Organization & strategy
The philosophy of open innovation: innovation winning by sharing?

Steven Kempkes
ANR: 520423
Instructor Dr. Dean Hennessy

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Management summary

This thesis tried to discover which relationship there is between a firm’s openness in the market and their innovation performances. It seems that there is enough evidence to conclude that there definitely is a positive relationship between them. However, when we look at the shape of this relationship between innovation openness and innovation performances there are different opinions from researchers. Some researchers suggest and found evidence that there is an inverted U - shape relationship between the degree of using external information and technology innovation performance this due to an over-search problem and maintenance cost of network. But other scientists argue that the over-search problem is decreased due to the reduction of searching cost and development of knowledge absorption process, this by the fast evolution of information and communication technologies. So there remains uncertainty on the exact kind of relationship.

Furthermore in this thesis some moderators regarding innovation openness and performance were found. There seems to be a positive relationship between good leadership and the relationship between innovation openness and innovation performance. Besides good leadership also the company’s and industry’s characteristics seem to influence the relationship between innovation openness and innovation performances.

Last, three core open innovation processes were identified. They highlighted the importance of these required core processes (archetypes) to successfully follow an open innovation strategy according to a company’s characteristics and capabilities. The three core open innovation processes that were distinguished are: the outside-in process, the inside-out process and the coupled process.
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Chapter 1: Introduction

1.1 Problem indication

According to Chesbrough (2003) in the past, internal Research and Development was a valuable strategic asset within companies, which was used as a barrier to make it more difficult for competitors to enter the market in many markets. Closed innovation strategies caused that competitors who wanted to compete against the internal Research and Development of big existing companies, had to attract appreciable resources to gain knowledge on their own, if they would like to have any chance of succeeding.

However in the world of today another perspective on product innovations is rising. The leading industrial enterprises of the past have been encountering remarkably strong competition from many upstart firms. Surprisingly, these new firms conduct little or no basic research on their own, but instead get new ideas to market through a different method than closed innovation, called open innovation. However, according to Laursen and Salter (2006) Chesbrough’s work and statements on the open innovation strategy model has not yet empirically been examined in a database to measure the innovation performances of firms with an open innovation model.

Most firms still does not use aspects of the open innovation strategy in their business models, in a research of Lichtenthaler (2008), a total of 67.5% firms in the sample belonged to the group of closed innovators. Maybe this is because of high uncertainty about whether this strategy would benefit their innovation performances and whether their company is suited to follow an open innovation strategy. This paper tries to discover whether implementing an open innovation approach helped other companies to boost their performances, and especially their innovation performances. And which characteristics and business models companies should have when they want to implement an open innovation strategy successfully.
1.2 Problem statement and research questions

Against the background of the introduction it can be noticed that it is not clear yet how a firm that adapts an open innovation strategy performs after their adaptation on their innovations. The following question is formulated as the main subject of discussion in this paper:

Which relation is there between adapting a (more) open innovation strategy and innovation performances?

The main question will be answered by using different sub questions. Each of these sub questions will focus on an important subject necessary to work towards an answer on the main question. The subjects that will be discussed in this paper are the philosophy behind open innovation, the characteristics a firm should have to successfully adopt an open innovation strategy and possible open innovation business models, and furthermore the result of firms that adapted a certain degree of information sharing on that firm’s innovation performance.

These subjects have led to the following sub questions that will be discussed in chapter two:

1) What entails an open innovation strategy?

The first sub question will give us a short introduction about the thinking behind the philosophy of open innovation. It will present the developments that have lead towards this new attitude regarding information and sharing by companies and the business philosophy of open innovation firms.

2) What are the required characteristics and business processes of companies that are able to successfully implement an open innovation strategy?
Before a company wants to be more open regarding their innovation sharing and absorbing capabilities, some changes have to be made regarding the firm’s management and operational policy. To achieve success from this open innovation policy, this subchapter will show which business processes are needed if a company wants to implement an open innovation strategy and which characteristics (or industry requirements) a company should have in order to succeed.

3) What are the innovation performances of firms that adapted certain degrees of information sharing and information absorbing?

After sub question 2 is answered it is time to look at the innovation performances of firms that adapted a certain type of open innovation degree. This last sub question will provide us the last information that is needed to answer the main question of this paper.

1.2 Research methods

This paper will make use of a literature survey, which entails “the documentation of a comprehensive review of the published and unpublished work from secondary sources of data in the areas of specific interest to the researcher” (Sekaran, 2003, p63). Furthermore this paper is of a descriptive kind in order to ascertain and be able to describe the characteristics of the variable(s) of interest (Sekaran, 2003). The literature will be provided by the literature database of the library of the University of Tilburg, Google Scholar, several books and some relevant journal on innovation. Besides these primary sources of information there also will be secondary sources involved. These secondary sources were found through the use of citation analysis. The sources that were used in this paper can be found in the list of references.
1.3 Academic and managerial relevance

This thesis tries to investigate whether companies that adapted an innovation strategy significantly perform better on innovation performances than their closed competitors, like Chesbrough (2003) expects. Little research has been done about this relation and until this moment there is a very limited amount of work that tries to compare the results from the papers that researched parts of this matter, which explains the added value of this thesis.

Many firms who once were great with their strategy of closed innovations like IBM, are faced with the fact that it is not certain whether they choose the right strategy concerning information sharing. A study like this could help them to think about the right strategy in the near future to maximize the output of their innovation capabilities. Also the paper aims to give a clear view about which characteristics are required and which business models are suitable to choose certain levels of information sharing and absorption. If we look at a managerial perspective, then we can conclude that this overview can contribute to the decision making task regarding this matter. This work could help managers to answer the question whether they should implement a open innovation strategy in their enterprise or just stick to their old familiar closed innovation approach in order to maximize their companies innovation output and performances.

1.5 Framework

The following framework will be tested:
Dependent variable

**Innovation performance:** In a research from Laursen and Salter (2006) they used the following definition of product innovation: “goods and services introduced to the market which are either new or significantly improved with respect to fundamental characteristics. The innovations should be based on the results of new technological developments, new combination of existing technology or utilization of other knowledge by your firm” (Laursen. K and Salter.A, 2006, p 138). To not only highlight the importance of product innovation also the term R&D intension/intensity, defined by Lichtenthaler (2008, p149) as “the percentage of R&D expenditures / sales” will be taken into consideration when it comes to innovation performance.

Independent variable

**Innovation openness:** Lichtenthaler (2008) distinguished six types of clusters where companies can be located if you look at their degree of openness, which are using aspects of the open innovation model developed by Chesbrough (2003).

The clusters of Lichtenthaler (2008) are respectively closed innovators, which has two kinds of types, absorbing innovators, desorbing innovators, balanced innovators and open innovators. The most attention will be paid to the first and the last clusters (closed versus open,) because these are the types of firms that are most relevant for our research question. But also the other degrees of openness will be taken into account in which way they influence the relation between the investments in Research and Development departments and innovation performances. This because it is maybe interesting for companies to implement some elements of the open innovation model in the way their doing business, but not to apply the whole model.
Moderating variables

Are not considered in this model, but when it is clear that certain variables influence the relationship between innovation openness and innovation performance they will be attached and described.

Hypothesis

Following Chesbrough (2003) a firm with a closed innovation approach is prone to miss a number of innovation opportunities because many will fall outside the organization's current businesses or will need to be combined with external technologies to unlock their potential. This suggests that a firm with an open innovation will have more innovation opportunities and therefore will have a higher innovation performance. Therefore it is assumed that there is a positive relation between innovation openness and innovation performances.

H1: There is a positive relation between innovation openness and innovation performances.
2.1 What entails an open innovation strategy?

Before we want to see which effect the use of an open innovation strategy has on the innovations performances if you compare it against closed innovation, it is necessary to understand what open innovation exactly entails. In this chapter we are going to look what is the thinking behind the open innovation principle and the differences between open innovation and closed innovation.

2.1.1 The development of the open innovation model

According to van de Vrande et al.(2008) traditionally, large firms relied on their internal R&D to create new products. In many industries, large internal R&D labs were a strategic asset and represent a considerable barrier to entry for potential entrants. According to Vrande et al. (2008) researcher David Teece (1986) already concluded that large firms with extended R&D capabilities and complementary assets could outperform smaller rivals. Teece (1986) created a framework which shows that the boundaries of the firm are an important variable for innovating firms. The ownership of complementary assets, particularly when they are specialized or co-specialized, help establishes who wins and who loses from innovation. Imitators could often outperform innovators if they are better positioned with respect to critical complementary assets. Vrande et al(2008) explains that this process in which large firms with a lot of complementary assets discover, develop and commercialize technologies in their own Research and Development department later on was labeled as 'closed innovation' by Chesbrough(2003.)

But as times passed by new ideas were born and new views were developed. Cohen and Levinthal (1990) already argued that the ability of a firm to exploit external knowledge is a critical component of their innovative performance in their research about absorptive capacity. But According to Lichtenhaler (2008) it was Chesbrough who was the first person that introduced the world to the term: “open innovation.”
Chesbrough (2003) identified a fundamental shift in how companies generated new ideas and made them commercialized. In the old model of closed innovation that people used to innovate, firms stacked to the philosophy that successful innovation needs control. Companies had to generate their own ideas that they developed and brought into the market. This approach required self-reliance: if you wanted to accomplish something and do it right, you need to do it yourself and do not rely on others.

In figure 2.1 the view according to closed innovation is shown. For years the logic of closed innovation was held to be the only good way to bring new ideas and innovations towards the market. This resulted that all successful companies invested more money in their internal Research and development department than their rivals and hired the best and most knowledgeable people to work on innovations. Thanks to these huge investments they succeeded in discovering most of the best and greatest ideas. By using patents to protect their products, these companies were able to reap most of the profits. Companies used this profit invest in more Research and Development, which led to a virtual circle of breakthrough discoveries by already successful companies.
Towards the end of the 20th century a couple of factors combined destroyed the fundamentals of closed innovation. The most important factor was the exponential rise in the number and mobility of knowledge workers, which made control of ideas and property harder for most companies. Another factor was the rising availability of private venture capital, which helped to finance new firms to commercialize ideas that were created outside corporate research labs of the already successful companies.

These factors lead towards the situation that now, when breakthroughs occur, the scientists and engineers who invented them have an outside option, which was not the case before. If a company that funds a discovery doesn't pursue it in a well-timed way, the people involved in the process could chase for it on their own. This they can achieve by financing it with private venture capital. If this new created firm were to become successful, it could gain additional financing through a stock offering or it could be acquired at an attractive price. Because of these new opportunities the virtuous cycle of innovation is broken: the company that originally funded a breakthrough does not profit from the investment, and the firm that reaped the benefits did not reinvest its proceeds to finance the next generation of discoveries. (Chesbrough. D, 2003)

2.1.2 The open innovation model

In the new model that arose because of the broken virtuous circle, the open innovation model, firms commercialize next to internal also external their ideas by deploying outside pathways to the market. Companies can commercialize internal ideas and information through channels that are not part of their current business, this in order to generate value for the idea sharing organization. Some possibilities for accomplishing this can include start-up firms, who can be financed and staffed with some of the company’s own workers, and licensing agreements. In addition, ideas could also originate outside the firm’s research and development labs and be brought inside for commercialization. So the boundary between a company and its ambient environment is more open and that enables innovations to move more easily between the firms and its environment. The open innovation model is shown in figure 2.2.
In the beginning open innovation is based on a landscape of comprehensive knowledge, which should be used willingly if it is to provide value for the company that created it. However, an organization must not limit the knowledge that it exposes in its research towards its internal market pathways, nor should those internal roads necessarily be controlled to bringing only the firms internal knowledge to the market. (Chesbrough. D, 2003.)

2.1.3 Differences between closed and open innovation

The perspective on the limitations of an organization regarding the exposure of knowledge mentioned above, suggests some very different rules between closed and open innovations,
which also could be seen in figure 2.3. For example, a firm should not lock up their IP, but instead it should find ways to profit from others' use of that technology through licensing agreements, joint ventures and other arrangements with sharing firms.

![Contrasting Principles of Closed and Open Innovation](image)

Figure 2.3: The contrasting principles of closed and open innovation, (Chesbrough H. 2003. The era of open innovation. Sloan Management Review Summer, p38)

According Chesbrough (2003) one major difference between closed and open innovation is how companies monitor their ideas. In every Research & Developments process, researchers and their managers should separate bad proposals from the good ones, so that they can abandon the bad ones and commercialize the good proposals. Both the closed and open models are adept at cutting out the so called "false positives" (that are the bad ideas that initially appear promising), but open innovation also consists of the ability to recover the "false negatives" (projects that at first seem to haven't got any promise but turn out to be unexpectedly valuable at the end). A company that is focused too much on their intern innovations, thus a firm with a closed innovation approach, is likely to miss a number of those opportunities. This because many opportunities will fall outside the firm's current businesses or will need to be combined with external technologies from other companies to release their full potential.
2.2 What are the required characteristics and business processes of companies that are able to successfully implement an open innovation strategy?

This subchapter will describe the characteristics a company should have and which business models are suitable when they want to implement a more open innovation strategy approach successfully.

2.2.1 The use of open innovation strategies within companies

Gassmann and Enkel (2004) identified three core open innovation processes in a study among 124 companies. They highlighted the importance of these required core processes (archetypes) to successfully follow an open innovation strategy according to a company’s characteristics and capabilities. The three core open innovation processes that were distinguished are: the outside-in process, the inside-out process and the coupled process. All of these three the core processes represent an open innovation strategy, but not all are equally important for every company. Each company chooses one primary process to implement, but most of the time also integrates some elements of the other processes. In figure 2.4 a model of these three process archetypes is shown.
2.2.1.1 The outside-in process

The outside-in process as a company’s core open innovation approach means that a company invests in co-operation with suppliers and customers and to integrate the external knowledge gained. This can be achieved by for example, customer and supplier integration, applying innovation across different industries, participation at innovation clusters, buying intellectual property and by investing in global knowledge creation. According to Gassmann and Enkel (2004) opening up the internal innovation process by integrating customers and suppliers is not a new phenomenon. The literature on collaboration between different firms in general and on supplier relationship management in particular already repeatedly suggested, that firms are able to significantly benefit, if they are able to create differentiated relationships with some suppliers (Dyer et al., 1998)

Also Fritsch and Lukas (2001) already found out that the more intensely product innovation activity is intended for generating new products, the higher the propensity for the existence of a Research and Development cooperation with for example customers, research institutions or other firms. This brought them to the conclusion that when firms have the necessary competence and supplier management capabilities, they could successfully integrate internal company resources with resources of other supply chain members, especially by extending new product development activities across the organizational boundaries.

Suppliers can improve the buyer’s product and project success by contributing their capabilities to innovate and create new products. Suppliers and customers should be integrated as valuable sources of knowledge and competence that are required for product development. Other potentially valuable sources of external knowledge in the new product development are Intellectual Property licensed patents and technological knowledge gained by linking the company to local innovation clusters. (Gassmann and Enkel, 2004.)

Table 2.1 shows us the most important characteristics of companies focusing on the outside-in process as the major process in their open innovation strategy.
2.2.1.2 inside-out Process

Companies that choose the inside-out process as a key process focus on the externalizing of the knowledge and innovation of their firm, this in order to bring ideas to market faster than they are able through internal development. Deciding to change the place of exploitation to outside the boundaries of the company enables the firms to generate profits by licensing Intellectual property and/or multiplying technology by transferring ideas to other companies (Gassmann and Enkel, 2004.)

Commercializing ideas in different industries (also called cross industry innovation) and therefore focusing on the inside-out process in open innovation can increase a company’s

<table>
<thead>
<tr>
<th>Characteristics:</th>
<th>Outside-in process:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- low tech industry for similar technology acquisition</td>
<td>- Earlier supplier integration</td>
</tr>
<tr>
<td>- act as knowledge brokers, so these firms innovate by combining existing technologies in new ways that result in impressive synergies (Hargadon, 1998) and/or as knowledge creators</td>
<td>- Customer co-development</td>
</tr>
<tr>
<td>- highly modular products</td>
<td>- External knowledge sourcing and integration</td>
</tr>
<tr>
<td>- high knowledge intensity</td>
<td>- In-licensing and buying patents</td>
</tr>
</tbody>
</table>

Table 2.1: the characteristics and examples of implications of the outside-in process. (Gassmann, O., Enkel, E., 2005. Towards a theory of open innovation: Three core process archetypes. R & D Management, p10.)
Next to commercializing ideas outside the own industry or market, this outsourcing could be used to guide knowledge or ideas to the external environment. The benefits of outsourcing are many according to Gassmann and Enkel (2004) who refer to Haour (1992.) These benefits are getting access to new areas of knowledge, managing capacity problems, concentration of core competencies, more speed by reducing time-to-market, and the sharing of costs.

The certain dissimilar approaches within the inside-out processes could be summarized as: leveraging a company’s knowledge by breaching the boundaries of company and gaining advantages by letting ideas transfer to the outside of a firm. The inside-out process as a major process in an open innovation strategy creates a significant advantage for companies that are able to meet certain criteria. The open innovation paradigm and especially the inside-out process within this approach, benefits to the idea that the place of invention and innovation does not necessarily have to be the same as location of exploitation.

Table 2.1 summarizes the characteristics and some examples of companies that choose the inside-out process as their major process in their open innovation strategy.

<table>
<thead>
<tr>
<th>Characteristics:</th>
<th>Inside-out process:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(basic) research-driven company</td>
<td>Bringing ideas to market</td>
</tr>
<tr>
<td>Objectives like decreasing the fixed costs of R&amp;D, branding, setting standards via spillovers</td>
<td>Out-licensing and/or selling Intellectual Property</td>
</tr>
<tr>
<td></td>
<td>Multiplying technology through different applications</td>
</tr>
</tbody>
</table>

Table 2.2: the characteristics and examples of implications of the inside-out process. (Gassmann, O., Enkel, E., 2006. Towards a theory of open innovation: Three core process archetypes. R & D Management, p12.)
2.2.1.3 Coupled process

Following Gassmann and Enkel (2006) Companies that decide on the coupled process as their key process, combine the outside-in process (to gain external knowledge) and the inside-out process (to bring ideas to market) earlier mentioned. In order to use both, these companies co-operate with other companies in strategic networks. Co-operation with other companies refers to the joint development of knowledge through relationships with specific partners, like for example universities, supplier or consumers. Hagedoorn (1990) created a classification of different modes of co-operative agreements, which are shown in table 2.3. Relationships like the ones mentioned in table 2.3 are extremely important to firms, who use the coupled process.

According to Gassmann and Enkel (2004) the transfer of research into knowledge through alliances and joint ventures is a relatively recent phenomenon and different views have been developed. Kogut (1988) was the first to explicitly argue that joint ventures could be motivated by an organisational learning imperative. In the view of Kogut (1988) a joint venture “is used for the transfer of organizationally embedded knowledge which cannot be easily blueprinted or packaged through licensing or market transactions” (Kogut, 1988, p.319). Furthermore Westney (1988) and Hamel (1991) developed related perspectives on
the ways in which learning can be achieved through alliances and joint ventures. Westney (1988) stressed out the importance managing the relationship between the partners and how to transfer the learning curves effectively within the firm. Hamel (1991) suggested among other things that not all partners are equally adapted at learning and that process may be more important than structure in determining learning outcomes.

The objectives of most companies that focus on the coupling of the outside-in and the inside-out processes are to develop standards or a leading design for their products. Alliances with complementary partners can also lead to valuable input for a co-operative innovation process. Firms working in strategic alliances or joint ventures know that a major success factor for the cooperation is a right balance of giving and taking. A crucial precondition for working in co-operative innovation processes is the capacity to integrate foreign knowledge into a company’s own knowledge and of course to externalize foreign knowledge in order to enable the partner to learn. Success is based on the ability of a company to find and integrate the right partner that is able to provide the competencies and/or knowledge needed to acquire a competitive advantage in its own industry. (Gassmann and Enkel, 2004.)

<table>
<thead>
<tr>
<th>Characteristics:</th>
<th>Coupled process:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- standard setting (predominant design)</td>
<td>- combining outside-in and inside-out processes</td>
</tr>
<tr>
<td>- increasing returns (mobile industry through multiplying technology)</td>
<td>- integrating external knowledge and competencies and externalising own knowledge and competencies</td>
</tr>
<tr>
<td>- alliance with complementary partners</td>
<td></td>
</tr>
<tr>
<td>- complementary products with critical interfaces</td>
<td></td>
</tr>
<tr>
<td>- relational view of the firm</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.4: the characteristics and examples of implications of the coupled process (Gassmann, O., Enkel, E., 2006. Towards a theory of open innovation: Three core process archetypes. R & D Management, p13)
2.2.2 The Competence Perspective: Core Competencies related to open innovation

Next to implementing core processes to allow integration of external knowledge, to utilize ideas outside the firm or to co-operate within joined innovation processes, the company needs certain capability to apply the open innovation approach effectively. For each of the core processes a different capability is needed to make the strategy successful (Gassmann and Enkel, 2004.) The absorptive capability has to be matched with multiplicative and relational capability.

2.2.2.1 Absorptive Capability related to the Outside-in Process.

Technology knowledge generation and application processes are getting increasingly complicated, broad and expensive to firms. Furthermore, the “ability of a firm to recognize the value of new external information and apply it to commercial ends is vital to its innovative capabilities” (Cohen, Levinthal 1990.) Gassman and Enkel (2004) argue that since many organisations miss the ability to listen to their external world and process the signals received in an efficient way. The efficiency of both knowledge generation and application is dependent on the concept of “absorptive capacity”.

2.2.2.2 Multiplicative Capability related to Inside-out Process.

The exploitation of knowledge outside the company is interrelated to the company’s capability to multiply and spread its own knowledge to the external environment. The capability to multiply innovation by external exploitation is strongly related to the firm’s capability to transfer knowledge and the selection of appropriate cooperation partners. The commercialization of ideas will be only successful if the company is able to share its knowledge with the external entity. Next to knowledge sharing also the strategic selection of partners that are willing and able to multiply the new technology is an important component of the multiplicative capability of the company (Gassmann and Enkel, 2004.)
2.2.2.3 Relational Capacity related to Coupled Process.

The idea of a firm’s capacity in building relationships as a strategic way to achieve a competitive advantage already relates to Dyer et al. (1998), who concluded that a company’s value is strongly connected to its capability to build and maintain relationships with partners in order to enable cooperative development in strategic alliances. A company can be differentiated by the networks to which it is connected and the alliances and joint ventures that it can establish. As a result, the relationships with other companies and competitors could be an important asset for a firm and a necessary precondition for the linked process within an open innovation strategy. According to Gassman and Enkel (2006) further research needs to investigate the capabilities needed to conduct open innovation successfully more closely.

2.2.3 The general industry characteristics for open innovation

Open innovation can be seen as an approach that enriches the company’s ability to innovate, but open innovation is also limited to companies with special products or industry characteristics. According to Gassman and Enkel (2006) The following general characteristics could help managers to decide whether the open innovation approach is of extra value for their firm.

The first required characteristic to successfully enable an open innovation strategy is a high product modularity, to exploit the advantages that an open innovation approach provides. Companies in modularized types of manufacturing industries are able to increase their innovativeness by opening up their innovation process. For companies within for example the chemical industry with a low modularity the advantages of an open innovation approach are minimal. Industry speed is another characteristic that can indicate whether companies can gain an advantage from open innovation. Industries such as companies providing network technology and services are able to gain a huge advantage by integrating external knowledge or through co-operative innovation processes with partners. However,
companies with a low industry speed, like providers of building materials, do not need to focus on faster innovation processes.

Also the tacit knowledge required to innovate and the complexities of interfaces are characteristics which are important to acquire advantage by means of an open innovation strategy. Some companies are really characterized by the high degree of tacit knowledge required for their innovation, together with a high complexity of interfaces. They could therefore use the open innovation approach to increase their innovativeness.

Table 2.5 summarizes the characteristics identified as core to gain an advantage from an open innovation approach.

<table>
<thead>
<tr>
<th>Open Innovation Approach</th>
<th>Closed Innovation Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>- high product modularity</td>
<td>- low product modularity</td>
</tr>
<tr>
<td>- high industry speed</td>
<td>- low industry speed</td>
</tr>
<tr>
<td>- much explicit and tacit knowledge required</td>
<td>- less tacit knowledge required</td>
</tr>
<tr>
<td>- highly complex interfaces</td>
<td>- low complex interfaces</td>
</tr>
<tr>
<td>- creating positive externalities</td>
<td>- no positive external effects through licensing</td>
</tr>
</tbody>
</table>

Table 2.5: Characteristics to follow an open or closed innovation approach. (Gassmann, O., Enkel, E., 2006. Towards a theory of open innovation: Three core process archetypes. R & D Management, p14)

Furthermore the distribution of innovation in order to reach increasing returns is an important attribute of open innovation. Will the value gained by an innovation be higher through increasing the number of partners using this technology in their products and therefore increasing the number of potential customers for these products? In order to develop a dominant design as well as to set standards, it is necessary to multiply the
connections to partners with an open innovation approach. However, exclusivity can also be a major advantage and a qualification for a company’s choice of partner. Only when companies first include new technologies and innovative features, they can differentiate themselves from their competitors and maintain their market position in their industry. The companies therefore need to co-operate in partnerships with guaranteed exclusivity. In order to boost their innovativeness they are heavily dependent on focusing on including external knowledge in an outside-in process regarding their research. For both kinds of co-operations, namely bilateral or multilateral, open innovation could be a successful approach for every company meeting the required characteristics. (Gassmann and Enkel, 2004.)

2.2.4 The influence of leadership in open innovation companies

Next to business model and the characteristics of companies also leadership within the companies is needed to make the open innovation strategy successful. According to Fredberg (2008) researchers Fleming and Waguespack (2007) discuss leadership in open innovation communities. They state that consistent with the norms of an engineering culture the leader of open innovation communities must make strong technical contributions. Beyond these technical contributions, they must integrate their communities. This is enabled by two correlated but distinct social positions: social brokerage and boundary spanning between the technological areas. An inherent lack of trust associated with brokerage positions could be solved through physical interaction. Boundary spanners do not experience this handicap and are much more likely than brokers to advance to leadership.

Following Fredberg (2008) next to Fleming and Waguespack (2007) also Witzeman et al. (2006) researched the relationship between leadership and open innovation. Witzeman et al. (2006) point out that not only the technological systems have to change. The more external innovation is sourced by the company, the more of systems, processes, values and culture also needs to be transformed. The firms in the sample expressed resistance against open innovation. Strong forces inside the organization worked to exploit current technology rather than look for new technologies from the outside. This however is not strange, the
authors argue. Company people are trained to think internally, and this tendency is strengthened by concepts such as core competences and Six Sigma. The leaders within this department are therefore those that are able to include the external sourcing in its work procedures. Witzeman et al. (2006,) state: Building external thinking into the company needs change. The company must evaluate the supply chain, the new product development processes, the reward system, the strategic planning process the technology roadmap, and many other systems for their ability to integrate external innovation. Connecting external technology for innovation requires an essential change in employee thinking. The“Not Invented Here” syndrome must be changed to the“Invented Anywhere” approach.”
2.3 What are the innovation performances of firms that adopted the open innovation principle?

In this chapter we are going to investigate whether more open innovation strategy leads towards more innovation performances. To answer this question a few researches have been investigated. They sometimes differ in measuring innovation performances and the degrees of open innovation they research. But altogether they give a high extent of overview regarding the innovation performances of open innovation adapting firms.

2.3.2 The innovation performances of open innovation companies

According to Laursen and Salter (2006) Research in evolutionary economics already suggested that a firm’s openness to its external environment can improve its ability to innovate. (Nelson and Winter, 1982.) Laursen and Salter (2006) examined the relationship between open innovation and innovation performances. In their research they considered the term innovation performance as a term ‘which is explained by a firm’s external search strategies, R&D intensity and a number of control variables, such as market orientation and size.”(Laursen.K, Salter.A, 2006, p2.) They introduced two new concepts, namely external search breadth and external search depth. These concepts describe the characters of a firm’s strategy for accessing knowledge form sources outside the company. The conclusion was that firms who are more open to external sources or search channels are more likely to have a higher level of innovative performance. Laursen and Salter (2006) argue that this effect arises because openness to external sources allows firms to draw in ideas from outsiders to deepen the pool of technological opportunities that are available for firms. Their findings agree with Chesbrough view that firms that are too internally focused have a chance of missing opportunities. The results strongly suggest that searching broadly and intensely across a variety of search channels can offer ideas and resources that help firms gain and exploit innovative opportunities.

But innovation search leading to more innovative performances is not an exponential rising relation. Innovation search is not costless. Following Laursen and Salter (2006) it appears
that there are moments after which openness can negatively affect innovative performance. Also Katila and Ahuja (2002) already found that firms who search too much, may have a negative effect on innovation performance, this because the scope of search at a moment becomes too costly. So the search efforts to external sources is of great importance to openness of firms in the development of new innovative opportunities, but the enthusiasm for openness need to be tempered by taking into consideration the costs of such search efforts. It suggests external sources need to be managed carefully so that search efforts are not dissipated across too many search channels.

Next to Laursen and Salter (2006) and Katila and Ahuja (2002) also Kang and Kang (2009) conducted research about innovative performances of open innovation firms, although Kang and Kang only considered technology innovation performance in consideration. Technology innovation performance in this study was measured by using the perceived number of product innovation in 2004.

Kang and Kang (2009) researched the importance of using external knowledge for successful innovation, an importance that is a key element in the open innovation strategy. They concluded that the effect of external knowledge on technology innovation performance varies depending on which kind of external souring method used. When a company absorbs outside information through information transfer from informal network, then if a firm uses more and more information transfer from informal network, the firm also gains more technology innovation performance.

The results of Kang and Kang (2009) are different from the previous studies mentioned above from Laursen and Salter (2006) and Katila and Ahuja (2002), which asserted that there is an inverted U - shape relationship between the degree of using external information and technology innovation performance. These studies explained inverted-U shape relationship through an over-search problem and maintenance cost of network. But Kang and Kang (2009) research claims that there is a positive relationship between the extent of using information transfer from informal networks and technology innovation performances. They argue that the over-search problem is decreased due to the reduction of searching cost and
development of knowledge absorption process, this by the fast evolution of information and communication technologies. Furthermore the evolution of information and communication technologies implies that informal network for information transfer does not require anymore a high maintenance cost and therefore the benefit of information transfer is larger than the costs.

2.3.2 The innovation performances of companies who adapted certain aspects of open innovation

Lichtenthaler (2008) also researched the innovation performances, in terms of R&D intensity, of firms based on their open innovation adaptation. He used a cluster analysis based on the extent of external technology acquisition and the extent of external technology utilization.

The clusters Lichtenthaler (2008) distinguishes are two different groups of closed innovators, absorbing innovators, desorbing innovators and balanced innovators.

The first cluster the closed innovators, form the largest cluster with and as the name already suggest they use a rather closed innovation approach with very limited external technology exploitation and acquisition. The next cluster also is a type of closed innovators, but the major difference is that the companies within this cluster acquire a part of their technologies from external resources. The third cluster refers to the absorbing innovators. The firms in this group are very reliable on external technology acquisitions and use the innovation approach in one direction. However the use of these acquisitions to commercializing the ideas in these companies is still limited. The cluster that does commercialize these external technology acquisitions is the fourth cluster, the desorbing innovators. They focus on internally developing new technologies and they actively commercialize technology assets to improve and replenish their product businesses. The companies absorb knowledge from outside and desorb a lot of knowledge from the firm’s own technology portfolio for example
with licensing agreements. The fifth cluster balanced innovators use both types of technology transaction to a considerable amount. The companies have really opened up their innovation processes. And instead of clusters 3 and 4 these companies don’t use a one way direction. So these firms largely follow the new paradigm of open innovation. The last direction, cluster 6, contains of firms that have adopted a very open approach on both dimensions. We therefore consider them as open innovators. The firms have the same characteristic as the previous cluster 5, but their innovation process has been opened to a really high degree.

2.3.2 Differences in innovation performances of open innovation companies in different industries

Lichtenthaler (2008) did not find any significant industry differences between the clusters and concluded that the open innovation paradigm clearly has not been adapted to a much higher degree in any of the industries. This is in contrast with the opinions that open innovation is just only interesting for the ‘high-technology industry’, although Chesbrough and Crowther (2006) already suggested that certain Open Innovation paradigms are finding application in companies who are not operating in the ‘high-technology’. The most common motivation of participants of other industries to use open innovation is the belief that utilizing more technology from outside the firm is critical for profitable growth.

Furthermore regarding the performances of innovation in terms of R&D intensity Lichtenthaler’s (2008) investigations, in table 2.6, show us that the R&D intensity is getting stronger when firm are implementing more and more ideas regarding the open innovation approach. Especially the intensity over 8% is remarkable. This finding provides support for the assumption that firms find open innovation to be complementary with internal ideas of the Research & Development department, instead of serving as a substitute. Firms with a strong need to develop new knowledge, by achieving high innovation performances, rely on internal and external sources simultaneously.
### Table 2.6 The R&D intensity among the different innovation clusters.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample</th>
<th>Cluster 1</th>
<th>Cluster 2</th>
<th>Cluster 3</th>
<th>Cluster 4</th>
<th>Cluster 5</th>
<th>Cluster 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>R&amp;D intensity</td>
<td>5.12</td>
<td>4.27</td>
<td>4.8</td>
<td>6.4</td>
<td>5.9</td>
<td>5.0</td>
<td>8.73</td>
</tr>
</tbody>
</table>


#### 2.3.3 The innovation performances of Procter and Gamble

Furthermore we look at the company that Chesbrough (2003) mentioned when speaking of firms that are using the open innovation approach, the firm Procter & Gamble, and their innovation performances. It is estimated by Huston and Sakkab (2006) that Procter and Gamble’s innovation success rate has more than doubled and that R&D productivity has increased by nearly 60% when compared to their result of 2000. And Dodgson et al. (2006) conclude that the company has become much more successful at accessing external sources of technology and is extensively using innovation technologies. It becomes clear that the innovation performances are positively connected with their adaptation of open innovation.
3.1 Conclusion

This thesis tried to discover which relationship there is between a firm’s openness in the market and their innovation performances. The open innovation model developed by Chesbrough (2003) was used as the definition of an open innovation policy and closed innovation policy.

3.1.1 Relationship between innovation openness and innovation performance

Based on Chesbrough’s open innovation model Lichtenthaler (2008) studied the approaches of firms to open innovation and found several different clusters, based on the extent of external technology acquisition and the extent of external technology exploitation. The different clusters were: two clusters of ‘closed innovators’, a ‘absorbing innovation’ cluster (rely very strongly on external acquisition), a ‘desorbing’ cluster (commercializing internal ideas with environment), ‘balanced’ innovator (considerable use of both external sources and commercializing internal ideas) and ‘open innovators’ (very open approach on both dimensions.) If we look at the innovation intensity of these different clusters it shows us that when the degree of openness is increasing, the innovation intensity and thus the innovation performances are rising. Many companies that are implementing certain elements of the open innovation are performing better than their ‘closed competitors’ on R&D intensity. The good innovation performance of Procter & Gamble the last couple of years is just another source that strengthens the suggestion of a positive relationship between innovation openness and innovation performances. It seems that there is enough evidence to conclude that there definitely is a positive relationship between them.

However, when we look at the shape of this relationship between innovation openness and innovation performances there are different opinions. According to an investigation of Laursen and Salter (2006) there is no exponential increasing connection. Laursen and Salter (2006) concluded in accordance with earlier suggestions of Katila and Ahuja (2002) that
innovation search is not costless and it appears that there is a certain moment when increasing openness can negatively affect innovative performance. Laursen and Salter (2006) suggest and found evidence that there is an inverted U-shape relationship between the degree of using external information and technology innovation performance.

However in contrast with Laursen and Salter (2006) Kang and Kang (2009) had another conclusion about the importance of using external knowledge for successful innovation, an importance that is a key element in the open innovation strategy. Although Kang and Kang (2009) research was not the same, this because they only considered technology innovation performance, their conclusion is very interesting because of the fact that it is opposite of the findings of Laursen and Salter (2006.) They conclude that the effect of external knowledge on technology innovation performance varies depending on which kind of external souring method used. They argue that the over-search problem is decreased due to the reduction of searching cost and development of knowledge absorption process, this by the fast evolution of information and communication technologies. Furthermore the evolution of information and communication technologies implies that informal network for information transfer does not require anymore a high maintenance cost and therefore the benefit of information transfer is larger than the costs.

It is hard to compare the results with each other, especially because the conclusions are not coherent with each other and the investigations differ in the measurement of innovation performance. But it could be possible that in the last three years the cost of innovation is diminished because of the fast evolution of information and communication technologies and that the investigation of Laursen and Salter has become outdated. However although maintenance costs are decreasing rapidly, innovation is still not costless because of the new communications technologies. So maybe the inverted U-shape is still the right reflection of the relation between innovation openness and innovation performances although the inverted U is more stretched than first considered. Further research on the costs of open innovation is necessary to finally determine the relationship between innovation openness and performances. It should investigate the comparative advantages of open versus closed innovation under different conditions by economic modeling. Also not only the innovation
performances should be taken into account but also the influences on financial performances, such as revenues and profit. After all more innovation performances is a good result, but it is more profit that counts. Furthermore maybe it is for certain companies more profitable to only adapt a certain degree of the open innovation policy. So how open do firms have to be, and is there a certain level when a company is too open.

3.1.2 Core competencies of open innovation firms

In this thesis we also looked at the core competencies needed to perform successfully after the adaption of an open innovation strategy. From Gassman and van Enkel (2006) it becomes clear when you want to be successful, it is necessary to at least stick to one of the three core open innovation processes: outside-in process, the inside-out process and the coupled process. These are the different strategies a company with an open innovation company can follow.

In the outside-in process a company invests in the collaboration with customers and suppliers and tries to integrate the external knowledge gained. It seems that this strategy connects strongly with the activities of the companies that are in cluster three of the research of Lichtenthaler (2008): the absorbing innovators. These companies only search for external knowledge and do not exploit information themselves. Firms that are aiming to adapt this strategy should develop themselves in recognizing the value of new external information and commercializing it according to Cohen and Levinthal (1990.) The efficiency of the generation and application of knowledge is dependent on the concept of absorptive capacity.

Companies which use the inside-out process as a key process focus on the externalizing of the knowledge and innovation of their firm. This enables the company to generate profits by licensing and multiplying technology. This one way open innovation strategy is very much the same as the companies of the fourth cluster, the desorbing innovators, in the investigation of Lichtenthaler (2008.) They focus on internally developing new technologies and they actively commercialize technology assets to improve and replenish their product businesses. Gassman and van Enkel (2006) argue that success is strongly related to the firm’s capability to transfer knowledge and the selection of appropriate cooperation partners. The
commercialization of ideas will be only successful when the company can share its knowledge with the external entity. Next to knowledge sharing also the capability of selecting the right partners that are willing and able to multiply the new technology is an important capability of firms who use this strategy.

The last process that is used is the coupled process, which combines the outside-in process and the inside-out process. This process looks familiar with cluster 5 and 6 of Lichtenthaler (2008): the balanced innovators and the open innovators. Both clusters are transacting knowledge in both directions, only the sixth clusters do it more frequently. The core competency regarding this process is following Gassman and van Enkel (2006) is building relationships. The relationships with other companies and competitors could be an important asset for a firm and a necessary precondition for the linked process within an open innovation strategy. Further research is needed to investigate the capabilities required to conduct the coupled process successfully more closely.

3.1.3 Moderators influencing the relationship between innovation openness and innovation performance

Next to the relation between innovation openness and innovation performances and the core competencies an open innovation firms needs, a couple of possible moderators were discovered. First there might be the factor of leadership within open innovation that influence the innovation performances and also the different industry characteristics possibly have a side effect on the innovation performances within open innovation companies. Taking these possible moderators into consideration we have the model that is shown in figure 3.1.
Leadership within the companies is needed to make the open innovation strategy successful. Witzeman et al. (2006) point out that not only the technological systems have to change. The more external innovation is sourced by the company, the more of systems, processes, values and culture also needs to be transformed, because many employers of firms resist against open innovation. The company must evaluate the supply chain, the new product development processes, the reward system, the strategic planning process the technology roadmap, and many other systems for their ability to integrate external innovation. Connecting external technology for innovation requires an essential change in employee thinking. The “Not Invented Here” syndrome must be changed into the “Invented Anywhere” approach. “When taking these words into consideration it becomes clear that good leadership is an essential part in the implementation of open innovation within a company. Without good leadership open innovation would not think external and therefore will have less innovation performance. So there seems to be a positive relationship between good leadership and the relationship between innovation openness and innovation performance.

Besides good leadership also the company’s and industry’s characteristics influence the relationship between innovation openness and innovation performances.
According to Gassman and Enkel (2006) some general characteristics could help managers to decide whether the open innovation approach is of extra value for their firm. For example companies with high product modularity, high industry speed, high complex interfaces, and companies which create positive externalities and require much explicit and tactic knowledge would benefit more from an open innovation strategy than companies with the opposite characteristics. However Lichtenthaler (2008) in his research did not find any significant industry differences between the clusters which adapted certain aspects of open innovation. His conclusion was that the open innovation paradigm clearly has not been adapted to a much higher degree in any of the industries. Also Chesbrough and Crowther (2006) already suggested that certain open innovation paradigms are finding application in companies who are not operating in the ‘high-technology’ sector. So we can conclude that at the moment it is not the case that companies in certain industries use open innovation strategies more frequent, but that there are some characteristics that are influencing the relationship between innovation openness and innovation performance. Further research should determine how much the influence of these industries’- and company’s characteristics entails and whether for every company it is beneficial if they implement an open innovation strategy.

3.2 Limitations and further research

During this descriptive thesis a few limitations were discovered. First of all the fact that this thesis is of a descriptive kind forced me to compare the different researches that already are conducted about open innovation performances. Unfortunately most researchers did not use the same measuring method in calculating the innovation performance and that made it difficult to compare the results. Furthermore most of the researchers did not investigate the whole open innovation approach but only one of the core processes, like the innovation performances through the use of innovations from external sources.

This thesis made clear that a lot of further research is needed in exploring the phenomenon of open innovation. Further research on the costs of open innovation is necessary to finally
determine the connection between innovation openness and performances. It should investigate the comparative advantages of open versus closed innovation under different conditions through economic modeling.

Also not only the innovation performances should be taken into account but also the influences on financial performances, such as revenues and profit. This will finally answer the question whether open innovation is a good way to improve a company’s profitability. Furthermore maybe it is for certain companies more profitable to only adapt a certain degree of the open innovation policy. So how open do firms have to be, and is there a certain level when a company is too open.

Next to the performances also the factors that are possibly moderating the relation between innovation openness and innovation performances should be further investigated. How much is the influence of the industries’- and company’s characteristics and is it beneficial for every company to implement an open innovation strategy. Also about the influence of leadership further research is needed because there has not been conducted much research on this factor. For example which tools and technique are applicable to manage an open innovation in a good way.
4.1 References list


