormous amount of time and money on the crucial part of understanding the users needs, often without success (Henfridsson & Lindgren, 2010; Piller & Walcher, 2006; von Hippel & Katz, 2002). So now companies are asking themselves how to create ideas that better meet the users needs and desires in a strategic manner that forms new value (Brown, 2008).

One solution to this problem that companies have found, is to engage in different kinds of user driven initiatives such as open innovation (Chesbrough, 2006; von Hippel & Katz, 2002; Benkler, 2002; Piller & Walcher, 2006). These user driven innovation initiatives makes is possible for companies to access innovation capacity such as knowledge, ideas and creativity, and to acquire intellectual properties (IP) from external individuals and firms from which the companies had no prior relationship (Piller & Walcher, 2006; Feller, Finnegan, Hayes & O'Reilly, 2012). In this way the companies can advance their products and services using external innovator by addressing their intrinsic motivators as well as providing extrinsic rewards (Boudreau & Lakhani, 2009; Chesbrough, 2006). This is possible due to the fact that the innovation contributors are not amateurs, they are largely self-selected experts and professionals who seeks opportunities to make money, express themselves, build portfolios for future employment, help others, or just have fun (Brabham, 2012). This means that, in user driven innovation, ideas and innovation can arise from anywhere (Chesbrough, 2006; Flowers, 2008). Some of these ideas and innovations will take place inside companies and others outside of the companies. Some will be on the legal side of the companies framework and the countries laws, while others will be on the illegal side of them (Flowers, 2008; Söderberg, 2016). Some of the user driven innovation the companies will engage in by themselves, some will affect them without their consent. Some companies might be able to capture value from all these kinds of innovation initiatives, while others might not even be aware of them. Some will treat user driven innovations as an ally while other as an enemy.

1.1 Purpose

Past research has focused on how firms capture innovations in a single innovation domain, but no known research has had a holistic perspective where they focus on firms engagement in all identified innovation approaches together. Therefore, this thesis sets out to shed some light upon this matter by conducting a qualitative study based on semi-structured interviews as well as secondary web-based data to answer the research question:

How do firms balance their innovation initiatives between innovation domains?

This thesis will therefore answer how firms balance their innovation initiatives between internal and external innovation domains as well as between controlled and uncontrolled innovation domains. This is an important and interesting area to explore since the answer of this question creates a holistic view over companies focus and initiatives in the innovation domains. This holistic view is interesting to investigate because it creates a clearer view over innovation situations which can make up the foundation for better and informed decision making concerning innovations. This is answered by illustrating which innovation domains are given focus, why and to what degree.

2. Theoretical background

This section presents related theories on the relevant subjects to this article. The information is divided into three main subsections: Innovation, Firm driven innovation, and User driven innovation. The first subsection defines innovation. The second subsection, Firm driven innovation, provides a background to the innovation domain Closed innovation. The third subsection, User driven innovation, provides a background and introduces concepts for the innovation domains Open innovation, Shadow innovation and Outlaw innovation. This division enables the reader to clearly understand the drivers behind each innovation domain as well as from whom the innovation capacity comes from.

2.1 Innovation

Innovations are a cluster of processes that takes new ideas into widespread application (Flowers, 2008), and can in other words be seen as new processes or technologies that are introduced to markets to meet users needs and desires (Utterback & Abernathy, 1975). These innovations can be completely novel and radical, or they can be improvements or a combination of existing processes and technologies (Flowers, 2008; Utterback & Abernathy, 1975). An innovation process entail all the equipment, work force, task specifications, materials and information etc that are employed in order to produce innovations (Utterback & Abernathy, 1975). This innovation process is viewed as occurring in the distinct phases. The first being idea generation, the second being problem solving and development, and the third being implementation and diffusion (Utterback, 1974). Idea generation involves synthesis of diverse disciplines and information. This entails the crucial part of knowing what the market and the users need, and the technology required to meet these needs (Utterback, 1974; Piller & Walcher, 2006). Problem solving and development involve designing different solutions and innovations to meet a set of specific technical goals. Implementation and diffusion consists of the manufacturing, tools and marketing required to bring innovations to use in the markets. After an innovation has reached a market the diffusion of the innovation can begin (Utterback, 1974). The source of an idea for innovations often springs from an informal conversation initiated by a person expressing a need or desire. The person on the other end of that conversation is more likely to be the one forming an idea around that problem and initiating an informal discussion about the required technical means to develop the innovation (Utterback, 1974).

2.2 Firm driven innovation

Firm driven innovation emphasises that the firms conduct internal research and development in the secret chambers of their compound without the help of external innovation capacities from the users (Vanhaverbeke, Roijackers, Lorenz & Chesbrough, 2016; Piller & Walcher, 2006). This view assumes that successful innovations require control, and was for a long time viewed as the right way to innovate. In this context, firms tend to have large internal research and development facilities organised around the process of innovation (Flowers, 2008).

2.2.1 Closed innovation

Many organisations view the new product development, or the innovation process, as closed (Piller & Walcher, 2006). This means that they view the innovation process as an internal activity where their own research and development department (R&D) is trusted to be the source of innovation (Utterback, 1974; Piller & Walcher, 2006). The innovations tend to be driven and stimulated by new user needs and market opportunities (Utterback &

Abernathy, 1975), and the most critical insight for innovations is the process of obtaining and identifying relevant information to the technical requirement to meet the user needs (Utterback, 1974; Utterback & Abernathy, 1975). But in order to set the technical requirements, the firms need first to establish the user needs. The activity to acquire the information from the users about their needs and preferences, is stressed as prerequisite for successful innovation (Piller & Walcher, 2006). Many companies acquire this information through market research, spending enormous amount of time and money. But despite all the allocated resources towards defining the users needs, innovations rarely succeed (Piller & Walcher, 2006). This leads to that innovation managers may rely on trends and assumptions about the users preferences. The innovation managers at the firms also transfer the information about the users needs by using the innovation capacities that are known to the firms, which reduces the solution space to the sources known to the firm (Piller & Walcher, 2006).

This mindset of doing everything inside the firms led to many and heavy investments in internal research and development and resources such as personnel. This model worked well for a long period of time, but the rise of digitalisation, private ventures and knowledgeable people made firms lose some control and not benefiting as much from their investments in internal research and development as knowledge and ideas became more present externally (Chesbrough, 2003). This made them realise that a more open domain was in order. Firms did already use external sources of idea generation from professionals such as consultants. Discussions with consultants have a good track rate in generating innovation ideas for firms (Utterback, 1974). Although the benefits of external sources of innovation were known, in the mindset of closed innovation the external sources are very limited to the innovation phase of generating ideas, and by no other than professional firms since they view the users as amateurs (Utterback, 1974; Piller & Walcher, 2006; Brabham, 2012).

2.3 User driven innovation

In today's complex world there has been a growth in the numbers of highly technically skilled individuals known as intellectual or knowledge works (Flowers, 2008). This has in turn led to a shift in the structure of firm level innovation (Chesbrough, 2003). Firms today are gaining an awareness that good ideas, technologies and applications might exist both inside and outside the borders of their firm (Flowers, 2008; Piller & Walcher, 2006). As a response to this they are trying different domains to open up their innovation process to external sources (Piller & Walcher, 2006) in different phases of the innovation process (Utterback, 1974). The idea is that by incorporating a wider synthesis of diverse ideas and knowledge in the innovation process, the innovation process will get a higher performance and resulting in products better fitted to the user needs (Piller & walcher, 2006). The term user driven innovation refers to the concept where users are substantially involved in the innovation process of idea generation and problem solving, that leads to innovations (Piller & walcher, 2006). But user driven innovation is not a replacement for firm driven innovation process, but a compliment that can contribute to the innovation process. Not all ideas formulated by users are great, and firms should be show constraints towards following their present consumers as these might recommend old procedures over radical innovation. The firms should instead focus on a smaller group of users that sets themselves out from the rest (Piller & walcher, 2006).

These users are formulated as lead users, and they possess a set of characteristics that make them more valuable for the companies than the rest. They tend to face needs that will become general in the market before the bulk of the market; they are innovative and trendsetting; they regularly adopt technology early; they tend to possess great knowledge

in the area, and are able to come up with ideas to improve the existing offerings of products and services (Piller & Walcher, 2006). Lead users input are valuable for the producers (Piller & Walcher, 2006), and a term called prosumers coined by (Toffler, 1980), describes lead users, that are not content to being passive on the market. Instead they get themselves involved in the production, utilising their knowledge and passion about the product or service to improve it for their own consumption (Flowers, 2008). The term prosumers rests upon the distinctions between producers and consumers, or lead users, have essentially disappeared because the improvements in IT enable prosumers to develop their own products and services, and freely sharing their innovations (Flowers, 2008; Von Hippel, 2005). The incorporation of users in the innovation process is due to the fact that firms more and more are starting to realise that the notion of the users being amateurs is nothing more than a pervasive myth. The reality turns out to be the opposite of the myth, where the prosumers are largely self-selected experts and professionals who seek opportunities to improve the products that they themselves use, to make some money, to express themselves, to build their portfolios for future employment or to just have some fun and be creative (Brabham, 2012). Some of these prosumers are motivated by their own impetus and performing idea generation and problem solving autonomously, while other prosumers can be motivated by organisations involvement (Piller & Walcher, 2006). Many of today's innovations originate from prosumers in many different user driven innovation domains (Piller & Walcher, 2006; Brabham, 2012).

2.3.1 Open innovation

In contrast to closed innovation where the firms only conduct internal research and development in the secret chambers of their compound, the open innovation emphasises on joint research and development together with external sources of innovators (Vanhaverbeke, Roijakkers, Lorenz & Chesbrough, 2016). More and more firms are opening up their innovation process to external innovators like prosumers as a source of innovation (Dahlander & Gann, 2010). This emerged behaviour of letting prosumers in to the innovation process has democratised the innovation process, by letting them be a part of it (Flowers, 2008). Open innovation has shown that firms need not only rely on innovations being sourced through existing hierarchies or market relationships, but can be acquired from individuals and firms that the organisationer had no prior relationship with (Feller et al. 2012). This means that open innovation treats research and development as an open system, where firms both can and should use both internal and external ideas in order to advance their technology. Open innovation also suggests that internal ideas for innovation can be taken to market through both internal and external channels, to generate value (Chesbrough, 2003). Open innovation can thus be described as conscious controlled inflows and outflows of knowledge with the goal to accelerate internal innovation and expand the markets for external use of innovation ideas (Chesbrough, 2006). The concept of open innovation rest upon the assumption that useful knowledge is widely distributed (Chesbrough, 2003; Flowers, 2008) and that no firm in today's digital competitive business landscape (Pessi et al. 2013; Burns; 2009) can innovate in isolation (Laursen & Salter, 2006), and must therefore leverage external knowledge sources as a core aspect for the innovation process (Chesbrough, 2006; Piller & Walcher, 2006; Feller et al. 2012; Brabham, 2012).

The main driver for the prosumers involvement is the increase of knowledge, and the access to information that the internet has made possible. Prosumers can now access information that was previously exclusive to firms, and with this information participate and exchange ideas and solutions (Piller & Walcher, 2006). There are different ways of

accessing innovative ideas and solution from external innovators. It can be done by revealing, selling or outlining their internal resources, or using external resources by buying, licensing or acquiring innovations, input and expertise (Dahlander & Gann, 2010). This can be achieved through creating innovation competitions and communities, or engaging in existing communities (Boudreau & Lakhani, 2009; von Hippel, 2007). But to participate in open innovation initiatives, the firms have to provide extrinsic motivation like monetary rewards and intrinsic motivation like intellectual challenges; as well as competence related to the area to understand and further develop the idea (Brusoni et al. 2001, Granstrand et al. 1997; Boudreau & Lakhani, 2009). One novel way to achieve this is through the use of toolkits for idea competitions (TIC), which is a good domain to handle the difficulties and uncertainties that firms are faced with today regarding innovation (Piller & Walcher, 2006). This toolkit for idea competition creates an arena where the prosumers innovations can evolve. It builds upon the nature of competition as a means to encourage users to participate and increase the quality of the submission. The concept can be applied on either the idea generation or the problem solving phase of the innovation process, and the prosumers with the highest evaluated submissions will receive an award such as acknowledgement or monetary reward in exchange for the right to exploit the idea and solution (Piller & Walcher, 2006).

Another way for organisation to open up their innovation process and thus democratise the process of idea generation and possibly the problem solving phase, and at the same time lowering the cost of doing business and spurring innovation is through crowdsourcing (Brabham, 2012). Due to the dispersed nature of knowledge and the difficulties associated with gaining the innovation capacity such as knowledge and innovation from external individuals and organisations which the firms have no prior relationship with, there is typically intermediaries present to help facilitate the crowdsourcing process (Feller et al. 2012). Crowdsourcing is basically the act of outsourcing a function performed by employees to a large and undefined open network of people. These intermediaries enable innovation capacity exchange between organisations and prosumers, and facilitates the acquisitions of intellectual properties (IP). Even though all contributions might not bear fruit, all contributors should get rewarded in order to ensure future involvement (Feller et al. 2012).

Another open innovation process, not facilitated by organisations or intermediaries are open source projects. This phenomena describes a fully-functional, horizontal, innovation network that consist of tens of thousands of prosumers contributing to large and small projects (von Hippel, 2007; Benkler, 2002). The incentives prosumers have for engaging in these projects are often intrinsic in the form of the possibility to build innovative products for their own use, to be creative, and challenge themselves. The prosumers can adopt, replicate and improve on any project, but the central organising principle is the outcome of these projects must always be free (von Hippel, 2007; Benkler, 2002; Munos, 2006). Open source are most common in the software development industry, but the concept can be applied perhaps in all industries, like drug research and development (Munos, 2006). One huge benefit of open source, and perhaps all open innovation initiatives, is that innovation spikes when diverse mindset frequently interact with each other in an unstructured informal manner. By combining innovation capacities from all around the world, and by making the innovation easily accessible, the speed of innovation is dramatically improved (Monus, 2006). But even though the benefits and the arguments for open innovation are great, there are downsides. It might be difficult for firms to protect their intellectual properties, and it might be difficult to capture value from the external innovators (Dahlander & Gann, 2010).

2.3.2 Shadow innovation

Shadow IT and innovation is a rather new, emerging and unexplored phenomena of user driven innovation (Silic & Black, 2014; Myers et al. 2016; Gyröry et al. 2012). Shadow innovation is a broad concept, but can be described as business units going rogue and finding ways to bypass the formal hardware, software or any other solutions sanctioned and monitored by the firm (Myers et al. 2016; Behrens 2009; Friedenberg 2011). Shadow innovation is usually obtained when employees internally develop or externally purchase information systems to use inside the organisational ecosystem, that work outside the companies approved channels and systems, and without the knowledge and oversight of the firm (Myers et al. 2016; Silic & Black, 2014; Stadtmueller 2013). Many cases of shadow innovations entail employees on their own impetus, finding, creating and adopting better solutions than the ones provided by the firm to handle the existing problems they face. The positive side of this phenomena is that shadow innovation often provides a better, more efficient way for the employees to conduct their work. Shadow innovation is said to increase both productivity and innovation (Myers et al. 2016; Silic et al, 2016; Harley et al. 2006; Behrens & Sedera 2004).

But practitioners has raised concerns and risks about the organisational security involved with shadow innovations. Shadow innovations can be seen as an insider threat where there is a strong non-compliance in employees behaviour towards information security policies (Strong & Volkoff, 2004; Warkentin & Wilson, 2009). Shadow innovations can also be seen as a security threat where the undermining of the official systems endanger organisational data and processes, loss of data integrity, and the risk of the data being stolen when stored or processed outside of the firms control (Myers et al. 2016; Silic et al, 2016; Oliver & Romm, 2002). There is also the risk that departments develop systems that are already in use in a different department, or that they buy another instance of the same systems creating duplicates, which is very cost inefficient (Myers et al. 2016; Oliver & Romm, 2002). This tend to pit the departments which are in charge of controlling and securing resources, against the employees which use shadow Innovations to fulfil their needs in order to conduct their business efficiently (Behrens & Sedera 2004; Myers et al. 2016). Shadow innovations tends to emerge at the existing gap between the users and the sanctioned solutions offered by the firm (Myers et al. 2016; Silic et al, 2016). This is usually the domain of business and IT alignment, which should reveal the organisational capabilities in order to fulfil the business needs with IT resources. IT should then be an enabling force and strive to achieve the business objectives in the most efficient way (Henderson & Venkatraman, 1993; Behrens, 2009). When this fails, when the alignment between business and IT fails, then it creates an ideal environment for shadow users to create and facilitate shadow innovations (Myers et al. 2016). Today the evidence suggest that shadow innovations makes up for around 30% of IT spending in organisations, and by 2020 this number is estimated to rise up to 90% (Silic et al. 2016; Pettey 2012; Hinchcliffe 2013).

2.3.3 Outlaw innovation

The increase of enthusiastic, intellectual and technically skilled prosumers has led to that fact that good ideas for innovation can be found in many places (Chesbrough, 2003; Flowers, 2008; Meyer, 2013). Sometimes just as ideas, and sometimes as fully developed innovations. It is often talked about the prosumers that act inside the framework of the law, but sometimes prosumers create innovative ideas that emerge from the somewhat illegal side of the law, coined outlaw innovations (Flowers, 2008). The illegal activities that springs outlaw innovations can arise from prosumers that make changes to a product's

functionality or distort the intentions of the original designers; exploit flaws in order to attack or evade security; create dubious legality services that competes with mainstream commercial firms; tinkering with biology or pharmaceutical drugs (Flowers, 2008; Meyer, 2013; Söderberg, 2016). Depending on the act these prosumers are called different things. A prosumer that changes hardware and software products by developing modifications are called Hackers. Hackers often reverse-engineer existing products or systems and thus violate manufacturers intellectual properties or copyright protection laws. The hackers often wants to alter the performance in order to improve it (Flowers, 2008; Söderberg, 2016). Prosumers that subvert computer security without authorisation by taking control of a remote computer through a network, or employ a trojan horse, are called Crackers. Crackers might do this to demonstrate their abilities, but more often they do it to engage in vandalism, fraud, theft and others forms of crimes (Flowers, 2008). These different kinds of prosumers that innovate on the unlawful side of the law, as well as the larger group that simply use these outlaw innovations are coined Outlaw User (Flowers, 2008; Söderberg, 2016), thus separating the prosumers from the outlaw users.

By definition, outlaw users will generate and use outlaw innovations in processes that actively oppose or ignore the limitations imposed on them by standards, products, systems or legal frameworks (Flowers, 2008). The presence of the technically skilled outlaw users present a challenge for firms that now are less able to exert control over how their users are to use their products or services. Since the outlaw users activities might violate laws and intellectual properties, and pose a direct threat to established suppliers, the outlaw innovations are often underground in nature and the outlaw users tend to operate anonymously. This often means that the outlaw users are unknown to the established suppliers and thus there is no free flow of information between the parties (Flowers, 2008). The outlaw innovations on the other hand, is often difficult not to recognise, and firms employ different tactics in response to the outlaw innovations in order to either resist och benefit from such innovations (Flowers, 2008; Mollick, 2005). The firms might: closely *monitor* the outlaw users activities; *adapt* or copy the innovations developed by the outlaw users; *influence* the directions of the efforts by enabling toolkits to move the outlaw innovations into a more structured environment; *absorb* both the outlaw innovation and outlaw users in order to obtain rare skills and technologies; and or *attack* by taking aggressive action against the outlaw users in the form of legislation (Flowers, 2008). Some of the innovations called outlaw innovations might not directly break any laws or intellectual properties, but exploit loopholes in these framework that technically makes them legal but are frowned upon by the makers of the frameworks. The confrontation with the law is what compels users to be innovative. Regardless of the innovations being file sharing protocols, biological tinkering or psychoactive drugs, the rate of innovation tend to be faster than legislators are able to keep up with (Söderberg, 2016; Flowers, 2008). Outlaw innovations tend to have a good and bad side, where some are a means to improve the experience for the users like file sharing protocols, product hacking and psychoactive drugs; and others might sabotage and be a national safety threat like cyber attacks and biological weapons. Some legislations are implemented to protect the content creators, and other to protect the users (Söderberg, 2016; Flowers, 2008; Meyer, 2013).

3. Theoretical framework

The four domains of innovation described above, one firm driven innovation and three user driven innovation, are used in the theoretical framework below. This framework was created by the authors of this thesis for the purpose of using it as a lens for the analysis of the empirical data as well for visualising the relationships between the innovation domains. Based on the theory two apparent dimensions were identified that describe these kinds of domains of innovations. The innovations domains are therefore categorised based on these two dimensions, each with two opposite attributes. The first dimension that is used to categorise the innovation initiatives is whether they are external or internal. The second dimension that is used to categorise the innovation initiatives is whether they are controlled or uncontrolled from the firms perspectives. These two dimensions with a total of four attributes are aligned in a x-axis and y-axis to describe four unique states of innovation that firms can engage themselves in. One might not exclude the other, firms can engage in several or all of these types of innovation domains. This framework serves as a guide to the categorisation of the data collected and the discussion in this paper. Many research articles focus on the contrast and relation between the internal and external innovations, but this study will mainly focus on what the authors are calling controlled and uncontrolled innovations. These innovation domains will also serve as the thematization throughout the sections of result and discussion.

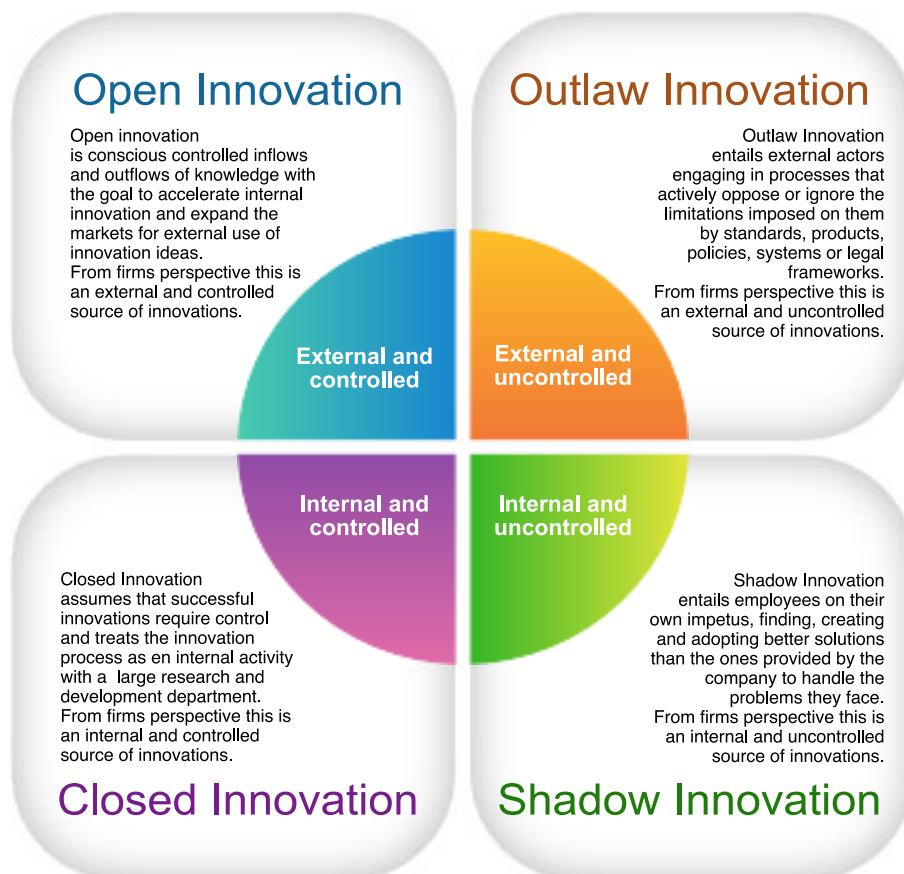


Figure 1: Framework of innovation domains.

4. Methodology

This section explains the steps taken in order to conduct this study when it comes to methods chosen for collecting data as well as analyzing the data. It also contains a critical reflection of the study.

4.1 Methods

This study was conducted as a qualitative explorative case study (Patel & Davidsson, 2011) around the innovation phenomena. The study is based on data from qualitative semi-structured interviews at four big Swedish companies active in different business sectors as well as secondary, web-based data collected from various sources regarding these companies.

Semi-structured interviews were chosen as the main method because Patel and Davidsson (2011) advocates it due to the incredible efficient combination of structure and flexibility that enables the authors to collect vast amounts of data while steering the course of the dialog and at the same time making room for the informant to speak freely.

Secondary data was also chosen as a complementary method of collecting data because phenomena like open and outlaw innovations can be difficult to observe first-hand. Situations like this is the reason why secondary data has become an important resource and frequently used in information systems research (Freeman & Jarvenpaa, 2000; Romano et al., 2003). Secondary data is a collection of data accumulated and published by others, not specially for the research question at hand (Cowton, 1998; Esaiasson et al, 2012). The positive aspects with secondary data comes from the low cost of gathering the data since it already exists; with the downside being that the researchers don't have control over the data generation (Cowton, 1998). The secondary data has been collected and analysed based on Romano et al (2003) three-step methodology for dealing with web-based qualitative data: Elicitation, Reduction, and Visualisation.

4.2 Data collection

The data presented in the theory chapter was extracted from various academic books, papers and journals on the topic of this paper. The empirical data was gathered from both qualitative semi-structured interviews as well as from secondary data sources.

The interviews were conducted at four big companies present in four different industries: car industry, food industry, furniture industry and pharmaceutical industry. The authors conducted about 3-6 interviews at each company, accompanied by data collected from secondary data sources. These companies are big and well established public limited companies, present on the global market. The informants from these companies have been carefully selected through criterias about their profession and experience. The informants were found and contacted through the social platform LinkedIn, where the authors searched for individuals with certain innovation manager titles in said companies. The authors of this study engaged in dialogues with the informants beforehand to prepare and motivate the informants to contribute to the study, which Patel and Davidsson (2011) says is important. The authors then proceeded to enquire their permission to record the interviews. This is according to Walsham (1995) an important step in order to ensure that the informants feel comfortable during the dialog and to ensure validity of the data. This also enables the authors to focus on the dialog instead of taking notes of the conversation (Patel & Davidsson, 2011; Walsham, 1995). The interviews lasted from 30min up to 1 hour, and was later transcribed in order to be used in the analysis for this study. The informants were chosen based on their professional title on their respective companies. The titles that this thesis focus upon were titles such as: Innovation enabler management, Innovation & Creative Manager, Innovation leader at Retail and expansion, Innovation & Creative

leader, Innovation Leader, Corporate IT Innovation Manager, Head of IT Strategy and Innovation, Innovation Project Manager, Corporate Innovation Office, Director Business Strategy & Innovation, Manager IT innovation, IT Innovation Manager, Innovation Hub Team Manager.

The first step in Romano et al (2003) three-step methodology, election step, for dealing with web-based qualitative data refers to the gathering of data. This study has gathered data from several various online sources such as newspaper articles related to the topic and the companies of this study. To locate this data a google search was made with keywords chosen from the theoretical framework: closed innovation, open innovation, shadow innovation, shadow IT, outlaw innovation, user driven innovation, prosumers, outlaw users, hackers. The top results where scanned and explored in order to identify user driven initiatives that companies had either rejected or welcomed.

The different type of sources, as well as the description and the amount, used in the study are visualised in the data table below:

Data source	Number of sources
Theoretical journals/books/papers/articles	53
Qualitative interviews	13
Quantitative secondary data	46
Total	113

4.3 Data analysis

The empirical data were analysed during the transcription as well as after and the outcome was categorised in order to gain a deeper understanding of the material. The transcribed material as well as the secondary data were also coded in order to map out into which four categories from the theoretical framework they belonged to by identifying criteria in the sources related to the categories. This was done by the facilitating method of color coding each innovation domain. The data were analysed one category and one company at the time. This kind of categorisation helps the researcher find common denominators and traits in the gathered data (Patel & Davidsson, 2001; Romano et al, 2003). This categorisation was also the structural foundation for the chapters result and discussion and it is based upon the theoretical framework.

It is important for the researcher to perform a qualitative review of the secondary data before using it for research purpose (Atkinson & Brandolini, 2001), in order to build up an understanding of the content and create a possibility to extract valuable insight from the data (Romano et al, 2003). The second step of Romano et al (2003) methodology for dealing with web-based qualitative data, refers to Reduction: is an important, interactive process of selecting, focusing, simplifying, and abstracting raw data into useful information. In this study the reduction process took place when the sources where iterative analysed and coded in order to map out into which of the four categories from the theoretical framework they belong to by identifying criteria in the sources related to the categories. This kind of categorisation helps the researcher find common denominators and traits in the gathered data (Patel & Davidsson, 2001; Romano et al, 2003). The third step of Romano et al (2003) three-step methodology for dealing with web-based qualitative

data, visualisation: involves visualising organised data assembled from the previous step in order to draw conclusions based on the data. In this study this visualisation was made through carefully selecting and writing words (Romano et al, 2003).

It is also important in every research study to relate theories and reality to each other, which is why this study conducted a deductive domain when analysing the data, meaning that the conclusions from the collected data was drawn based upon existing theories (Patel & Davidsson, 2001) presented in the theoretical framework.

4.4 Ethics

The authors of this study has chosen to anonymize at an individual level in order to protect the informants. This means that the informants have been mentioned as informants instead of by their names. And in order to further protect the informants identity, their professional titles can't be traced to the specific informants. Instead the professional titles of the informants has been documented together in the same paragraph, excluding the possibility to identify what title the specific informants possesses. The companies however, have not been anonymized and have therefore been mentioned by their name since we are using secondary data sources that can be directly linked to the companies. The companies names also provides more weight behind the thesis.

4.5 Critical reflection

This thesis rests upon the theoretical framework which consists of four innovation domains on a high level. Given a larger time scope, the authors could have dug deeper regarding these innovation domains and could possibly included a few more domains if such exists.

Regarding figure 2 in this thesis, the figure that represents the companies engagement in the different innovation domains, there is an important factor to be aware of. The scale upon which the authors placed the companies when it comes to how much they engage in different domains are based upon the relation between different domains as well as the relation between the companies in each individual domain. Another way of approaching this would have been to define criterias that would be needed to be met in order to reach a certain engagement level, but the authors did not chose to go that way when creating the radar chart due to the diffusely nature of putting criterias on engagement levels. The authors chose therefore to compare the relations between the innovation domains and the companies in order to define levels of engagement in the innovation domains.

5. Result

In this section we present the empirical data by the categorisation of the conceptual frameworks of the four innovation dimensions, with the subcategories of the four companies. The empirical data is presented in a mixture of text and quotation.

5.1 Closed innovation

5.1.1 Volvo Cars

Volvo Cars has brought the world many innovations throughout time, and is still regarded as one of Sweden's most innovative companies (Volvocars, N/A; Holm, 2016). They spend a lot of resources on their internal R&D, with the main focus being on their core business, making cars (Informant 2) and products related to the car such as creating a digital key that replaces the physical ones (Volvocars-a, 2016; Davies, 2016). They also spend funds on other things not directly related to cars, but still on areas they are interested in, such as safety. As an example they developed a spray that pedestrians and cyclists can spray on their clothes and bicycle so that the cars and the driver can spot them easier (Breakit, 2015).

When Volvo Cars talks about innovation they talk about incremental innovations and radical innovation. The responsibility of the incremental innovations belongs to each individual department according to Informant 1. This incremental development and research occurs continuously and is very tightly connected to the cars and safety. It's a very stable process that hasn't changed in many years (Informant 2). This incremental work is done on a strategic, tactical and operational level in order to ensure improvements and optimisations.

They also stress that it is hard to plan and make schedule for innovations, and that it is therefore important to have a thorough process in place where the employees have sufficient time to find areas for improvement. They have also started a new division focusing on the sorting, structuring and sharing of information, a step that they see as vital when it comes to providing a base for innovation. The sharing of information allows the parties to find gaps in knowledge and combine information to new ideas (Informant 3).

The responsibility of the radical innovation though belongs to a newly established department called innovation office, that lies outside of the traditional and incremental R&D. The idea of this department is to think outside the box and to drive innovations forward that would otherwise get lost, thrown away or never thought of (Informant 1).

"We are responsible for the radical forward thinking innovation of this company" -
Informant 1

They try to capture ideas from their employees that does not quite fit in the traditional innovation process and thus minimizing shadow innovation (Informant 2). They have a management team that helps them guide the different directions, and an innovation network that connects them to other parts of the traditional operations (Informant 1).

5.1.2 ICA Group

The important thing to remember about innovation is that it's impossible to put on a schedule. It cannot be made into a project. It needs to come from within with input from the outside. ICA often host different kinds of innovation seminars where different people with similar interests get together and share ideas. Sometimes it generates good ideas, and sometimes not. But it's a good way to get started (Informant 4).

"The more process you make of it, the less innovation you get as an outcome" - Informant 4

ICA stress that it is very important that the organisation is ready since there are two parts of innovation. On the one hand they are faced with innovations that they believe that no one will ever order or ask for and as such they need to take responsibility for the initiative themselves. They are also faced with those innovations that are prematurely, that the market or the organisation is not ready for yet. They realise that these might be valuable to pick up at a later point (Informant 5).

"Innovation is like driving when the road is slippery, there is no point in going full throttle, and at the same time there is no point in hitting the breaks with full force either" - Informant 5

ICA focuses its innovation capacities not only on food but on areas such as technology, marketing, transport, and banking. The company has developed a mobile application for the customers to facilitate with their grocery shopping. The customers can with the app create grocery lists, see recipes, find specific products in the warehouses. They are also launching the service to scan the products with the app, thus eliminating the need for scanning devices. (ICA Group-a, N/A)

They are also innovative in the way they market themselves. A few years ago they launched a series of commercial films that went viral. They continued creating these kinds of commercial films, and these are still popular among the viewers. ICA is also trying to innovate in the area of propellant, trying to find ways to minimize fossil emission. (ICA Group-b, N/A; ICA Group-c, N/A)

As many other companies tries to do, ICA is also trying to innovate in order to minimize expenses. One way the company found was to create their own bank. This enabled them to lower the costs for both the franchises, the customers and for themselves. From this their loyalty system arose which made it possible for them to target specific deals to their customers, deals that fits their needs (ICA Group-d, N/A).

"We saw a close link between private finances and purchasing groceries" - ICA Group-d, N/A

5.1.3 IKEA

IKEA aim to create well- designed and functional furniture to every part of the home, to low prices so many people can afford them. The product development process begins at understanding the needs of the people with limited income and living space, creating products with focus on design, price, functionality, environment and health. To test their ideas and prototypes the company builds model apartments where they invite locals families to live in and document their experiences (IKEA-a, N/A; IKEA-b, N/A; Melendez,

N/A). The company is considered as Sweden's second most innovative company according to a large sum of Sweden's top management in different industries (Holm, 2016).

IKEA has a long tradition of innovative work when it comes to products and delivery. They have incorporated a work process where they look at alternative solutions and new ways of assembling furniture. They also have a new group of experts that actively work with seeking out new solutions that can be applied in the company. They look at new strategic areas of innovation such as VR since it is considered to be an important area in the future (Informant 7). This group experiment and brings these areas forward without any hierarchical control or enforcement (Informant 8, Informant 9).

“This new group of experts has the ability to spend money on areas without clear directives” - Informant 7

IKEA consider themselves as a furniture retailer but also a low-tech firm. In this aspect they are already using technological tools such as augmented reality in order to visualise how furniture will fit in different rooms. This is one function they have incorporated into their app (Truong, 2013). They are also active in incorporating technology into the furniture and the whole aspect of a “smart home”. They have developed LED-light bulbs which is and can be incorporated into the furniture they sell and controlled via your smartphone or triggered by their motion sensor (Ricker, 2017). They have also developed wireless charging stations within their products which make it possible for customers to buy a lamp or a table that you can then put down your smartphone upon in order to charge its battery (IKEA-c, N/A).

“So, imagine what could happen to the worldwide ubiquity of smart home technologies if lighting is just the tip of Ikea’s ambition” - Ricker, 2017

5.1.4 AstraZeneca

AstraZeneca has a strong focus on their core business which entails creating pharmaceuticals that cure and relieve symptoms of their customers. They spend an enormous amount of resources to create their products. AstraZeneca have merged their R&D-site and their production department which have meant that certain demands such as speed and future planning in relation to the development process has been put upon them. They also work closer together with the production department when it comes to commercialisation and technology drives which forces them to think more about the life cycle of the products, how the design is developed, and what possibilities for innovation that might arise (Informant 12).

“We are very good at our core business, and we spend a lot of money to achieve our goals” - Informant 12

Rather recent, AstraZeneca created a new department with a focus on innovation processes. It works outside of the ordinary R&D department in order to avoid conflicts about the timeframes and the resources within the department. It also obtains different processes than the traditional R&D department because it sets out to be more flexible and agile. The projects they work on in this department are more diffuse, and might not have a straight forward direction. The employees in this department tries to think more outside the

box. They think about new emerging technologies, new ideas about the future, projects that will be interesting and create value in 10-20 years from now (Informant 10).

“We have recently established a new innovation process department that works outside the core business” - Informant 10

At this department they dare to be crazy and to think crazy. The employees are encouraged to think out of the box, and the ideas usually starts crazy. But when they later try to ground the ideas to reality they usually find possibilities and real world solutions from these crazy ideas. Another good thing about this new agile innovation process department is that they also have the ability to easily shut projects down. If they recognise that a project doesn't bear fruit, they won't hesitate to shut it down. The traditional R&D department is more hesitant to shut a project down due to the fact that they have been financed and has thus more prestige about the project (Informant 12).

“For us working with innovation the criterias surrounding ideas are a bit more blurry.” - Informant 11

A big challenge for the company is how to balance creativity and efficiency, how to boost creativity while at the same time show the management that they are efficient with their budgets. One dilemma is how they can offer products that are efficient and at the same time enables them to be creative and possibly diversify their product portfolio and offer tailored solutions for their customers. The outcome often is that they develop something that fits everyone but at the same time does not fit anybody perfectly (Informant 10).

5.2 Open innovation

5.2.1 Volvo Cars

Since a few years back, Volvo Cars is engaging themselves in more and more open innovation initiatives, although still not as much as they would like to (Informant 1; Informant 3). The company has a long habit of collaborating with students in both large and small scales. These collaborations have been for both for ideas and for development, but mostly for ideas and inspirations that the company can use for their own development. One example of this is autonomous driving and services around this phenomena. (Informant 1; Informant 2). Volvo Cars also collaborates with different companies to achieve a higher level of innovation. Right now they have several collaborations active in several countries, among these one is with a taxi service within the sharing economy, where they collaborate to develop and test self-driving cars, other collaborations are with London taxi, Autoliv and Polestar (Informant 1; Informant 3; *Volvocars-b, 2016*). These collaborations usually start with the realization that they can achieve better and faster innovation when working together, sharing both the cost and risk but also the innovation (Informant 3).

“We don't do as much as much open innovation as we would like.” - Informant 1

Earlier this year Volvo Cars engaged in an open discussion where people meet to discuss problems that companies are struggling with regards to transportation. They found it to be a great way to spread ideas and find solutions to their immediate and future problems (Ideon, 2017). Volvo Cars is also engaging in open innovation challenges such as idea competitions aimed for everyone to contribute to ideas in the specific area. They started

with this a few years ago and has had competitions aimed at connected services, design and active safety to name a few. The people with the best ideas according to Volvo Cars gets monetary rewards for their contribution (Informant 2; Lindholmsscincepark, N/A).

New for this year is that Volvo Cars has created a hackathon in Switzerland with developers from around the world. The goal is to develop services useful in the car context using open API:s with a focus on sustainability (Informant 2).

5.2.2 ICA Group

ICA is eager and willing to engage in collaborations. This task is largely performed by the marketing team. They believe that sharing information can only benefit them, and that this society demands more and more collaborations and teamwork. ICA thinks they have come a long way in this area, but that they want to be even better (Informant 4; Informant 6).

“Our challenge is to be more brave, to be more open to collaborations in this digital ecosystem that we exist within, according to the organisations CEO Anders Svensson.” - Guerrero, 2016

The collaborations they engage in are both with students and with companies. They consider these kind of collaborations as a win-win where all parties benefit from the collaborations. ICA often collaborate with smaller more agile companies in the setting of workshops and discussions during some weekends. The output from this can then be used to formulate and further develop ideas (Informant 4; Informant 5). For example, ICA has created a collaboration with a startup called Karma which aim to reduce food waste (Sting, 2017). Another example is the collaboration with Polarbröd who sets out to switch to a more environment friendly plastic (Casserlöv, 2015). They have also begun a collaboration with the start-up Glue and the logistics firm PostNord in order to deliver food straight into peoples fridges (PostNord, 2016).

5.2.3 IKEA

IKEA has had a lot of experience with open innovation initiatives over the years. Some of these initiatives have been on a broader scale where the firm has made sure that they have had the ability to execute ideas in a good manner. They have also tried a total open innovation approach but found that their organisation was a little too complex for it to work out well enough. These initiatives have led mostly to ideas regarding products which has meant that they have been forced to incorporate a framework with directives and directions regarding the areas of innovation they are seeking (Informant 8, Informant 9).

“We got 95% product ideas.” - Informant 8

The company is also a huge attraction when it comes to drawing brilliant minds to participate in their open innovation initiatives (Axelsson, 2016). They even produce open innovation initiatives for children, an annual competition where children are able to submit drawings of stuffed animals and the best one gets its drawing made into an actual product sold in their stores (Ikea, 2017; Ikea, 2016). For the grown-up customer base they produce bag competitions where one winner is selected and where some of the voters win the limited edition designed bag (Ikea-d, N/A).

They also make use of collaborations with experts, small and agile firms, as well as certain innovation companies, in order to explore potential ideas together for areas of problems for both product development and for business development (Informant 7).

A few years ago IKEA started up a collaboration with another company to create an innovation hub in Copenhagen (Ikea, 2015). This innovation hub was created to explore and test new ideas for the future that enable improved, meaningful and sustainable life for many people (Le Pluart, 2016). To achieve this, the innovation hub is inviting people from around the world with knowledge in art, design and technology (Tucker, 2015). In this innovation hub they research projects that will result in a range of prototypes, and they arrange workshops, brainstorming, events, seminars and challenges (Rhodes, 2015; Tucker, 2015). It is in this innovation hub that IKEA expect to find it's next big idea. For example some students came up with a table that harness the waste heat from your morning coffee with thermoelectric pads, and then convert it to electricity that charges your phone. Some other individuals came up with an idea of a window that opens and closes itself depending on the outside pollutants (Le Pluart, 2016; Ikea, 2015; Rhodes, 2015)

5.2.4 AstraZeneca

AstraZeneca believes that scientific innovation and collaboration goes hand in hand. They have fantastic scientists doing groundbreaking research in their own laboratories, but they are well aware that in order to deliver the next generation of life changing medicine, they must find ways to combine their own research with the great knowledge and science happening elsewhere. To do this they have turned to open innovation, to work closely with academic and industry researches to explore and discover new ideas and compounds (AstraZeneca-a, N/A).

AstraZeneca has launched a open innovation site with six different collaboration opportunities. On this site they say that they currently have 200 clinical projects in progress, 250000 compounds available for free in their library, and have had 14 challenges awarded. These challenges have had different areas that the company has experienced problems when trying to solve, where the company has awarded the winning contribution with a large sum of monetary reward for its solution (AstraZeneca-b, N/A). They reach out to different communities with expertise that can contribute to these questions and challenges they pose. Sometimes they are looking for an idea, other times a solution with proof of concept, or some experimental work proving a theory (Informant 10). These kinds of approaches requires a large sum of money to hand out, but it's not much in relation to how much it would cost the company to come up with these solutions by themselves. On the other hand some in the company possess some kind of prestige, wanting to be the one coming up with the solution. But many at the company realise that they sometimes need to swallow their pride and collaborate and accept help from other great minds outside the company (Informant 13; Kirsner, 2016).

“Somewhere you have to realise that it is better to turn to the public and all the knowledge that is out there. I see a big potential in this and I think this will increase even more in the future.” - Informant 13

Collaboration with other companies is also something that AstraZeneca views as beneficial to not only their own development but for all parties involved. They are open and flexible to the possibility of joint ventures at the big market in different industries, and the way they approach patients needs and how they create attractive solutions (Informant 10). Since

AstraZeneca is large it is also slow moving, requiring new processes and resources to turn even the smallest business opportunity into a reality. That's why the company is turning to small and agile companies to get help with this, since they can achieve these things much faster and adapt to changes faster (Informant 11).

"There is a picture with an elephant and small mice that are jumping around and on the elephant, an illustration that smaller companies are more flexible" - Informant 11

These collaborations might involve small startups, but also larger but agile companies, universities, consortiums, or other actors on the market. They are also aiming to collaborate and work closely with universities in order to attract newly graduated students with new knowledge and a new way of thinking (Informant 12).

In addition to this, AstraZeneca has also created a rather unique approach to open innovation. They have created an open innovation ecosystem they call BioVentureHub that sets out to further strengthen competitiveness and dynamism in the life science industry. It is located in AstraZeneca's facilities in Gothenburg and gives emerging biotech and medtech companies a broad and unique opportunity to share office space and tap into the power and knowledge of the scientist of AstraZeneca as well as their state of the art lab facilities and infrastructure. To date there is 18 companies working together in this open innovation ecosystem (AstraZeneca, 2016; Hedlund, 2016).

5.3 Shadow innovation

5.3.1 Volvo Cars

Shadow innovation revolves a lot around individuals brave enough to innovate in the shadows, despite the risk of losing their positions at the company. The company encourages their employees to take risks, be brave and take initiatives, but don't mention innovating on their own discretion (Informant 2). Despite this, the managers try to give their employees freedom to express their ideas and find new ways to improve the processes. This is usually not sanctioned by the board, but many managers think that it is important to create an innovative culture in the company. But all innovations might not be doing the company a favor even if the intention was good. That's why it is important to have an accepting culture that does not punish the workers for trying to improve, and to allow them to think new and to talk about their ideas and maybe get help before trying to realize them (Informant 3).

There are some examples of shadow innovation projects within the company, some that has become real successes on top of that. One of these projects aimed to lower the fuel consumption by a significant margin. Cars were modified to become very fuel efficient, specific rims and chassis were put on in order to fulfill this goal. This project ultimately led to a new type of car which saved the company during a time of crisis all across the car industry. This project was in the beginning turned down but some individuals kept going and as it panned out saved the company (Informant 2).

The company realise it needs to be careful in handling these kinds of shadow innovations. If they shut them all down, the employees might feel the need to leave the company for one of its competitors and give them their innovations (Informant 3). One thing the management can do to support innovation and new ways of thinking amongst the employees is to allow access to information. By realising that information doesn't belong to

specific individuals or departments, but to the company as a whole, the company can open up the information allowing everyone at the company to access it. This creates possibilities for the employees to explore and find new ideas and to innovate (Informant 2, Informant 3).

“I believe that having information open to all is an important driving force for innovation.” - Informant 3

Volvo Cars has created this new department called innovation office, a department that lies outside the traditional R&D and tries to drive innovations forward that would otherwise get lost. In short, the department's goal is to capture ideas from their employees that doesn't quite fit in the traditional innovation process and thus minimizing shadow innovation in the sense that they help and boost the individuals and the innovations (Informant 1, Informant 2). They are tasked with projects that lies outside the regular frame, a sort of half sized grey area where people that run shadow innovation initiatives can get help, backing and coaching (Informant 1). When the department finds an idea to develop or to help develop other employees ideas, they will keep the innovation and the process secret from the remaining company, working in the shadows. Only when the idea is more developed and they have a tangible innovation to show will the department step forward and showcase the innovation and the value to the rest of the company. This is possible due to the fact that this new department has a unique deal where they can find and support whichever project they choose to without asking or informing the management (Informant 2).

Outside of this Volvo Cars realises that there are probably some shadow projects that they don't know of yet and some that they never will know about. But they believe that there are less of these shadow projects today than there were 20 years ago, some thanks to their new department (Informant 1).

5.3.2 ICA Group

ICA focus on creating a culture that promotes innovations and new ways of thinking, and at the same time allows for mistakes and crazy ideas. By having this culture, the employees can act like an auditory for themselves, controlling and deciding which ideas are feasible and which they should ignore (Informant 4, Informant 6). This innovative friendly culture enables the employees to create things outside of the formal processes, creating things that no one has ordered and expressively said they want or need, but will want to have when they see what value it brings (Informant 4).

“It's all about the culture, creating an environment that encourages innovation and accepts failures.” - Informant 6

The company has launched a program that aims to gather ideas from primarily the logistics employees in the company. Since they are experts in their area they know much better than anyone else what parts needs polishing and fixing. Once every month they select one idea that they find is the best one and reward the source. This program started out quite slow but has grown to now convert a lot of ideas every month. A substantial part of these ideas are also implemented into the company which has led to the making of a management system to cope with this process. This process includes delegating the implementation of new ideas to different teams within the company. They are also given the freedom to chose how far to take the idea. They also stress the importance of

feedback, to tell the employees that their ideas are good or why they might not fit at this time (Informant 5).

5.3.3 IKEA

IKEA has and is actively creating an innovate friendly culture with innovative employees. Innovation is encouraged across the whole company and some departments has specific processes that enables the employees to spend extra time exploring possible areas for improvement (Informant 9). The company tries to hire people they see thinks outside the box, thus bringing more innovative ideas into the company and its culture. This is specially noticeable in the product development departments (Informant 7). The managers estimates that many of their innovations have it's roots in shadow innovation (Informant 8).

The company recently created a new group of experts that actively work with seeking out new solutions that can be applied in the company. The group focuses on new strategic areas of innovation that could be considered to be important for the future (Informant 7). This group experiments and brings these areas forward without any hierarchical control or enforcement. They also have the ability to spend money on areas without any clear directives or areas. The group works according to the terms ideation and incubation where the ideation is described as where they gather the ideas on a grander scale, connect them and look deeply into them. Incubation is when they validate the hypothesis surrounding the ideas and check out if they are sustainable and if so they are pushed into production and getting ready for implementation (Informant 8, Informant 9).

5.3.4 AstraZeneca

Innovation is also a question about culture. How the employees treat the people in their surroundings can boost the innovation. If they share their knowledge and information to others inside the company, then the company as a whole can become more creative, more experienced and more brave to challenge and to take risks. This is essentially empowerment of the people. The employees can take on a project on their own behalf, but also know that they can reach out to their boss if they need help or support. And if a problem arises, it's important that the boss doesn't blame the employees, mistakes happens. It's more important to make the employees feel comfortable to take risks and innovate (Informant 13).

Managers have found that when their employees have less work to do or when they are between two projects waiting for orders, they innovate. The employees are never really restless. If they aren't working on a project from the managers, they will create their own project to work on, potentially adding value to the company. Innovation happens when time is not scarce (Informant 11).

"If you use time to smother initiatives, then nothing will be accomplished." - Informant 11

Not long ago AstraZeneca created a new department with a focus on innovation processes that works outside of the ordinary R&D department. At this department, they employees are allowed and encouraged to think crazy and outside the box, and these crazy diffuse ideas usually ends up in some great innovations grounded to reality that solves real world problems. But this new agile innovation office is not afraid to shut down projects that they deem bad or too expensive even though they have already invested in them. The traditional R&D department on the other hand, are more hesitant to shut project down due

to the fact that they have been financed, and many people are involved and has thus more prestige about the project. The innovation office operates outside of the company's traditional frameworks, often in the shadows, at least until they have something that they deem worthy to showcase to the rest of the company (Informant 12).

“Our innovation office is flexible and agile, is open for possibilities, kills of the craziness.” - Informant 10

Since the innovation processes in the new innovation office differ from ordinary project and innovation processes, the company has lifted out the innovation office from the core business. This means that it does no longer fight for the same resources. This innovation office is also more flexible since they can never be completely sure in what direction an innovation might go. This office also allows employees to submit ideas through systems and formulas in addition to verbal expressions of ideas that might occur (Informant 10). They also try to handle ideas that are out of scope for projects and the company at this point in time, these they sort and try to find possibilities with. They work agile and iterative in the evaluation process, and they encourage the agile and iterative approach in order to loop back and create new understandings of what an idea might be used for. In the classic approach towards projects they might have killed it if it did not reach certain criterias but in this innovation process they don't, they try to tweak or apply it to another area or product instead (Informant 11). This innovation office also focuses on collecting ideas from the company's employees. These ideas might be of interest for certain projects and if so they are forced through and quickly handled when it comes to IP and other demands. There are also those ideas that are more out of scope and these are gathered and sorted in a way that should the opportunity present itself they can be brought to light. In a more classic style of project work they might have put an idea to sleep if it did not turn out to be something the first time around, but at this innovation department they tend to loop back and tweak and try again (Informant 11).

5.4 Outlaw innovation

5.4.1 Volvo Cars

Volvo Cars is rather restrictive regarding the involvement of illegal activities, they don't want to damage their brand (Informant 1; Informant 3). They are aware that some of their customers are modding the cars they buy in order to make it faster, but they have no interest in stopping these activities or to adopt their innovations into the cars. Although they have created a separate company that offer services that will mod their customers cars, in order to get some more control over the process and outcome (Informant 2; Informant 1).

“There is no security being done at all when a car is being built. Zero.” - Szoldra, 2016

Another outlaw activity the company has observed that some of their customers and other actors sometimes do is hacking. Some people see hacking as a challenge, as fun and as rewarding, and involves unlocking, stopping, starting the cars (Informant 2). The cars today come outfitted with navigations, android auto, apple carplay and other high tech technologies, but the underlying technology is old and low tech, without any security measures in mind (Szoldra, 2016). This allows the hackers to take complete control and do whatever they want (Vanian, 2016; Szoldra, 2016). These outlaw innovations can have devastating outcomes for people both in the cars and for people in the surrounding

(Informant 2; Szoldra, 2016). Volvo Cars has done no known attempts to gather knowledge about these hacks or the hackers in order to prevent them. Although they have closed their API:s, making it at least a bit harder for the hackers to access the cars controls (Informant 2). Cyber security CEO thinks hacking will continue to be a problem, and that it will unfortunately take something catastrophically before the major car companies will take this threat seriously (Szoldra, 2016).

5.4.2 ICA Group

ICA stresses that they are very careful with their brand which means that they do not engage in activities or look into things that are unethical or illegal. They claim to be top three in Sweden on brands and they do not want anything to affect this negatively (Informant 4).

They do however acknowledge that customers and other actors have used their products and services in unusual ways which has affected their view upon these products and services, however they could not provide any direct examples of this (Informant 5; Informant 6).

5.4.3 IKEA

IKEA has observed that hacking communities has emerged around their products. Their customers are finding innovative ways to hack the furniture they buy, combining them in unique ways and even creating new ones (Informant 7; Pinterest, N/A; Foy, 2015). Other outlaw activities they have observed is that they have customers in countries where they have no warehouse. People on their own behalf are importing furnitures and selling them (Informant 8). IKEA has realised that they have three choices in handling these activities, they can attack it, adopt it or let it be. The best choice according to them is to let it be, and maybe adopt good ideas or collaborate with the innovative users (Informant 7). The online communities and websites around hacking the furniture are many, with a lot of innovative ideas (Zambelli, 2016; Dahlgren, 2015; Ikehackers, 2017).

“Either you attack it, adopt it, or let it be.” - Informant 9

As a response to these communities, IKEA is planning to release its own open source hacking platform. This smart product development platform is their way of being a part of the hacking community and increase their involvement and absorptions of innovations (Informant 8). The first product of this platform is set to be released next year, consisting of a rather modular sofa that is easy to customize, change and add stuff onto (Vincent, 2017; Thodes, 2017). Products from this open hacking platform is targeting these hacking communities, creating an official platform for them to hack (Debczak, 2017; Lee, 2017).

There are some areas in which IKEA wants to adopt innovation that is happening outside of their reach. Innovations that are made in regard to their products. There are innovations that surrounds services and processes that are set up in relation to their products but also business models that are being made that has to do with their products. These innovations are things like spare parts, actors that buy their furniture and then strip them down and sell parts, home delivery services among other things. These they want to capture and incorporate in some ways so that they can draw value from this (Informant 9).

5.4.4 AstraZeneca

Today AstraZeneca is very restrictive when it comes to outlaw innovation, they have a lot of ethical policies that are in the way of these kinds of interactions. They do however see this area as a potential for the future, one which they hope they can open their eyes towards more and more, but at this point in time their views are not entirely in sync with this kind of innovation domain (Informant 12). Despite of this they are looking into different ways of working which includes finding smarter ways of going through all regulations and demands that the pharmaceutical industry is surrounded by. They check the landscaping and what trends that circulate around the world, they dare and they move a little bit more freely. They try to build understanding, reading between the lines in order to see potential instead of just debriefing things that occur as a side effect or a behaviour (Informant 10).

*“I think there are a lot of possibilities. It has a lot to do with shifting perspectives.” -
Informant 10*

As mentioned they see the potential in this area and that they can use it to understand people's perspectives and through that help them better. They see that it is possible to turn things around and use different sources potential, as has been done with hackers, but at the same time it is important to maintain the ethical paradigm (Informant 13).

6. Discussion

The discussion of the theoretical and empirical data are presented in the categorisation of the innovation domains in the theoretical framework.

6.1 Closed innovation

All companies have an internal research and development department as their primary source of innovation (Utterback, 1974; Piller & Walcher, 2006), innovations that are driven and stimulated by new user needs and market opportunities (Utterback & Abernathy, 1975). Two companies that has been recognised as having an exceptional R&D department are Volvo Cars and IKEA (Holm, 2016). Volvo Cars has a great track record regarding providing the world with new innovations, and are still investing a lot of resources to innovate in different areas around the car, safety and technologies for the car (Volvocars, N/A; Informant 2; Davies, 2016). IKEA also has a long tradition of of innovative work for product development with focus on design, price and functionality. The company spends a lot of resources exploring and refining their understanding of their users needs. They even go so far as to create model homes where they invite people to live and to document their experiences, in order to understand them better (Informant 8; IKEA-a, N/A; IKEA-b, N/A; Melendez, N/A). ICA is also a prominent actor when it comes to R&D, their entire closed innovation is limited to their R&D (Informant 4), but they have not been recognised in the same sense as Volvo Cars and IKEA have. At first sight Volvo Cars and IKEA might not seem to similar. Volvo Cars creates cars, and IKEA creates furniture. But both companies consider themselves as low-tech firms, focusing a great deal on creating and incorporating technologies for and into their products. A combination of market push and pull has lead the companies into the area of technologies, forcing them to combine technologies into their core business, the products they create. Volvo Cars creates internal technologies for the cars, as well as hardware and software for autonomous driving (Informant 1; Informant 3). IKEA creates and incorporates technologies into their furniture like tables that charge your phone and lights you control with your phone, as well as VR for showcasing homes (Ricker, 2017; Informant 7). ICA has also been focusing more and more on the technology aspect with regards to their app and the possibility to shop and scan with it (Informant 5; ICA Group-a, N/A). But the difference is that they don't consider themselves as a low-tech firm. They do however focus on a broader range of markets and one in particular set them apart from the others, that is the banking - an innovation made to cut costs for all involved actors (ICA Group-d, N/A).

These factors have played important roles in bringing high success rates for the company's innovations and for Volvo Cars and IKEA being recognised as two of the most innovative companies. High success rates of innovations is generally a fairly rare occurrence despite a lot of allocated resources towards defining user needs (Piller & Walcher, 2006). This shows that allocating resources towards something does not mean that it is going to succeed, it might just as well fail, which seems to be the case a lot of times. But Volvo Cars and IKEA have proven time and time again that their R&D are capable of utilizing their resources in a result bringing way. But the fact that not all investments and innovation succeed has not escaped AstraZeneca. They have robust internal R&D that is considered their main source of innovation (Informant 12, Piller & Walcher, 2006) where they spend enormous amount of resources on many projects in their core business, trying to come up with new and exciting products and new value (Informant 12). Far from all their projects succeed, but some do. This mindset of knowing for whom you are creating value is important and enriching, rather than just delivering something just because you have to. Many companies gather information about their customers by

market research and assumptions about their preferences (Piller & Walcher, 2006). Sometimes this is enough, but more often than not you really have to get to know your customer whomever it may be, to familiarize yourself in their world in order to create something truly value adding to them. And then you will also have the ability to know what isn't value adding, and can thus remove it. Many people are stuck thinking in the technology driven perspective where the push of technology drives the creation of the products, instead of letting the market pull and say what they need. The balance between those two perspectives is one AstraZeneca tries hard to achieve (Informant 11). For Volvo Cars, IKEA and ICA, this combination of push and pull translated into the incorporation of technology into their core business and products, but for AstraZeneca this simply translate into creating new medicines and delivery methods the medicines to their customers, in order to ensure that the medicine gets used and helps people.

Three of the companies have realised that their R&D isn't always suited for all kinds of innovations. Some more radical innovations require a more loose and flexible approach with a more open mindset and longer time perspective. The fact that digitalisation and more knowledgeable people also made firms lose some control and not benefiting from their investments in internal research as before made it even more obvious that something had to be done (Chesbrough, 2003). Volvo Cars has for this purpose created what they call an Innovation office which does just this (Informant 1, Informant 2). The fact that this innovation office operates outside the traditional R&D creates opportunities for the company to explore more innovations and future solutions without it interfering and competing with the traditional R&D and its resources. This seems to be a growing realisation among companies. IKEA has also begun thinking in these terms and has started creating a similar innovation office but in a smaller scale (Informant 8, Informant 9). AstraZeneca has also recently created an innovation office for the purpose of boosting innovation (Informant 10; Informant 12). These innovation offices are unique from other departments and R&D:s since these innovation offices operates without hierarchical control and enforcements, and without any restrictions and directives on what they should invest in. This allows the companies to allocate resources into innovations that otherwise would have been discarded in the traditional R&D due to the area or timescope. The innovation offices focuses on out of the box innovations, radical innovations, that we might not know we want or need yet. This is the companies way of trying to stay in the leading edge of innovations. This makes these innovation offices an enormous potential asset which can bring them to new markets and new financial levels. At the same time the innovation offices also bring with them a very high level of financial uncertainty due to the fact that they can drain a lot of the company resources if their investments should not pan out. It is the definition of a high risk high reward concept. An important factor if they want to remain one of the most innovative companies with a high market share.

Volvo Cars is greatly engaged in closed innovation where they really exploit all possibilities and reach the full potential that this innovation domain has to offer. They have a robust R&D department that has been recognised and praised by other CEO:s, and have a well established innovation office that covers the parts where the traditional R&D can't excel. IKEA is also greatly engaged in closed innovation. They work to reach the full potential of this innovation domain and has also been recognised and praised for their R&D. They have also established an innovation office to cover the parts where the R&D can't excel, although they could expand and work on this area a little more. AstraZeneca hasn't been noticed and praised for their R&D, but they are still greatly engaged in closed innovation. They aren't afraid to invest in projects with high risk and uncertainty, and they have also a well established innovation office to support their R&D in order to cover the incremental, radical and transformational innovation. ICA isn't as engaged as the others, mainly since

they lack an innovation office and thus cannot support their R&D with more radical and transformational innovations. This might be because they are unaware that this approach is available, the other companies recently started with this approach. They might not have the funds for it, or they might not think they are in need of an innovation office in the same sense as the others.

6.2 Open innovation

According to researchers like Flowers (2008) and Piller & Walcher (2006), firms today are gaining an awareness that highly skilled individuals, good ideas, technologies and applications might exist both inside and outside the borders of their firm. As a response, firms are opening up their innovation process to external sources in order to gain a wider synthesis of diverse ideas and products better fitted to the users needs (Piller & Walcher, 2006; Chesbrough, 2003). This is true also for the companies studied in this study. All companies have a habit of tapping into knowledge outside of their company by collaborating with students, other companies and their knowledgeable workers (Informant 1; Informant 4; Informant 8; Informant 12). The companies seem to enjoy collaborating with students due to several factors. One immediate factor that comes to mind is that the collaboration doesn't cost the company anything. But the most beneficial factor seems to be that the students tend to bring forward new ways of thinking and ideas that the company themselves wouldn't have thought of. It appears that companies in general treasure these young minds and their fresh input greatly. The chance of them actually delivering a finished solution is low, but companies do get ideas that they can build upon and develop further. Regarding collaborations with other companies they tend to collaborate with smaller companies in order to benefit from their agility and flexibility, but also their fresh mindset. The companies seem to have been characterized by prestige and pride in their own abilities to innovate. But since a few years back they have begun swallowing their pride, accepting that there are more knowledgeable people -also known as prosumers (Dahlander & Gann, 2010)- and ideas outside of the company, than inside, and that will be of great value for the company to tap into that potential. This is something that Chesbrough (2003) and Piller & Walcher (2006) says is required in order to sustain the high level of innovation and to satisfy the market.

Internet can be seen as the main enabler for exchange between prosumers and companies due to the accessibility it brings. Previously, companies had kept a lot of information isolated for themselves but with the introduction of the internet and information only a few clicks away this is no longer the case in the same sense as before (Piller & Walcher, 2006). Open innovation initiatives allow companies not only to rely on innovations being sourced through existing hierarchies and relationships, but also to be acquired from individuals and other firms that the company has no prior relationship with (Feller et al. 2012). Most of the companies in this study, all except the ICA, have begun using challenges that external sources such as people and firms can engage in. These challenges generate a lot of ideas to the host of the challenges, in return of prize money for the winner of the challenge (Informant 2; Informant 10). The prize money as well as the challenge itself are important in order to motivate prosumers participation (Brusoni et al. 2001, Granstrand et al. 1997; Boudreau & Lakhani, 2009). Even though the companies hosting the challenges will lose large sums of money to the winner in order to attract a lot of prosumers to compete in the challenge, the companies will still benefit from this. They benefit both in terms of smaller sums of monetary expenses, as well as a fresh mindset just like the student collaborations, more innovative ideas and less time spent to come up with such ideas. Volvo Cars has also made another approach besides challenges this year, they are the only one that has created a straight out hackathon in order not only to

bring forth ideas from the participants, but also solutions in the form of software codes (Informant 2). All companies in this study that engage in open innovation initiatives have seen success from it. AstraZeneca has therefore realised its worth and continued with these open innovation challenges (Informant 10; Kirsner, 2016). To this day they have conducted 14 of these challenges (AstraZeneca-b, N/A). IKEA says they have had huge success in attracting brilliant minds to their open competitions (Axelsson, 2016), both for adults and for children (Ikea, 2017). Volvo Cars has seen ideas and solution in design, safety and software solutions in autonomous driving from these open innovation initiatives (Informant 2; Lindholmencincepark, N/A). The most essential benefit of open innovation initiatives is that innovation spikes when diverse mindset interact with each other in an unstructured informal manner. By combining prosumers from all around the world, and by making the innovation easily accessible, the speed of innovation is dramatically improved (Monus, 2006). But it is important to keep in mind that there are some downsides to open innovation. It might be difficult for firms to protect their intellectual properties, and it might be difficult to capture value from the external innovators (Dahlander & Gann, 2010). In the open innovation challenges, the companies are buying the rights to pursue the ideas the prosumers give them, by appointing a winner and giving away the prize money. Since the ideas came from outside the company, the ideas are more accessible and more easily spread to competitors to develop similar solutions based on the ideas. But since competition is beneficial for innovation, this might also be seen as a positive factor due to the driving force for the speed of innovation. The apparent trend of open innovation recognised by both the theoretical data and the empirical findings are that companies are beginning to swallow their pride of being the sole source of innovation, and recognising the value of tapping into the large potential of ideas and knowledge from prosumers around the world. The companies in this study have begun with open innovation not too long ago, and are not only willing to continue down this path (Informant 3; Informant 6; Informant 9; Informant 13), but seem to be leaning against expanding and increasing their initiatives in open innovation.

According to Dahlander & Gann (2010), there are several ways of accessing innovative ideas and solutions from external innovators. Two of the companies in this study, IKEA and AstraZeneca, has taking the open innovation a step further than other companies in order to access even more ideas and solutions from external innovators by outlining their internal resources. They have created their own open innovation hubs and ecosystems in order to speed up innovation and bring forth ideas for themselves and the other parties involved. IKEA recently created an innovation hub they call Space10, in Copenhagen (Ikea, 2015). The hub is meant to explore and test new ideas for the future that enables an improved and sustainable life for people (Le Pluart, 2016). They achieve this by adopting an open innovation process that creates interesting projects by allowing a rotating flow of prosumers, professors, student, designers etc take part in workshops, brainstorming, events, seminars and challenges (Rhodes, 2015; Tucker, 2015). IKEA uses this innovation hub, not as a source of product development, but as a source of ideas and proof of concept. They seem to expect that this innovation hub will shoulder some of the responsibility of radical innovation, in order to get the cutting edge of innovation on the market. Something that seems to be important to them. AstraZeneca also seem keen on being seen as progressive when it comes to innovation. They have also recently created an innovation hub that they call BioVentureHub. This hub sets out to further strengthen competitiveness and dynamism in the life science industry. It is located in AstraZeneca's facilities in Gothenburg and gives emerging biotech and medtech companies a broad and unique opportunity to share office space and tap into the power and knowledge of the scientist of AstraZeneca as well as their state of the art lab facilities and infrastructure (AstraZeneca, 2016; Hedlund, 2016). The main difference between the two companies hubs is that IKEA

focuses on letting the public gather together in different settings such as workshops, seminar discussions etc in order to create radical innovation in terms of concept of proof. An example of this is the table that charge your smartphone with the help of temperature differences (Le Pluart, 2016; Ikea, 2015; Rhodes, 2015). AstraZeneca on the other hand focuses on letting smaller companies use AstraZeneca's internal facilities in order to conduct their business and thus speeding up the outcome of innovations. Two different approaches to open innovation ecosystems. Both bringing forth innovation and speeding up the pace of innovation.

ICA engages to some extent in this open innovation domain. They create collaborations with students and other companies but that is where it ends, however they want to do more in this domain and might expand to challenges etc in the future. Volvo Cars exploits the potential in this innovation domain a bit more since they engage more and besides collaborations with students and companies, also hosts open challenges and hackathons in order to incorporate the knowledge and intellect of people from around the world to their innovation process. AstraZeneca is heavily engaged in this innovation domain since they often collaborate with other companies, has a habit of hosting open challenges and opening up their data to the public, and has also created an innovation hub that helps smaller companies boost their innovation speed. IKEA has a similar setup. They are also heavily engaged in this innovation domain. They collaborate with many companies, they host open challenges for people in all ages, and has also created an innovation hub. An innovation hub that collects external knowledge by inviting amateurs, students and professionals from around the world to brainstorm and innovate together.

6.3 Shadow innovation

Shadow innovation is a rather new and emerging innovation domain on the raise (Silic & Black, 2014; Myers et al. 2016; Gyröry et al. 2012) and usually occurs when there is a gap between what the company offers and what the employees want (Myers et al. 2016; Silic et al, 2016). ICA has created a culture where they encourage innovation and innovative thinking while giving a wiggle room for mistakes (Informant 4). It is this type of culture that allows for employees to innovate outside of the ordinary and formal processes. Any potential innovation that comes from this has not been under the same scrutiny and structure as it would have been had it come from a formal innovation process. It seems that ICAs culture is very flexible and encouraging in terms of individual thinking, but once a good idea has been brought forward they develop it as a company. They do not seem to allow any shadow development in the same sense that an innovation office in one of the other companies would do. Volvo Cars on the other hand, has a rather split view on the subject of shadow innovation. They do encourage their employees to take risks and initiatives, but don't mention if they should do it on their own or in the formal process. The managers at the company try to give their employees some freedom to express their ideas, but also know that if they found out that some employees have developed something big on their own they might have to fire them (Informant 3). The employees need to walk a fine line between innovating and being fired. But the shadow innovation might pan out and benefit the company. As it has before with the example of a fuel saving feature that almost saved the company from bankruptcy (Informant 2). It's a high risk high reward situation. Volvo Cars has realised they need to handle this innovation domain carefully. Shadow innovation tends to increase both productivity and innovations (Myers et al. 2016; Silic et al, 2016; Harley et al. 2006; Behrens & Sedera 2004). And if they strictly forbid it, the employees might leave and take their innovations to their competitors, but if open allow it they might put themselves in safety risks. Because the negative side of shadow innovations is that it can be seen as a security threat and undermining the

companies policies, innovating outside the companies control (Myers et al. 2016; Silic et al, 2016; Oliver & Romm, 2002). But Volvo Cars strives for having a forgiving and innovative culture that doesn't punish the employees that try to be helpful by innovating. IKEA actively work on creating an innovative friendly culture and environment where their innovative employees feel free to explore a bit. Innovation is encouraged across the whole company. Some departments even give the employees extra time meant to be spent on exploring areas of interest and generating ideas for improvement and innovation (Informant 9). The company even estimates that a lot of their product development ideas has it's roots in shadow innovation due to their culture (Informant 8), which is compliant to what Myers et al. (2016), Silic et al, (2016), Harley et al. (2006), Behrens & Sedera (2004) says, that shadow innovation boost productivity and innovation. The combination of hiring people with great minds and giving them time to explore and be creative can really give the company an edge when it comes to innovation, since it is this combination that creates an environment for, and accelerate innovation. AstraZeneca also treat culture as an important factor for innovation. They focus on the part of empowering their employees. Giving them access to information and letting them use this and be creative (Informant 13). They have noticed that their employees are never restless, because when they have less work they innovate on their own behalf. They are the most innovative when they have nothing else to do (Informant 11). It's when people have some extra time over that they can utilise their creative minds on areas of interest and come up with valuable innovations.

Rather recently AstraZeneca created a flexible department called innovation office to support the R&D by focusing on innovations that their R&D can't handle due to different factors, one of them being not enough time. This department encourages out of the box thinking and solves the issue of not having enough time to pursue own innovative ideas (Informant 12). This means that the innovation office allows for innovations to emerge that the R&D would otherwise have discarded. This department thus works closely with the company's employees in order to pick up ideas and innovation from them, either helping them or taking over (Informant 10). The innovation office has the right to choose whom to support and offer resources without the interference of the board (Informant 12). This enables out of scope projects and other crazy ideas without any clear directives to stay alive and in the future take form and generate value for the company. This type of innovation office also reduces the amount of regular shadow innovation work being done by single individuals, the type of work that no one ever finds out about until it is too late. This is a realisation that Volvo Cars also has come to with their several innovation offices, that they can reduce this type of shadow work but they cannot erase it completely (Informant 1). Volvo Cars innovation offices is strikingly similar to the AstraZeneca's innovation office regarding their functions and operations, and was created around the same time. However the innovation offices act in different parts of the company, for example they have one for IT and one for the business area, in order to cover all parts of the company (Informant 2). Both AstraZeneca and Volvo Cars have come a long way regarding this issue since they have their innovation offices in place and actively working with this on a relatively large scale. IKEA on the other hand has this type of innovation office on a much smaller and less formalised scale which could mean that there is more of the old form of shadow innovation taking place inside their company compared to AstraZeneca and Volvo Cars. Regarding ICA, they don't have this type of innovation office at all so their situation is most likely even more to the other side of the shadow innovation spectra, even more of the old school shadow innovation type of work.

The innovation offices acts like an enabler of shadow innovation since they work closely with the employees, helping them with their ideas and innovation, or take over for them if they don't have the time or knowledge to pursue it further. These departments then acts in

the shadow of the companies, only revealing the innovation when the time is right. We have named this type of innovative approach “enabled shadow”. The enabled shadow domain is a mixture between employees innovating in the shadow without the companies permission and control, and having complete control and guidance of the projects with employees acting on directives. The enabled shadow thus creates a balance between these two extreme points. A balance that reduces the risks of shadow innovations such as harmful ideas staying alive or good ideas dying; while still keeping the part that enables and spurs innovation. This is done by introducing a light form of control by having an official department which the employees can turn to for help. This department can then guide the employees, give advice on whether or not to pursue the ideas, to help them come in contact with the right people and to give them resources that will help them realise their ideas. This is done either by guidance or by taking over the project completely. And since this department also acts in the shadow of the company without any obligations to inform the R&D, the management or board of directors, the employees can feel comfortable turning to this department, knowing they won’t be punished for innovating in the shadows and undermining the companies policies. It also means that the department can freely choose which employees and ideas to pursue, without the interference of the rest of the company. This balance of shadow innovation and light official control creates an environment that enables valuable innovations to emerge and flourish. Allowing innovations to emerge and grow in the shadow with the right guidance and funding until it is ready to be brought into the light. This is an innovation domain we found emerging across companies, that we have named Enabled Shadow Innovation.

ICA engage to some extent in the domain of shadow innovation. They have a culture that encourages it, but lacks a function that enables, guides and helps the employees with their shadow innovations. This is a huge area of improvement. IKEA has realised that this might be needed and created a modest solution to this problem, but they could probably benefit from expanding this, using AstraZeneca and Volvo Cars as a model and guidebook. IKEA also has engaged in creating an innovative friendly culture. AstraZeneca and Volvo Cars both has engaged in creating a culture for innovation as well as in AstraZeneca’s case, they have moderately engaged themselves in creating a function for enabling shadow innovation. In Volvo Cars case, they have engaged themselves greatly in creating a function for enabling shadow innovation. Thus both of them boosting innovation and better capturing innovation.

6.4 Outlaw innovation

The increase of enthusiastic, intellectual and technically skilled prosumers has led to innovation emerging from many places, and when this entails prosumers making changes to a product's functionality, exploit security flaws, or create dubious services, it’s called outlaw innovation (Flowers, 2008; Meyer, 2013; Söderberg, 2016). Volvo Cars has recognised that there is a lot of outlaw innovation taking place in their industry (Informant 1). The typical and most harmless form of outlaw innovations by their users are hacking of the cars hardware. The customers that do this kind of outlaw innovations, that according to Flowers (2008) and Söderberg (2016) should be called outlaw users, are modding their cars in order to make them go faster or look cooler in their opinion (Informant 3). This kind of outlaw innovations are not something that Volvo Cars is concerned about, nor is it much that they could do to prevent it (Informant 2). Although they have created a separate company whose services encompass hacking of customers cars (Informant 2; Informant 1). They did this in order to gain some control over this area of outlaw innovation, and also to learn and absorb the innovations. But rather recently, in this digital era where their cars come equipped with high tech gadgets and systems (Szoldra, 2016), another sort of

outlaw innovation has emerged. A much more devastating sort. Volvo Cars refers to this as hacking (Informant 2), but this terminology isn't quite right since the researchers actually call this behavior cracking (Flowers, 2008; Söderberg, 2016). Hackers alter products in order to improve them, while crackers subvert security systems in order to gain unauthorised access (Flowers, 2008). These outlaw users are thus cracking the car companies cars in order to take control over them (Vanian, 2016; Informant 2; Szoldra, 2016). Actions that can have devastating outcomes for the driver and the people in the vicinity of the car. As cars get more tech heavy this becomes an increasing concern. But since there is a human sitting in the driverseat, he or she can still maneuver and manipulate the car thus potentially minimizing a destructive outcome. But with the development of autonomous driving the issue will become even greater since there will be no human controlling the car and the manual ability to minimize such destructive cracks fades. This puts more accountability on the security systems implemented in the cars to prevent these kind of attacks. Today, Volvo Cars isn't putting much effort into the security aspect (Informant 2), something that cyber security CEO:s thinks is irresponsible (Szoldra, 2016). The height of Volvo Cars efforts has been to close their former open API:s, in order to minimize known entry points of attack (Informant 1; Informant 2). This is not enough in the long run. They will most likely have to dive deeper into this area of outlaw innovation in order to study and in different ways interact with active crackers. This will be needed if they want to be a step ahead or at least at the same level as these individuals and be able to prevent them to remotely accessing their products.

ICA on the other hand experience no such serious outlaw innovations. They do acknowledge that their users have been using their products in ways that defy their intent, and thus creating a new area of use. But this is not something they focus on (Informant 5; Informant 6) thus missing out on the innovations. In contrast, IKEA is getting good at capturing outlaw innovations. For some time now there have emerged communities (Foy, 2015) around hacking (Flowers, 2008) the products that the company makes in order to achieve unique and innovative solutions for their own needs (Informant 7). In line with the options that Flowers (2008) presents about how to react to outlaw innovation, IKEA has realised that they can choose between attacking it, adopting it or monitoring it. They have come to the conclusion that they gain the most by monitoring it, gain insights and adopt ideas from these outlaw innovations (Informant 7). They also try to influence and gain control over the innovations by creating an open hackable platform that target these hackers by making the products with the intent to be hackable and modular, creating a broader set of possible configurations (Debczak, 2017; Lee, 2017). Creators, be that companies or prosumers, can then create modules for these products, expanding the number of possible configurations of the products (Vincent, 2017; Thodes, 2017). These innovations of combining and creating modules to the company's products is something that the prosumers have been doing unofficial on their own (Informant 7; Pinterest, N/A; Foy, 2015). But now with this platform that is released this year (Informant 8), these outlaw innovations gets an official arena to manifest and expand. This phenomena of creating an official arena for outlaw innovations is similar to what the innovation offices do for the shadow innovations in order to create Enabled Shadow Innovation. This open hackable platform that IKEA is releasing is their way of bringing the outlaw innovation into the light, in order to collect, reap and capture the benefits and value from the innovations that the users from around the world are creating. Thus, this domain is now coined Enabled Outlaw Innovation. AstraZeneca has no such domain. They are very restrictive regarding outlaw innovation since they have a lot of ethical policies that hinders many interactions with these kinds of innovations (Informant 12). Although they do acknowledge the potential in the area, and wish to become better at exploring and capturing value from it (Informant 13).

ICA is active in different areas such as food, application development, logistic, transport and banking (Informant 5; ICA Group-a, N/A). Still they do not pay any attention to outlaw innovations. They are far too protective of their brand to be associated with anything even resembling illegality (Informant 4). They are apparently not realising the whole scope of outlaw innovation since they directly associate it with illegality. AstraZeneca are more aware of the potential that this innovation domain beholds than ICA is, although they do nothing in order to reap and capture the benefits from it. Volvo Cars is slightly more engaged in this domain. They have created a form of enabled outlaw innovation by implementing an official channel for hacking cars in a separate company under their control, which is good. However they are fully aware of the outlaw users innovations regarding cracking the systems in their cars, but they seem to do nothing about this yet. According to Flowers (2008) and Mollick (2005) companies can choose to monitor, absorb, influence and or attack the outlaw innovations affecting their products. An increasingly popular reaction to crackers is to monitor their behaviour, absorb their knowledge and to attack their innovations in order to regain control over the situation (Flowers, 2008). But Volvo Cars seems at this point to do nothing more than monitor. A smart solution would be to follow this trend, by finding the outlaw users and hiring them in order to gain their knowledge about cracking for the purpose of creating protective measurement to prevent these kinds of cracks that can destroy lives. But this might be difficult to achieve because even though the outlaw innovation is known to the companies, the outlaw users tend to avoid the attention of the companies since they probably violate their policies and the law, creating a restrictive flow of information between the outlaw users and the companies (Flowers, 2008). Regardless, this is an untapped potential that Volvo Cars clearly must explore in order to future proofing their cars and retain their title as one of the safest cars. One way to achieve this might be to look into IKEAs approach, by exploring the Enabled Outlaw Innovation domain by creating an official platform for the outlaw users that enables the company to collect, reap and capture the value and knowledge from the outlaw users and their innovation.

The reason why it differs so much between the companies is most likely the fact that they operate in very different markets and with very different types of products. These markets have different regulations that in some cases hinder them with the interactions of outlaw innovation, while in other cases these regulations do not affect it at all. For example, pharmaceutical companies come under a lot more regulation than furniture companies do, which may be a reason why IKEA is a lot more progressive in this innovation domain. It is therefore important for the companies to know how far they can push this, and like in the case of Volvo Cars they really should push it further, at least regarding the technical security aspect. What type of product or service the companies are engaged in selling also plays a part of how big the possibilities with outlaw innovations are. It is easier for furniture companies to enable outlaw for their customers than it is for food companies, although it is still possible for all these companies. It is also important for the companies to come to the realisation that outlaw innovation is not synonymous with illegality even if it might sound like it. There seems to be a perception that it is only illegal elements, but to leave it at this would be a mistake and they would miss out on huge potentials for their businesses.

6.5 Framework and models

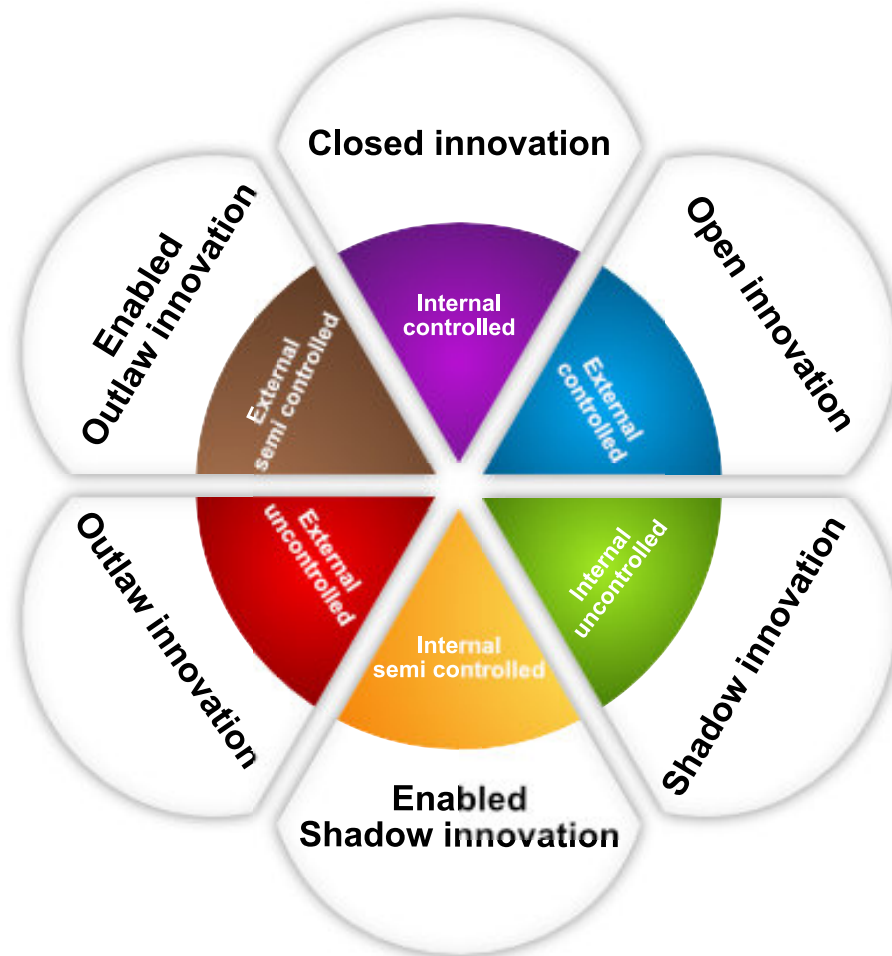


Figure 2: Innovation domains

The authors of this thesis found that the companies engage in two additional innovation domains that exceeded the scope of the theoretical framework. These two additional innovation domains can be viewed as an extension to some of the existing ones. The Enabled Shadow Innovation can be viewed as an extension of Shadow Innovation, and the Enabled Outlaw Innovation can be viewed as an extension of the Outlaw Innovation. These innovation domains with the enabled phenomena could possibly be better suited to be modelled as subdomains to the parent domains without the enabled phenomena. But since they can also be regarded as a mixture and balance between the controlled and uncontrolled innovation domains in the respective internal and external contexts, the authors chose to present them as stand alone innovation domains in order to better evidence the difference between the domains with and without the enabled phenomena. This figure is thus an evolution of the theoretical framework, expanding the innovation domains to incorporate the empirical finding of the enabled innovations domains. The firms engage in these enabled innovation domains in order to create some form of control to the uncontrolled innovation domains. This creates these enabled innovation domains with a structure of being a semi controlled innovation domain from the firms perspective, placing them between the controlled and uncontrolled domains.

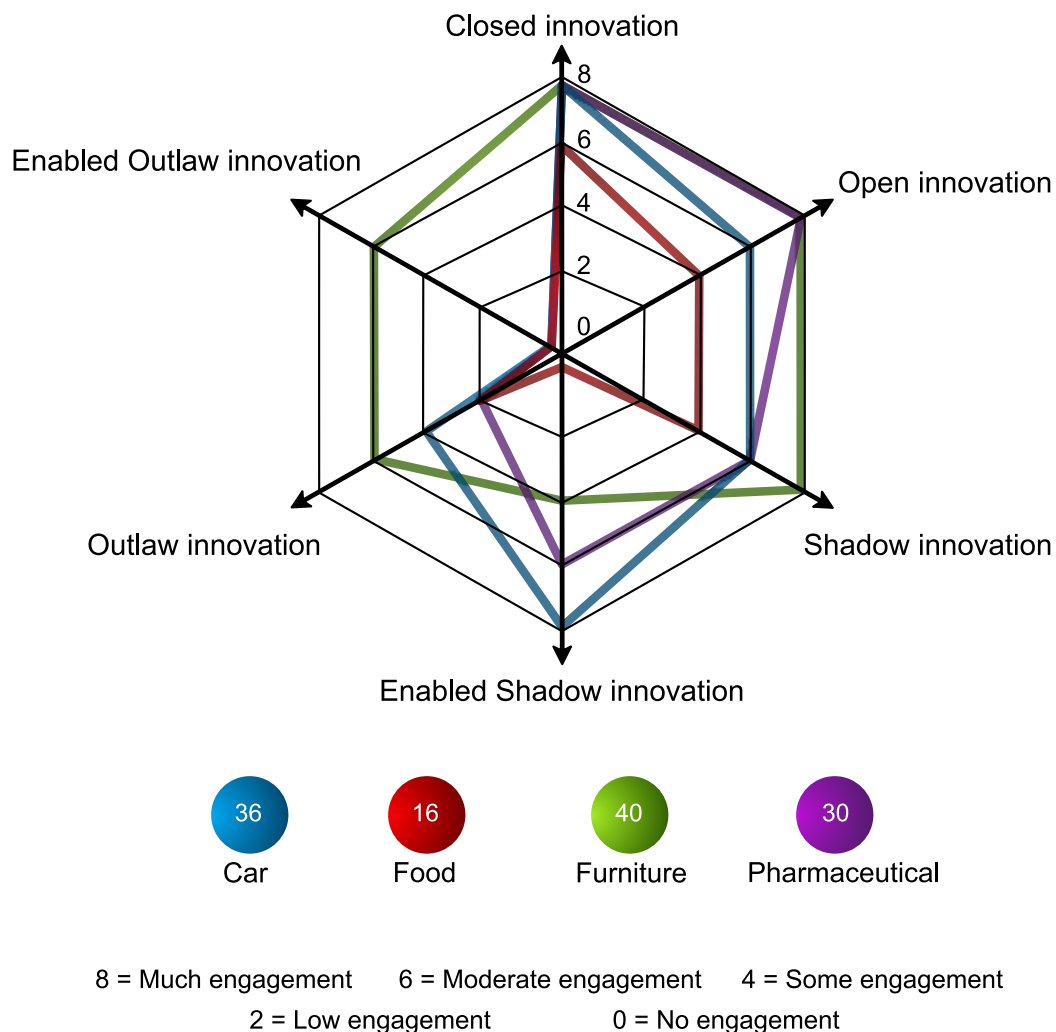


Figure 3: Radar chart over firms engagement in innovation domains

The figure above illustrates the companies engagement in the different innovation domains. The figure is of the type radar chart, created with figure 2, the model illustrating the different innovation domains, as a foundation. This chart easily enables the viewer to identify the levels of different areas for several data sources at the same time. In this model the levels are the engagement, the areas are the innovation domains and the data sources are the companies. The chart shows that the companies are heavily engaged in their own closed innovation. At the same time it visualises that other domains have been getting more and more attention in recent time, namely domains such as open innovation and shadow innovation. This has in turn lead to an apparent new trend, that companies are starting to create separate departments that can focus more on these domains without burdening their departments in the closed innovation domain. Volvo Cars, but mostly IKEA have taken this a step further, creating a separate department for the outlaw innovation domain as well. The reason for this trend is that companies are realising that the world holds a great number of highly technical and skilled individuals with great ideas and innovations that the companies can capture and absorb for their own benefit. These departments that acts in this uncontrolled innovation domain are the companies way to

bring these innovation domains into their control, thus creating the semi-controlled innovation domains, and increasing their ability to capture and utilise these ideas and innovations that exists within the domains.

The figures below illustrate the same data as the figure above, but with each company separated in different figures in order to increase the clarification of the result. By looking at these figures it is easy to identify which innovation domains gets much attention and engagement by the companies, and which are forgotten or discarded. These allocations of their innovation focus might be intentional or they might not be fully be aware of their situation. But given this result, they can now make more intellectual choices about which domain to explore and engage in.

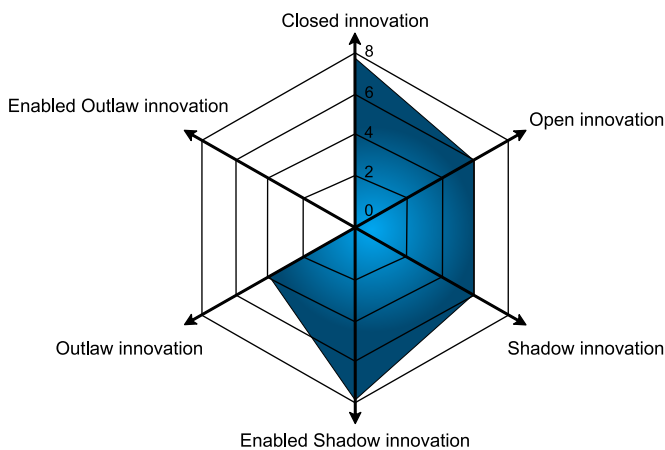


Figure 4: Volvo Cars 36p

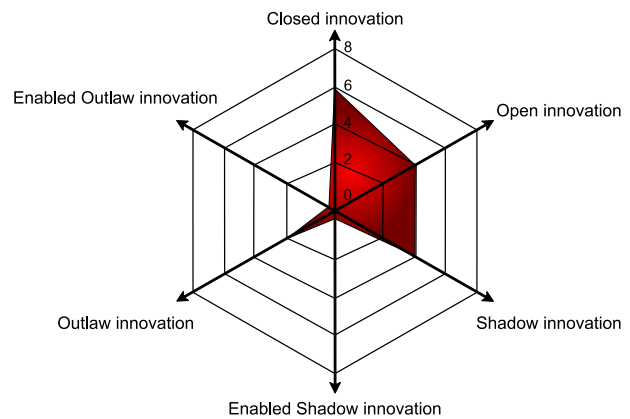


Figure 5: ICA Group 16p

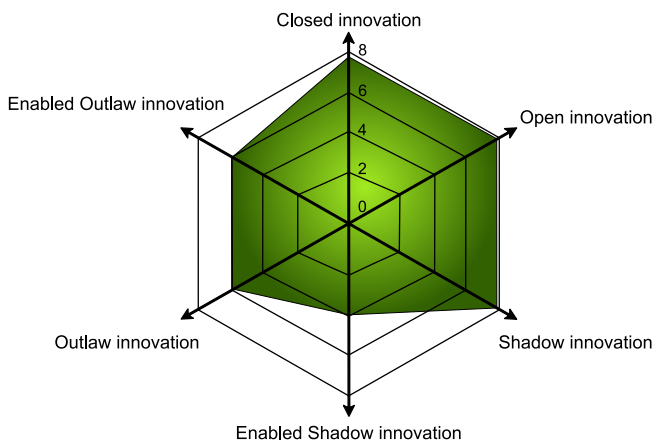


Figure 6: IKEA 40p

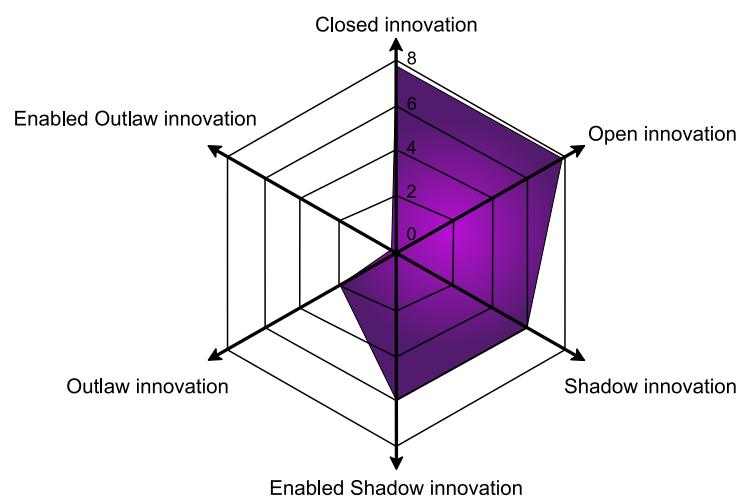


Figure 7: AstraZeneca 30p

7. Conclusion

The authors of this thesis set out to answer how firms balance their innovation between internal and external innovation domains as well as between controlled and uncontrolled innovation domains.

The main practical findings is the holistic view over the companies innovation situation that the charts and figures illustrate. How the firms balance their innovation initiatives between the innovation domains, including why and to what degree.

By looking at the figures it is easy to identify what innovation domains gets much attention and engagement by the companies, and which are forgotten or discarded. These allocations of their innovation focus might be intentional or they might not be fully aware of their situation. But the important aspect is that these figures illustrate a holistic view over the companies focus and initiatives in the innovation domains. This holistic view gives them a clearer summary over their innovation situation which enables them to make better and more informed decisions concerning innovations and which domains to explore and engage in. This view is important for companies in order for them to see what areas they need to exploit more in order to capture more value and tackle future challenges. According to the authors, some of the companies are in a situation where it is becoming more critical to venture deeper into certain domains.

The main theoretical finding is the extension of the theoretical framework illustrated in figure 2.

The authors of this thesis found that the companies engage in two additional innovation domains that exceed the theoretical framework. They can be regarded as a mixture and balance between the controlled and uncontrolled innovation domains in the respective internal and external context. These innovation domains are illustrated together with the other innovation domains in figure 2, and is thus an evolution of the theoretical framework, expanding the innovation domains to incorporate the empirical findings of the enabled innovations domains. Companies engage in these enabled innovation domains in order to create some form of control to the uncontrolled innovation domains. This creates these enabled innovation domains with a structure of being a semi-controlled innovation domain from the firms perspective, placing them between the controlled and uncontrolled domains. The reason for this trend of enabling certain innovation domains with new departments, is that companies are realising that the world holds a great number of highly technical and skilled individuals with great ideas and innovations that the companies can capture and absorb for their own benefit. These departments that acts in this uncontrolled innovation domain are thus the companies ways of balancing and bringing these innovation domains into their control, thus creating the semi-controlled innovation domains, and increasing their ability to capture and utilise these ideas and innovations that exists within the domains.

7.1 Future research

The two innovation domains that came to surface during this research are “Enabled shadow” and “Enabled outlaw”. An interesting development of this study would be to keep exploring these two domains further, looking at the potential they entail and how companies best can implement them into their innovation processes.

Another approach would be to take this even further and perform this type of research on a deeper level to see if there are any subdomains and how they affect these larger scale domains that are being explored in this thesis.

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