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EVENS, Ward

Datum: 14.12.2009

How can SMEs benefit from open innovation ?

Ward Evens

promotor :
Prof. dr. Wim VANHAVERBEKE

Eindverhandeling voorgedragen tot het bekomen van de graad
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TABLE OF CONTENTS

SUMMARY

In this thesis it's my intention to clarify how small and medium enterprises can benefit from open innovation. Above all, I chose this subject because it's linked to my study. A second reason was the fact that the subject is understudied. In this way I could contribute to the research instead of giving an overview of existing literature.

The last few years we have noticed an evergrowing use of the term open innovation. There are several reasons that explain the increase in attention for this phenomenon; to me, the two most important ones are globalisation and the technological evolution.

The increase in attention was most of the time linked to only large corporations. They have focused on this topic because they could gain most out of it. Also a lot of research has been done in this direction. In chapter 2 I will explain what open innovation is all about. Small and medium companies on the other hand were left out of the story, but recently the interest for the topic has been growing and SMEs are catching up with larger companies for various reasons. This is justified because - as you will find out by reading this thesis - open innovation can be important for SMEs as a new source of competitive advantage. Chapter 3 will be devoted to the amount of literature that is available on open innovation in SMEs.

Having read the small amount of scientific research articles on open innovation for SMEs, we can conclude this topic is heavily understudied. Because the literature is insufficient, I started my own research. I analysed three Belgian SMEs and their approach to open innovation through interviews. These three companies are Curana, Alupa and Televic. Chapter 4, 5 and 6 are preserved for this analysis. The analysed companies differ in size, are active in different markets and have their own view on open innovation. Having compared these three cases with each other and with the existing literature, I was able to add and where necessary to adjust existing theories. In the end, this led to a new and more detailed insight on the history, present, and future of open innovation for SMEs.

In chapter 7, I drew the following conclusions. I started by comparing the three cases to the literature in chapter 3. The theories discussed in this chapter match the analysis of the cases. I have two remarks towards the existing literature. First, weaknesses of SMEs like absorptivity, the unattractiveness of SMEs and the small market share were not that

obvious in the three cases. The second remark was that the role of the government was very important in the development of open innovation practices for SMEs. The cases showed that the open innovation practices upon which the government focuses, are more developed in SMEs.

Finally, I will summarize the most important conclusions of my research. The first one is that SMEs are, more than larger companies, embedded in social and institutional organizations.
Secondly, entrepreneurship in an SME is essential for success in every open innovation project.
Thirdly, fiscal measures need to be focused more on long term innovations.
The fourth conclusion is that SMEs are depending on large companies from within the value chain.
The fifth one is that the group of SMEs includes a variety of different companies, all with different characteristics and different approaches to open innovation. This means that no strategy can be generalized.
Finally, open innovation has an impact on the structure and management of the company. Therefore change management should be a part of an open innovation strategy.

For me, the most important for a SME to be successful is having the right state of mind: you have to show initiative, be motivated and possess the drive to keep going because "Not going forwards is going backwards".

FOREWORD

In the process of making this thesis, I didn't only rely on my own capacities. First I would like to thank my promotor, professor doctor Wim Vanhaverbeke, for his advice. Secondly, I would like to thank Dirk Vens of Curana, Hugo Princen of Alupa and Brecht Stubbe of Televic for their willing cooperation and enthusiasm in general. Thirdly, I would like to thank Jean-Marie Aussems for his linguistic support. Finally I would like to thank my parents and above all my girlfriend, Ruth, for their continuous help and support.

CHAPTER 1: INTRODUCTION

1. Introduction

In this paper it's my intention to clarify how small and medium entreprises can benefit from open innovation. The last few years we have heard more and more of the term open innovation. This was most of the time linked to large corporations. Large companies have focused a lot on this topic because they could gain most out of it. Also a lot of research has been done in this direction. Small and medium companies on the other hand were left out of the story, but recently the interest for the topic has been growing. This is justified because open innovation can be important for SMEs as a new source of competitive advantage.

There are several reasons that explain the increase in attention for open innovation. I believe, the two most important ones are globalisation and the technological revolution. The markets going global did not only mean more customers, and with this a lot of opportunities for companies to grow, but it also meant a lot more competitors. The strategies companies applied in their home markets were not sufficient anymore to face these new competitors who came from all over the world.

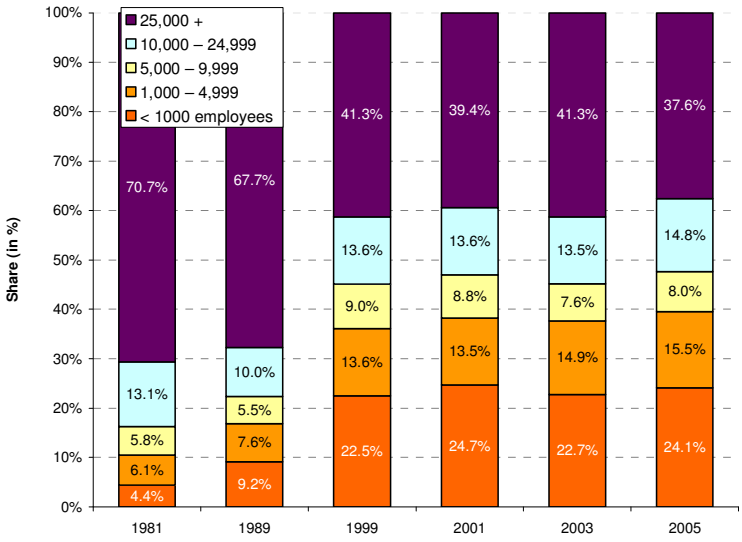
The technological evolution is more an accelerator of open innovation than a cause. Open innovation means sharing information with others. It's obvious that if it's easier to exchange information, open innovation becomes more important. For example the internet, which became more and more important as a way to communicate in the last decade, is now an essential element in open innovation.

The idea of open innovation is not a recent development. Bassala (2001) found that in the 19th century German R&D labs already applied a premature form of open innovation. At the time open innovation may not have been the right option, but nowadays, with globalisation and the technological evolution as instigators, a new innovation strategy is inevitable and that strategy is open innovation.

Next, I would like to show the growing importance of innovation in SMEs. Since the 80s SMEs have increased their R&D budgets more rapidly than large firms. This is shown in figure 1. You can see clearly that in 1981 the large firms spent 70% of all the money that was spent on innovation and smaller firms only 4,4%. We see that since then the part of

the smaller firms has increased while the part of large firms has shrunk. At the end of 2005 we notice a share of 37,6% for the largest firms, while the smallest increased their share to 24, 1%. This is an enormous increase in these 24 years. The R&D budgets from the smaller firms grows ten times faster than the ones of large firms. The budgets of large companies increased by a factor of 4 during this period which means that those of the smaller companies multiplied by 40. These numbers clearly show that SMEs have become much more important in innovation.

Figure 1: Growing importance of SMEs in innovation



Source: Chesbrough, H., Gassmann, O., & Vanhaverbeke, W. (2008). How smaller companies can benefit from open innovation . California Management Review.

In chapter 2, I will start by explaining in detail what open innovation is all about. I think it's essential to know more about open innovation before drawing the attention to the role of SMEs.

In chapter 3, I will continue by giving an overview of the characteristics of a SME that plays an important role in the open innovation process. From this, opportunities can be derived that give a good indication about the role of SMEs in the open innovation

process. However, as I mentioned before, the subject is understudied. Therefore I started my own research.
In the following three chapters (4, 5 and 6), I will discuss the open innovation approach of three Flemish SMEs: Curana, Alupa and Televic. With these three companies, I was able to cover the three different group sizes of SMEs: micro-, small- and medium-sized. Another important fact about these SMEs is that they all intensively make use of open innovation practices. I performed my research through interviews with key personnel and desktop research. The open innovation approaches of each company will be discussed by analysing the development of innovative products.
In chapter 7, I summarize the results from the cases and compare them with the existing theories. To conclude I will give an indication about future topics that should be researched further.

CHAPTER 2: OPEN INNOVATION

2. Open innovation

In this first chapter, it's my intention to explain the term 'open innovation'. I will start by giving a brief history of innovation in general. Then I will clarify definitions about related terms like innovation and closed innovation which might help to explain the meaning of open innovation. I will also compare closed with open innovation. This comparison will give the reader a better view on the differences between these two innovation strategies. It will show that in open innovation more parties are involved than the company itself. Therefore I will continue with an overview of those other parties.
Finally, I will finish with two topics that are getting more important in any innovation process; innovation intermediaries and intellectual property.

2.1 History of innovation

In this section I will illustrate how the idea of innovation has changed over the past 60 years. Thus it will be easier to understand the evolution of innovation management.

According to van der Duin, Hartmann & Ortt (2006) the way we look at innovation has changed over the past 60 years. They start their story right after the end of the second World War. In this period they determined four different approaches of innovation management. The first one (1950-1965) is described as technology push. Companies developed a lot of new technologies. And when they had a new technology they always made new products based on it, without holding the customer's opinion in mind. The R&D departments in the firms were organised like universities. Scientists and engineers tried to develop as many innovations as possible. The second approach (1965-1980) was the opposite of the first, namely market pull. People began to understand that the need of the customers were the most important in innovation and that science and innovation had to attribute to this. In contrast with the previous approach they now first determined what the need of the customers was, and would adjust their research in these directions. The problem with this approach is that customers know very well which adjustments they want on existing products but they don't have a good idea about new products.

The two previous approaches were linear methods. The third approach (1980-1990) tried to solve this issue by combining the previous two in a new one, but in practice it was still

a very linear method. More important in this approach was that innovation became a part of the strategy of the company. In this way, innovation became more important in the total company picture. The last approach (1990-present) is the open innovation approach that we know today, where innovation is an outcome of different contacts between stakeholders.

This short outline of how innovation management has changed over the last 60 years and especially how it evolved into the open innovation approach.

2.2 Definitions

2.2.1 Innovation

The first step in explaining open innovation begins with the term innovation. Mckeown (2008) describes innovation as follows: "The term innovation means a new way of doing something. It may refer to incremental, radical, and revolutionary changes in thinking, products, processes, or organizations. A distinction is typically made between invention, an idea made manifest, and innovation, ideas applied successfully."

As one can understand, innovation is important for any company to survive. If a company does not innovate it stands still in comparison with its competitors. This means losing customers and revenue. Through innovation companies can gain an advantage over their competitors. As the definition describes this advantage can also be gained in other areas than product development.

2.2.2 Closed Innovation

A second definition that might clarify more what open innovation stands for is the definition of closed innovation which is the opposite. Henry Chesbrough (2003) says the following about this:

> "Closed Innovation … is a view that says *successful innovation requires control*. Companies must generate their own ideas and then develop them, build them,

> market them, distribute them, service them, finance them, and support them on their own. This paradigm counsels firms to be strongly self-reliant, because one cannot be sure of the quality, availability, and capability of others' ideas: "If you want something done right, you've got to do it yourself." (Chesbrough, 2003, p. xx)

From the definition we can conclude that closed innovation refers to a company which does almost all of its research in house. They won't accept input from outside the firm. The internal research creates a lot of spillovers but those are seen as a byproduct of the innovation process (Chesbrough, Vanhaverbeke, West & eds, 2006). According to Carlino, Gerald A. (2001) and Jaffe et al (2000) a knowledge spillover, in knowledge management economics, is a non-rival knowledge market externality that has a spillover effect of stimulating technological improvements in a neighbour through one's own innovation.

Fifty years ago, when the markets were very local and communication tools were undeveloped, this approach was very successful. And today in some cases this might still be the best option for some industries. But with the markets going global and the growing power to exchange information outside their boundaries, companies cannot ignore the enormity of information that is available. The problem is to collect the information that adds value to the company.

2.2.3 Open innovation

With innovation and closed innovation explained we can move on to open innovation. As the founding fathers of the term open innovation, I think Henry Chesbrough's definition (2003) is the most appropriate:

> "Open Innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology. Open Innovation combines internal and external ideas into architectures and systems whose requirements are defined by a business model. The business model utilizes both external and internal ideas to create value, while defining internal mechanisms to claim some portion of that

> value. Open Innovation assumes that internal ideas can also be taken to market through external channels, outside the current businesses of the firm, to generate additional value." (Chesbrough, 2003, p. xxiv)

Open innovation means that a company breaks through its own organisational boundaries to generate more ideas and to be able to accelerate its own innovation process. But open innovation is not just one way traffic. A company can extract information from the outside but it can also place its own ideas to the disposal of others. The condition to work successfully with partners, is that the own research department has enough resources (money, time and expertise) and is organized in a way to absorb affectively externally developed technology.

Having read this definition, I will give you more information about the internal and external possibilities and the role of the business model. I believe these topics deserve more attention to give you a better insight in open innovation.

2.2.3.1 Internal and external possibilities

Developing new technologies is expensive. So a company has to focus on which technologies it will develop and how it's going to do that. In the past, large companies developed a lot of new technologies but only a few turned into a product, the rest would be put away and never be used again. The unused technologies were seen as a cost of development. Nowadays research has become so expensive that it's impossible to develop technologies without using them. Companies search for ways to make research less expensive and more profitable.

With technologies becoming more available, a lot of new possibilities emerge. Chesbrough (2003) gives some indicators to prove that technology is more widespread. In the past, the 1970s, the biggest part of the technology was owned by large R&D organizations. The dominance of these organizations has ended. The first indicator is that the quality of university scientific research has risen and more important that this knowledge is shared more with external partners. Other positive evolutions are that more and more smaller companies possess patents and that more patents go to companies

located in other countries, so that patents are widespread all over the world. The last indicator is the increase of college graduates and post-college graduates in the United States. This is important because these graduates are the start for new ideas. The rise of educated people will certainly evolve into an increase of knowledge. The evolution at universities is characterized by internationalization. Every year more students go and study abroad and universities also take part in foreign cooperations. This globalisation will only enhance the development of new ideas and technologies and diffuse them even more.

A lot of knowledge exists outside the company. Chesbrough (2003) mentioned a quote of the company Merck. Merck is one of the leading pharmaceutical companies in the world and made the following statement in their annual report from 2000:

> "Merck accounts for about 1 percent of the biomedical research in the world. To tap into the remaining 99 percent, we must actively reach out to universities, research institutions and companies worldwide to bring the best of technology and potential products into Merck. The cascade of knowledge flowing from biotechnology and the unravelling of the human genome – to name only two recent developments – is far too complex for one company to handle alone." (Chesbrough, 2003, p. liii)

When a scientist wants to develop something or when he's looking for the solution to a problem, it's possible that in another company, someone else has already come up with that idea or that solution. It's hard for these scientists to find out where those other researchers and companies who work on that topic are located. That's why the last years the business of trading knowledge has been increasing rapidly. Intermediary organizations assist companies in their search for technologies. These companies try to create a market bringing demand and supply of technology together. Also networks of scientists are becoming more important. Networks already exist where scientists can put questions on forums so other scientists can help them come up with a solution. All these evolutions offer possibilities to companies to accelerate their internal research process without significant investments.

Not only can companies extract ideas, they can also put their knowledge out there for others.

The technology that used to be put away can now be offered to others. The redundant knowledge can also be offered to knowledge intermediaries who offer them to their clients. If another company is interested, a deal can be worked out between the parties. The problem of spillovers, generated by the large research organizations like Bell Labs and PARC, was already criticised by Nelson in 1959. He mentioned that companies who invested in the research of these organizations had no power to gain a return from those spillovers. Katz and Allen (1985) described the mentality of these large research facilities as the Not Invented Here (NIH) syndrome. At every facility they thought they were the best in the world and thereby they rejected any input from outside.

A second opportunity was already mentioned in the previous paragraph: the use of spin-outs when the own business model isn't ideal to work out the project. The following quote of Chesbrough (2003, p. lii) is a good summary of the possibilities that open innovation offers to redundant research: "The projects that sat on the shelf between the research groups, and the development groups were part of 'the cost of doing business' in the old paradigm. They become revenue opportunities and potential new business platforms in the new paradigm."

These opportunities clearly indicate the added value of an open innovation strategy. Compared with the past, it isn't necessary anymore to invest the most in research to be the best player of the market. It's more important to exploit the possibilities of internal and external resources to its maximum and to make the combination work. This leads to new responsibilities for the research department. Instead of focusing solely on research, they have to extend their range of activities to adapt to the changing knowledge landscape. According to Chesbrough (2003) the R&D department in the current innovative environment should be organized for the following reasons:

- To identify, understand, select from, and connect to the wealth of available external knowledge
- To fill in the missing pieces of knowledge not being externally developed
- To integrate internal and external knowledge to form more complex combinations of knowledge, to create new systems and architectures

- To generate additional revenues and profits from selling research outputs to other firms for use in their own systems

Source: Chesbrough, 2003, p. liii

2.2.3.2 The role of the business model

The business model plays an important role in the innovation process as mentioned in Chesbrough's definition. Primary, a business model is the tool to evaluate R&D-projects (Chesbrough and Rosenbloom, 2002). Most business models are still focused on closed innovation. To successfully apply an open innovation strategy the business model has to be adapted to this new strategy. Otherwise any effort will be pointless. A good example is JAGA, the radiator company, located in Diepenbeek, Belgium. At first this company was a producer of traditional radiators but increasing competition from less developed countries pushed the company into serious trouble. They were forced to start the search for a niche in the radiator market and their eye fell on design radiators. To solve their problems, they changed their business model and focussed more on specialised products. This meant involving customers more into the development of new products, in a way they can contribute to the design of their radiator. The company is now a pioneer in its own business.

Of course not every project fits the business model of the company. Large companies are familiar with large projects, but smaller projects on the other hand, although they can be very promising, usually fail when developed further in these large organizations. The structure of the large company does not have the right characteristics to successfully finish a small project. The solution for this problem are spin-offs. These small companies with their own business models are much more suited for these small projects. The large company can keep its focus on its own core business while the small company can develop the technology into a promising product. When the project is finished the large company can acquire the small company or let it go its own way.

2.3 Open versus Closed innovation

The next comparison by Chesbrough (2006) clearly indicates the most important differences between closed and open innovation:

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

Source: Chesbrough, 2003, p. xxvi

The table above shows the view on innovation embedded in both approaches. The closed innovation advocates main idea is that they have to do everything on their own and that the amount of resources are directly proportional to success. The advocates of open innovation on the other hand see the benefit in opening up to external ideas. They also believe that a good management of these possibilities is worth more than investing everything in internal research.

As we can conclude from the upper table, closed innovation is more conservative in comparison with open innovation. It doesn't adapt to the existing changes in the world, like globalisation and the technological revolution, which offer a lot of new possibilities. On the other side, in some industries, like the chip industry, extensive research is still needed to gain success, but for the most industries closed innovation does not lead to success anymore. Does this mean that companies should stop investing in their internal research? Of course not. The research department has to be able to work with the external technology; in other words, it had to increase its absorptive capacity (Cohen and Levinthal, 1990). Investments should be used to prepare internal researchers for the external technology instead of doing basic research in house.

Open innovation on the other hand uses the advantages of these global changes to its maximum and that's why companies that are implementing open innovation correctly, experience significant benefits. It's clear that the phenomenon of open innovation is only at the beginning of its existence and that a lot still has to be learned about the topic through research and experience. However, for me it is clear that open innovation is the new way to innovate.

2.4 Open innovation partners

In practice the partners that can attribute to a company's innovation process are not just other companies. Eric von Hippel (1988) found four groups of possible external sources that can enhance the internal innovation process: suppliers and customers; universities, government and private laboratory; competitors; and other nations. This sumup includes almost all the possible partners for open innovation but it's not entirely complete.

Other possible partners might be companies from other sectors. At first sight, these applications lie miles apart from each other but out of the box thinking might create successful cooperations. There are enough good examples that prove otherwise. One illustration of a collaboration between two companies from another sector is the post-it noteblocks. The idea is based on a glue that was not strong enough for other applications. The company that developed the post-it papers works in this case together with a chemical company for the glue. Another example is the product called Senseo. In

this collaboration, coffee producer Douwe Egberts and Philips, a large player on the electronics market, created a new kind of coffee machine that is still a big success.

A second group of not so obvious partners are financial institutions like banks and venture capitalists (Romijn and Albaladejo, 2002). Venture capitalists, that are on the one hand a threat to other companies because they constantly try to extract key personnel and technology, could on the other hand be interesting partners (Chesbrough, 2003). Venture capitalists without a doubt pursue opportunities in markets with a substantial amount of risk neglected by the large companies. When large companies want to spin out certain technologies, VC companies can be partners to finance those projects. In this way the large company doesn't bear all the risk and this is the same for the venture capitalist(s).

2.5 Innovation intermediaries

Getting access to external information is, although we have the internet and other resources, more difficult than it appears at first sight. Innovation intermediaries can help companies in their search for new opportunities as well as help them in offering their technology. The biggest problem in offering technology is called the Arrow's Information Paradox. Possible buyers have to understand what the technology is about, but there cannot be too much revealed of the technology. Otherwise the buyer can develop it himself. Chesbrough (2003) mentioned five other problems that arise when accessing external sources:

- Managing and protecting property
- Managing contamination risk
- Identifying useful, non-obvious sources
- Fostering a two-sided market
- Scaling efficiently with volume

Source: Chesbrough, 2006, p. cxxxvii

Most of these intermediaries are internet marketplaces but there is a difference in the services they offer and the method of working. Some operate as agents who work with one side of the transaction whereas others operate as brokers of market markers, these are more focused on the result than on the benefit for one side. This makes it difficult to compare the different intermediaries and to know which approach is the best for a certain situation. It's difficult to choose an intermediary if you need one because there is no uniformity. The lack of uniformity is clearly an indication that this market is still emerging.

The success of these companies has been very limited. An article from Lichtenthaler and Ernst (2008) shows that internet marketplaces for technology, like yet2.com and Innocentive are having a difficult time. The results from the study were not positive. The maximum number of transactions any company had done through the marketplaces was 2 and less than 10% would consider working with the intermediaries again. The two most important causes for these results where, according to Lichtenthaler and Ernst, that the intermediaries' approach was too passive and that the quality of the technology offered was very poor. Clients only made their redundant technologies available.

Lichtenthaler and Ernst formulated six guidelines for innovation intermediaries to make them more attractive and to improve their method of working:

- Use integrated service offerings with a consultative element, not just databases, to exchange technology
- Complement intermediary services with internal activities (using knowledge distributed across the organization to link technologies and applications) instead of substituting internal activities with intermediaries
- Complement intermediary services with inter-firm networks, using knowledge embedded in formal and informal networks
- Develop dynamic capabilities of co-ordinating intermediary services, e.g. capabilities for preparing effective and thorough technology offers
- Support actively the technology transfers, as technological knowledge is often relatively complex to transfer
- Align the intermediary services with appropriability regimes, ie. use intermediaries for technologies and industries where there is less possibility of

appropriability problems (for example, in chemical industry, where patents protect technologies relatively effectively)

Source: De Ridder, 2008

The intermediaries are already evolving from the ordinary databases they were, into brokers. They also felt that their role had to be more consultive and active because technology is too complex to be traded in the way they were used to.

Finally, Lichtenthaler and Ernst noticed that pharmaceutical and chemical but also semiconductor and electronics industries saw less potential in the intermediaries' activities than the automotive and machinery companies. De Ridder (2008) suggests the difference in interest between these industries stems from the fact that the companies from the first group of industries have their own networks to trade their technology compared with the second group.

From these facts we can conclude that intermediaries can play an important role in the open innovation process, if they keep evolving in the way they are and if they focus on the industries that are interested.

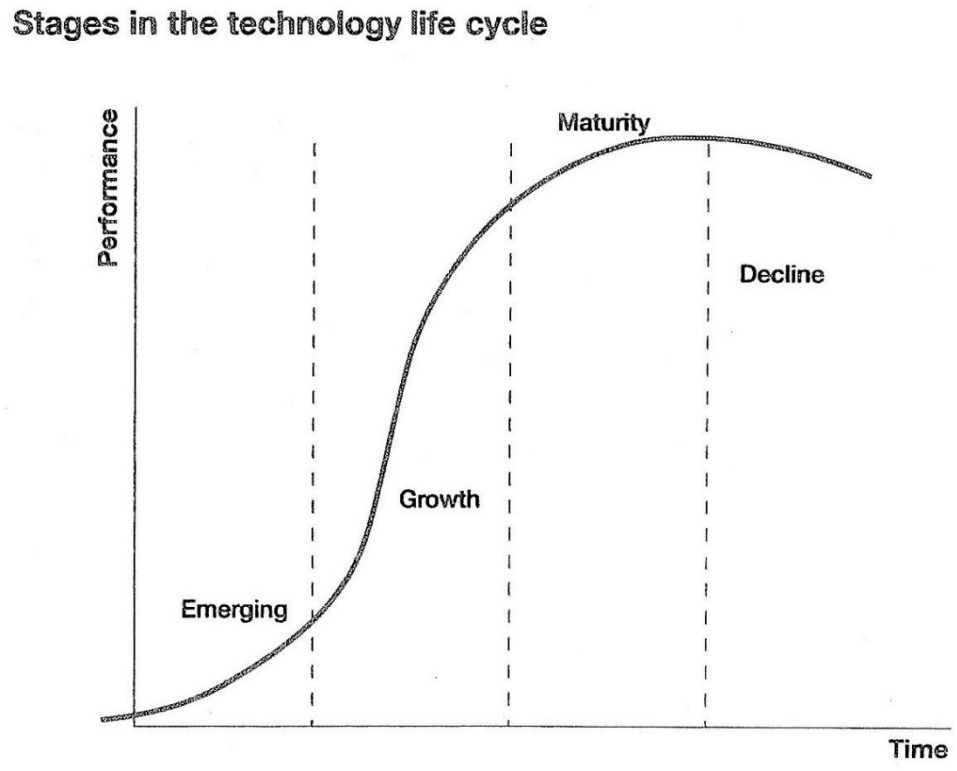
2.6 Intellectual property protection

Nowadays, it is crucial for the companies to protect their ideas and products in order to make the innovation process profitable. In order to protect their inventiveness, patents are crucial. Not every technology needs a patent and patents are expensive to appeal for. As a result good management will pay off. According to Chesbrough (2003) the management of patents should be tuned to the various stages of the technology life cycle.

As we can see in the picture on the next page, the TLC contains four different stages. The model does have some features to simplify it. The first one is the presence of a dominant design to stimulate the entire market. A second feature is that the performance of the technology is the most important in the early stages. The last assumption is the entry of a high number of companies in the first two stages, compared with the last two ones.

The IP management changes within every stage. Chesbrough calls this the "IP life cycle model" (figure 2). In the introductory stage, the technology has to be developed and protection for this technology has to be chosen. Companies also have to chose if the technology will be developed through the own business model or through a spin-off. The growth phase is the entry in the market. In this phase, partnerships can be established to accelerate the market entry. These partnerships include sharing of the technology. So the company has to be sure the technology is well protected or otherwise one of the partners could try his luck. In the next stage, the maturity stage, the time has come to profit from the earlier investments in IP. The technology increases the revenue of the company but other profitable possibilities are external licensing and spin-offs. In the last phase, the technology is burned out. There are two options: the IP could still play a role in the business model or be offered to another company.

Figure 2: Technology life cycle



Source: Chesbrough, 2006, p. xc

The stronger the IP, the greater the benefit. When applying an open innovation strategy, it's also important to know the IP of every partner. This way certain problems that can occur during the innovation process can be avoided. The tool to examine the company's IP and that of its partners is called patent mapping.

2.7 Conclusion

Open innovation is clearly a new way of creating new ideas and products but there are still a lot of questions yet to be answered. Chesbrough is one of the authorities in open innovation. His ideas and books have shown the success of applying open innovation but some remarks have to be made. He focuses a lot on high tech industries and large companies so his theories cannot be generalized for every company without being cautious. Chesbrough himself indicated that the chip industry still requires extensive research because a huge amount has to be invested to get a result many years later. Even within a company the innovation strategy can differ. Van der duin, Hartmann & Ortt (2006) give the example of Philips. For their medical division they work together with lead users and in the chip division a technology push strategy is applied.

This chapter gave you an idea what open innovation is all about but as I mentioned before, the theory of Chesbrough cannot be generalized for SMEs without any changes. Therefore, in the next chapter I will continue with providing an overview of the existing theories about SMEs and open innovation.

CHAPTER 3 : OPEN INNOVATION IN SMEs

3. Open innovation in SMEs

In the previous chapter I clarified what open innovation is all about. Most of the literature about open innovation is focused on large companies and the high tech industries. In this chapter I would like to focus on the literature concerning open innovation and SMEs because, as I exemplified in the introduction, SMEs are increasingly engaging in open innovation relations. The increase has not gone unnoticed in the academic world. The last few years the interest has grown to study how SMEs are involved in open innovation practices and what kind of benefits the process offers to them.

I will begin by indicating which sources of innovation are the most important for SMEs. Than a summary will be given about the barriers that make it hard for SMEs to apply an open innovation strategy. Next, I will discuss the strengths and weaknesses of SMEs while innovating with external partners, by comparing them to larger counterparts. Based on these strengths and weaknesses I will then give an indication about opportunities for SMEs. There is a great variety in the large group of SMEs therefore I will continue by discussing differences in-between groups of SMEs. Afterwards, the first exploration of open innovation in SMEs will be reviewed and analysed. Because in the next chapters the open innovation practices from three Flemish SMEs are analysed, I will finish by giving an overview of policies towards open innovation in Flanders.

3.1 Sources of innovation

Unizo(2008), the Belgian federation of independent entrepreneurs, wrote an article about the condition of SMEs in Flanders based on results of the Community and Innovation Survey (CIS) and information from Technologie,Organisatie en Arbeid (TOA). In this article they mention the seven most important sources of open innovation for SMEs: customers, suppliers, personnel, research organizations and universities, consultants and advisors, internal research and results from market research. Customers were the most important source of innovation followed by suppliers and personnel. The four other sources all scored substantially lower. I want to remark that competitors as well as venture capitalists or other investors were not mentioned in this list.

3.2 Motives for open innovation

Unizo (2008) also discussed the reasons for a SME to apply open innovation practices. The most important motive was improving the quality of products and services. The following three motives have somewhat the same importance: motivating personnel, optimizing employees competences and cutting costs. The last motive they found was the development of new products and services. This motive was only mentioned by one fifth of the respondents. A remark on the first motive, is that a paper from Cohen and Klepper (1996) as well as one from Fritsch and Meschede (2001) indicates that product innovations are more important. For large firms this is different, they can benefit more from process innovation because they produce products in larger quantities, which makes these innovations more profitable. Another reason for this difference is given by Rogers (2004). He claims that there are less licensing opportunities for process innovation compared to product innovation.

According to de Jong, et al (2008) the most important motives for open innovation are market related. Examples are keeping up with market developments, customers and increase growth. The practices pursued for this goal were venturing, participation in other firms and user involvement in the innovation process as the most used. A second, but less important, reason to use open innovation was corporate renewal. Five practises were evenly exercised by companies that had corporate renewal as a goal: venturing, participation in other firms, network usage and customer involvement. The last motive with some significance was gaining knowledge but this only through outsourcing.

Nevertheless the most interesting result was that venturing, participation in other firms, interorganizational network and customer involvement were used for the same motives, market related and corporate renewal. Only customer involvement was not used for these motives. Employee involvement was the only practice mentioned for motives like management conviction, optimizing capabilities and involving employees. De Jong et al (2008) conclude that the first group are a complementary group of activities which could be important for an SME in developing a open innovation strategy.

3.3 Comparison between SMEs and larger entreprises

3.3.1 Strengths

Chesbrough, et al (2008) point out five characteristics that are an advantage the SME during the open innovation process:

- size
- focus
- business specialization
- entrepreneurial persons
- speed

Through their size, SMEs are mostly active in smaller markets. These are not attractive for large firms because their business model is only profitable when applied to large markets. If large firms want to exploit opportunities in these markets, they have to cooperate with SMEs or spin-off the technology.
The small size obliges SMEs to focus more than large firms on certain objectives. Focusing on a particular market, customer type, expertise or technology isn't bad, moreover it can be a competitive advantage compared with large companies who can't afford to focus on a single customer or technology because they have a more scattered set of objectives.
The focus can lead to specialization in a certain business. SMEs who become specialists in a particular business usually develop special capabilities to reach that stage. These unique capabilities add value in the innovation process.
In comparison with large firms, R&D personnel in small firms is more entrepreneurial. I believe this is not limited to the R&D personnel but to all the employees of an SME. It's safer to go and work for a large firm that has existed for hundred years than in a small company that is only a couple of years old. In a SME the actions of one person have a bigger influence on the result of the company. The climate in a SME is more attractive to entrepreneurial people. This behavioural advantage is also acknowledged by Rothwell and Dodgson (1994). In this context Audretsch and Vivarelli (1996) suggest that the R&D productivity of SMEs is higher than that of large companies because they are better capable to use external knowledge. Even though this cannot be generalized for all businesses. Acs and Audretsch (1991) conclude the same but only for highly innovative

industries because of the importance of skilled labour here. This high productivity might be explained through the fact that SMEs are more R&D-intensive than larger companies. The analysis from Unizo (2008) shows that the expenditures for R&D as a ratio of total revenues or the number of researchers as a percentage of the total employment were both higher for SMEs.
The small size and the shape of the business model makes it a lot easier to take decisions because informal communication lines are shorter (Nooteboom, 1994; Narula, 2004). In an innovation process the speed of taking decisions can be crucial to the success of the project. The business model can also be modified more quickly to adapt to the market. This gives them a potential advantage in fast changing markets. Nooteboom (1994) as well as Rothwell and Dodgson (1994) acknowledge that this flexibility enables SMEs to benefit more efficiently from external networks, which gives them an advantage over larger competitors. In addition, Ahern (1993) as well as van Dijk et al. (1997) stated that these networks are necessary for SMEs to overcome the barriers mentioned in the previous paragraph. Another advantage of this flexibility is that SMEs have on average less problems in managing difficulties during the innovation process. Unizo (2008) supports this flexibility towards managing difficulties. Their analysis showed that for all barriers, the size is directly proportional to the number of companies mentioning the barrier.

3.3.2 Weaknesses

Next to these advantages, Chesbrough et al. (2008) also formulated four structural deficiencies:

- lower absorptive capacity
- lack of the ability to absorb external ideas and technologies
- unattractive as partners
- small market power

SMEs have less resources (money, personnel, etc) than large firms that can be used for innovation. For instance the largest SMEs have a turnover of around €50 million whereas large companies have turnovers that run into billions. This difference makes it more difficult to build up durable relationships with partners but it also means that they have

to make choices with whom they will work. Large entreprises on the other hand can try out all the open innovation instruments and see which works for them. In 2006 already mentioned that SMEs have more difficulty in getting access to resources and capabilities that are crucial for innovation.
The limited personnel involves that you don't have the best scientists in the field working for you. These scientists may not be able to process the external technologies and ideas. It will also make the partnership with universities and other research organizations more difficult.
Compared with large companies, smaller companies lack a certain reputation, especially when working with university professors or other experts. Working with large entreprises gives the experts more attention and more resources. This opinion corresponds with Rogers (2004), who claimed that SMEs have less access to knowledge and human capital than larger firms.
The small size of the company doesn't allow them to gain a large market share and the market power that goes with that. The lack of market power makes it more difficult to introduce new technologies into the market. They could protect their technology but patents are expensive and as mentioned before, the resources are limited. Without the patent infringement small companies run the risk that another company with more market power will copy the technology and use its power to undercut the company that originally developed the technology.

3.4 Barriers for SMEs

The disadvantages mentioned in the previous chapter imply that there are certain barriers for SMEs to overcome when they want to be involved in open innovation practices. The most important conclusion de Jong, et al (2008) draw concerning barriers to open innovation was that when SMEs worked together with other firms through venturing, participation in other firms, involvement of external parties and users, culture and organization of innovation are the biggest obstacles. Another important barrier was the administration that comes along with open innovation, especially when SMEs wanted to start up a venture. When searching for network partners the quality of the partners would prevent companies from joining in. Next in working with users or customers, these partners need be enthusiastic about the project or else it will be very difficult. Finally they found that when a company wanted to involve employees in the innovation process

the availability of resources, the competences of employees but especially their commitment are important barriers to involve them.

Unizo (2008) also listed four barriers. The first and most important is difficulties in understanding computer science or knowledge in general. The second barrier is resistance from personnel. Thirdly, the resources of the company are insufficient and the fourth barrier is resistance from management itself.

The results from de Jong et al (2008) are more specific to certain open innovation practices but in general we can conclude that culture, lack of resources and knowledge and the organizing of the process are the biggest barriers to start with an open innovation strategy.

3.5 Opportunities

Based on the advantages from the previous subsection Chesbrough et al (2008) concluded some opportunities. The first one originates from the growing interest of large entreprises concerning innovative partnerships. With their business specialty, SMEs can add value to the innovation networks of larger firms.
Secondly, larger firms are creating platforms where other companies can use their technology to accelerate product development. SMEs can profit from the available information and financial help but the large firms can also help to bring possible products to the market.
Next to being the developers of new technologies, SMEs are also users of new technologies. In this role they try to improve these technologies through the use of communities. This of course is interesting for large firms to see how these small companies cooperate in improving existing technologies.
The fourth opportunity is based on the presence of SMEs in niche markets and other small market segments. The strategy to reach that position is an added value as well as the presence in, for large firms, unreachable markets.
The next opportunity is open source development. This principle supposes that opening up a software code to customers, competitors, etc. benefits the further development of applications and eventually will point out the superior code.

Finally, the fact that SMEs are more specialized gives them a head start to innovate and makes them ideal partners for large firms that have not developed these specialized skills.

3.6 Differences between SMEs

The study from de Jong, et al (2008) analyzing open innovation in 605 innovative Dutch firms also searched for differences between SMEs. First they thought it would be interesting to see if services and manufacturing companies have different approaches towards open innovation because both sectors are assumed (2008) to be fundamentally different. The next division they would make was based on the differences in size of SMEs. They made a distinction between small firms (up to 100 employees) and medium sized companies (100-499 employees). Next to these differences, de Jong et al studied the motivation of companies to get involved in open innovation and the barriers that complicate the open innovation processes. Also the use of the different practices of open innovation were studied over the last three years. These practises were divided in two groups: technology exploitation and technology exploration. The former is the inside-out movement, the latter is the outside-in movement of technology. These are the practices that were studied by de Jong et al:

Technology exploitation:

- venturing
- license IP to other firms

Technology exploration:

- customer involvement
- employee involvement
- network usage in innovation processes
- participation in other firms
- outsourcing R&D
- license IP from other firms

The general trend from the study was that SMEs are using these practices more and more. With the opportunities mentioned in the previous subsection this should not be a surprise. The results show that customer involvement, employee involvement and network usage were very popular between Dutch SMEs. Almost every SME made use of these practises which also knew the highest increase over three years.
The results for differences in the use of open innovation practices for manufacturing and services companies were not so distinct as the researchers originally thought. The results were more or less the same except for three practices. Manufacturing firms made more use of outsourcing of R&D and the licensing-out of IP. Services firms on the other hand made significantly more use of venturing.

The differences between the groups of SMEs based on size were more obvious. First, the medium-sized SMEs made more use of all the practices. Also, the increase in use of all exploration practices was significantly higher for larger SMEs than for the smaller ones. The authors conclude that larger SMEs applied the practices much faster than the smaller ones. They point out that this could lead to an increasing differentiation between these groups of SMEs. Secondly, these differences were the largest between four practices: licensing -in and –out of IP, outsourcing of R&D and participation of firms.

This was also reflected in the cluster analysis they performed. The three-cluster solution showed three significantly different groups. The first groups used all the practices extensively. The second group were the most involved in customer and employee involvement and network usage. Licensing of IP wasn't used at all by this group. The last group of SMEs limited themselves to the less complex practices like employee involvement and network usage but they used it significantly less than the second group. The first group's rate of use did not only increase the strongest, it also contained the largest number of the medium-sized companies. This only strengthens the conclusion of the de Jong et al.

The conclusion from de Jong et al is supported by the study of Unizo (2008). They also concluded the existence of three different groups of SMEs. The first group using open innovation practices very limited or not all. They have to be informed about the necessity of open up the innovation process. The second makes efforts but doesn't exploit them to full potential. According to Unizo they need advice and easy access to networks to develop further. The last group already has the support they need and integrated open

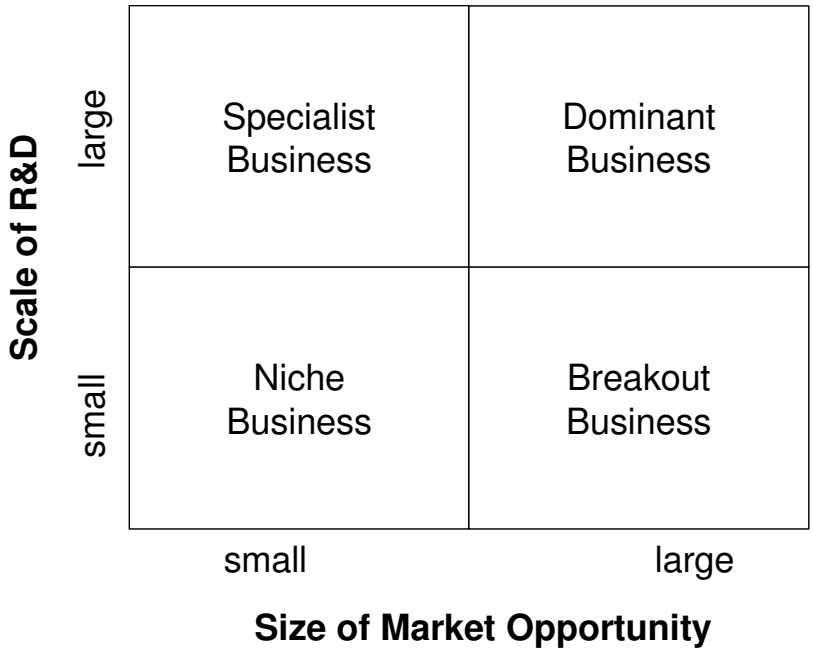
innovation in their strategy. They can still use further advise but more importantly financial assistance for risky projects.

3.7 A first exploration of open innovation in SMEs

Chesbrough, et al (2008) drew the attention to the lack of research about SMEs concerning open innovation by developing a theory. They started by classifying SMEs in four groups based on two characteristics:

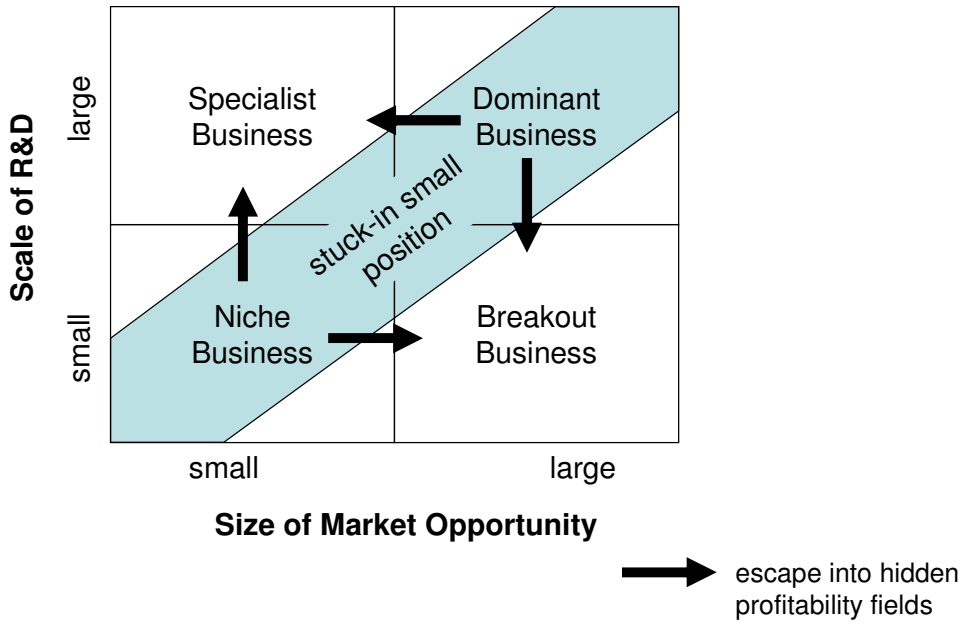
According to Chesbrough et al. (2008) the four groups don't have the same chances to survival. The sales and profits of the niche business are to small whereas the dominant business is likely to face competition from large companies because they have a strategic advantage over SMEs in the value chain. On the contrary, the specialist and breakout business are strategically better positioned. Therefore the authors (2008) developed four open innovation strategies to address the problem of the niche and dominant business (Figure 4).

Figure 3: Typology of business fields



Source: Chesbrough, Gassmann & Vanhaverbeke (2008)

Figure 4: 0pen innovation strategies for SMEs to exploit



Source: Chesbrough, Gassmann & Vanhaverbeke (2008)

The first strategy is the specialization strategy. This strategy will transform a niche business into a specialist business. By opening up the innovation process the SME can benefit from available opportunities. The personnel is usually well informed about these opportunities but lacks the resources to profit from them.
The second strategy pulls the niche business towards the breakout business. They call it the leverage strategy. This strategy implies the company has to come up with a new business model to address new customers in new markets. The change has to be based on competitive advantages developed in the niche business like a specific competence, brand or the business model itself.

Chesbrough et al (2008) also developed two strategies for the dominant business. The first strategy forces the SME to narrow its focus to a smaller market where it can become a dominant player as a specialist business. Again the business model has to undergo a change to adapt to this new situation.
A second way to escape the threat of big companies is reducing internal research and focus more on specific needs from customers. Thereby holding the in to account the

technology life cycle (chapter 1). Opportunities for SMEs are situated in the growth and maturity stage of a technology.

As you might have noticed, this first exploration on open innovation strategies for SMEs is very hypothetical. Chesbrough et al (2008) based these assumptions on certain examples and their own experience and knowledge about open innovation.

3.8 Innovation landscape in Flanders

In 2008 Chesbrough, de Jong, Kalvet & Vanhaverbeke analysed the open innovation situation and policies in Flanders. Because Flanders is a region in Belgium, SMEs are influenced by national as well as regional policies. Similar to the EU-average, 99% of all companies in Belgium are SMEs and 66% of all people are employed by these SMEs. These numbers clearly indicate that SMEs play an important role in the Belgian, and therefore also the Flemish, economy. With Belgian only performing in the line of the EU average on open innovation and to ensure future growth, the Belgian as well as the Flemish government have indicated to focus more on innovation.

The results from the analyses show that in Flanders the open innovation policy towards SMEs is very well equipped to cope with most of the difficulties SMEs are facing. Especially financial and network stimulation measures are well developed. Nevertheless there are certain areas that could use more attention. First the policy is to opaque according to Unizo (2008). Second, as being an important instigator, governments can accelerate innovation if they take the right decisions. Therefore the next subjects should get more attention to help SMEs even more:

- support technological standards
- support user innovations
- enhance technology markets
- support corporate entrepreneurship
- balanced incentives
- labour market and knowledge immigration

Especially support for user innovations and technology markets are important. User innovation can be easily enhanced by integrating lead users in to networks. The fact that user innovation is more process related might have left them out of present policies because SMEs are more oriented to product innovation. This diminished the gap with larger companies concerning product innovation but not for process innovation. Government incentives can stimulate SMEs to focus more on user innovation and thereby closing the gap with larger firms for process innovation as well.
As mentioned in the previous chapter, technology intermediaries could play an important role in the innovation process through the trade in IP but their development is still in an early stage. Their existence could be crucial for SMEs because IP is too expensive and time-consuming. At the moment there are now real measures to support SMEs in using more IP. Policies can be developed to direct assistance for SMEs but supporting technology intermediaries is easier.

To conclude, regional and national policies are important to stimulate open innovation in SMEs but as we all know open innovation doesn't know boundaries. Therefore policies should be developed at the highest levels possible. This doesn't implicate that regional is useless because a lot of SMEs operate locally and need local assistance but when SMEs grow out of their local position, European measures for example become more important.

3.9 Conclusion

Open innovation is becoming more important for SMEs, and SMEs for open innovation. Recently the interest in the subject is growing larger, however the literature around the subject is still very limited and incomplete. Nevertheless, the research that has been done towards open innovation in SMEs clearly shows that there are a lot of opportunities for SMEs. The fact that open innovation practices are being used increasingly in SMEs, indicates that these companies are noticing these benefits as well. Of course, it's not all good news. The characteristics of SMEs bring along certain difficulties in comparison with large firms. To support these small companies in better understanding open innovation opportunities and threats, further research has to be done. Therefore I will continue by analysing three SMEs. The results from these cases will be compared with the existing literature, discussed in this chapter. In the conclusion I will also give an indication about future topics for research that have been left out until now.

CHAPTER 4 : CASE 1 CURANA

4. Case 1: Curana

4.1 Introduction

Figure 5: logo Curana

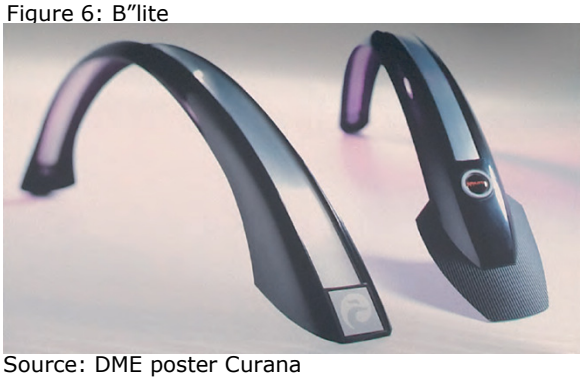
Source: www.televic.com

Curana is a Flemish SME, with 10 employees, located in Roeselare. It's a company run by the family Vens. At this point the company is run by the third generation with Dirk and Geert Vens as its CEOs. The company was founded in 1946 by their grandfather. For two generations long the metal processing company has been selling mudguards and racks to Belgian bicycle producers. At that time every country had his own kind of bicycle, so there was almost no export. When Dirk and Geert started running the company in 1990 Curana had acquired a monopoly in Belgium under the leadership of their parents (VOKA, 2008).

In that period, the mountainbike came out of nowhere. Until then, the bicycle business had been very conservative without any change. The success of the moutainbike was the start for something new. Suddenly, the market for bicycles went global and competitors as well as customers went international. Also the time of immobility was over. The bicycle parts were evolving in the direction of aluminium and plastic based instead of metal based. This required more manpower but the price had to stay level. As a result that a lot of suppliers like Curana had to shut down. Also Curana went from a quasi monopoly in Belgium to worldwide competition. So at the end of the 90s, Dirk and Geert had the choice, shut down or change their strategy.

4.2 B"Lite

Figure 6: B"lite



Source: DME poster Curana

Dirk and Geert wanted to develop a plastic mudguard to follow the competition but they didn't want to make it like all the others. So they went to Pilipili, a design bureau from Kortrijk, that Dirk saw on a fair. The first time they went over to Pilipili only a minor result was achieved. They came up with a

mudguard out of plastic but it didn't really work out when they tried to produce it. Still they went to a customer and showed him what they got. The customer wasn't enthusiastic about it. It had too many disadvantages because it consisted only out of plastic. The biggest disadvantage was the instability of the mudguard. With the remarks of the customer they went back to Pilipili. Soon it became clear that the mudguard had to consist of a combination of plastic and metal. For the new mudguard, they chose a sandwich material (aluminium, polypropene, aluminium) because it was lighter than ordinary aluminium. This allowed them to combine the strength of metal with the flexibility of plastic, which makes it easier to absorb the vibrations. Furthermore, plastic offers more possibilities for the designers. The design element is becoming more important in the world of bicycles. Today having a decent bicycle isn't enough, it also has to appeal to the eye because for some people a bicycle is part of their personality.

The biggest problem with their idea however, was how to weld the two materials (metal and plastic) together. This is where Curana's experience in working with metals paid off. At first they came up with the idea of a plastic centre with two different poles on the outside, that would hold the material together, but the production would be too expensive. Dirk Vens then thought of integrating the two materials during the molding process. The metal had to be placed in a dye and the plastic would be spray-casted around the metal and in this process the two would connect. The molding technique is described as follows by the Technical University of Delft (2005, p.41):

> "During the manufacturing process the properly cut and bent Hylite part is placed inside the injection mold. A small part of the aluminium skin is removed off its edges beforehand to expose the polypropylene core. The polypropylene used to create the final shape is injected into the mold and melted with the exposed core of Hylite, thus obtaining a durable and very simple joint."

With this idea they went to different spraycasters, but only one was interested in the idea. This was important for Dirk and Geert because they needed someone who really believed in the project because otherwise it would be an impossible partnership. A testing mold was fabricated and different things were tried out. They started running out of money but they still believed the project would succeed. Then the problems arose at the spray-caster company. The director left the company and another person became pregnant. The replacements of these people didn't believe in the project. This was a big

problem for Curana because they had signed a deal with the Axel-team, the second biggest bicycle team at the time, that they would buy their product if they where able to get it ready before May 2001, the only moment when new products can be launched on the market. The problems with the spray-caster made the deadline unrealistic. So it was postponed to May 2002.

In January 2002, their spray-caster was still trying but hadn't come up with a solution. Dirk Vens became a member of VKC (Flemish synthetic centre). This changed the whole situation. At the VKC they made the process work but the spray-caster didn't want any priers when they tried to make the process operational. It was two weeks before the deadline and Vens decided to go to another spray-caster, Hanziplast. They were willing to give it a try and they agreed to work with VKC. A man of VKC and the people of Hanziplast worked day and night to make the process work. Eventually they made the deadline because Hanziplast, compared to the other spray-caster, was willing to open up to the knowhow of VKC and of course the external adviser of VKC who worked day and night to make it work.

The product got the name B"Lite. The B"Lite offers a lot of advantages in comparison with the standard mudguard:

- 25% lighter than a plastic mudguard (without losing its strength and rigidity)
- production cost low enough to be competitive with standard mudguard → the manufacturing process only had to be modified slightly
- Improved design
- Hylite can be used as conductor for electricity for the lighting
- Installation of the mudguard is easier
- Easier to combine with other components

Shortly after they developed the new mudguard they got the attention of one of the biggest bicycle manufacturers, Batavia. The partnership of these three companies (Curana, Pilipili and Batavia) was a success and led to the launch of B"Lite. With Batavia as a partner, B"Lite was produced in large quantities and led to a success. This successful partnership was the start for Curana to change the company entirely in the new direction they chose, an open innovation direction.

Figure 7: B”lite

Source: presentation Professor Vanhaverbeke

4.3 Rack

A second product that Curana developed was a rack. Like with the B”lite, Curana chose again for a combination of metal and plastic. The idea was to create a rack with a plastic surface supported by a metal structure connected through a click system. The use of plastic reduces the weight of the rack and the click system reduces the manpower needed to construct it. Also, other components like lights can be integrated easier. The metal used for the metal structure would be aluminium. The problem with aluminium is that it requires manual welding, which of course in a time where manual labour is expensive, is a huge disadvantage. Curana had to come up with an innovative idea or release it.

Figure 8: left: rack; middle: Dvide; right: B"lite

source: (IWT, 2007)

They chose a gas injection method to eliminate the problem of excessive manual labour. A testdie needed to be developed. Therefore Dirk Vens went to IWT (The Institute for the promotion of Innovation by Science and Technology in Flanders). IWT is the only organization in Flanders that supports innovative companies. They assist companies in two ways: they give financial help and offer a range of services like partner search and advice for subsidies. Another interesting fact is that for the largest part IWT focuses on SMEs. A file had to be made to defend the case of Curana. First, tests were needed to control the gas injection method. Three different organizations controlled different aspects of the method (IWT, 2007):

gas injection	→	VKC (Flemish synthetic centre)
strength simulation	→	CBOK (chemical & biochemical research centre)
flow simulation	→	KHBO (university)

After the research, they went back to IWT with the results. The experts of IWT advised them to make some minor adjustments for the final assessment by a panel of experts. In May 2006, after a successful presentation for the panel of experts, the project was

approved. Afterwards, Dirk and his team had the opportunity to look into the notes of the experts which contained some valuable information to finish the project.

Another advantage of working with an organisation like IWT is that you gain credibility. Research organizations and universities have a reputation and working with them lets you profit from this reputation. When Curana worked together with IWT their product was mentioned in their annual report with pictures and everything. This gives the product more credibility. Curana also gives lectures and publishes articles to give their credibility a boost.

4.4 DVide

Nowadays Curana not only produces bicycle parts but they also focus on the aftermarket. This shows that Curana is evolving in to a think tank that brings together external developers and production partners. An example of a product for the aftermarket is the Dvide. This mudguard is based on the same production technique as the B”Lite. The difference with the B”Lite is that the DVide can be separated into two different parts. The advantage is that when the rear mudguard breaks down it can be replaced without the removal of the entire wheel. Another bonus is that because it exists out of two parts, two different colours can be used to give an extra dimension to the bike, as you can see on the picture. Finally, the usual size of a mudguard is rather annoying to stack them onto a store shelve. Again, the possibility to divide the mudguard in two parts eliminates this problem. The packaging of the DVide is also very easy to open with a simple hand movement. Moreover it contains a wrench and an easy manual.

In 2006, they were rewarded the ‘FietsRAI Innovatie Award’ for the design of the DVide but in 2008 it got even better. First, they received the ‘iF Packaging Award’ for the innovative and elegant packaging of the DVide. The award was granted for the first time on the ‘Interpack-beurs, Processes and Packaging 2008’. Through the award, Curana received the iF-label for their winning product, the DVide. Secondly they received two Eurobike Awards for their new dress guard and the CLite (new ultra light mudguards and bashrings). Next they were chosen to be ambassadors for the Belgian Design Forum. And last but not least, they received the prestigious ‘Design Management Europe Award’. The DME Award was granted at the Cardiff Design Festival not for any specific product, but

for the management team that had successfully applied an design strategy in their company. (Visser, 2008)

4.5 Open innovation strategy

4.5.1 100% offensive

At Curana they describe their open innovation strategy as 100% offensive. They try to beat the customer in knowing what he wants by constantly evaluating their products and coming up with new ideas without copying anything from others. Therefore everyone in the company constantly tries to come up with new ideas, which can come forward out of anything. According to Dirk Vens, his employees have to absorb everything they see and experience, to be as creative as possible. The idea to involve everyone in his organisation in the process was advice he took from a session about innovation organised by VOKA West-Vlaanderen (local organisation for entrepreneurs).

Next it's very important to share these ideas or thoughts with your colleagues. An employee could have a brilliant idea but if he doesn't share it, the idea is worth nothing. Besides that, sharing with colleagues gives the chance to discuss the idea and make it even better. Of course the sharing of ideas has to be extended to all partners in the development process.

It's also crucial for Curana when they have an idea to develop it as fast as possible because there's always the possibility that someone tries to copy an idea or product. That's why Curana's development strategy (Muësen, 2008) contains these three keystones:

- Pro-actively searching for new products/ideas
- Offering them to the market
- Once accepted: total execution of design and forming of a new product

When new ideas are found through the pro-active search they develop the idea into a product to a certain level. Then these premature products are offered to their clients. When these clients pick up the idea, the people at Curana will continue the development

of the idea keeping the remarks of the customer in mind. This strategy guarantees Dirk Vens that they'll be the only supplier who offers that kind of product. Besides the development strategy, because of their increase in design and development activities, they invest more in and pay more attention to intellectual property. For example the process to create the B"Lite and the B"Lite itself are both patented.

Another important factor in their strategy is image building. They pay a lot of attention to the presentation of a new product or the company as a whole. The presentation is important to build up a certain reputation. When a new product is developed they make sure the presentation reflects the way the company works. An example is the submission for the Cardiff Design Festival. They made a poster out of the material that they use for the DVide and CLite products, which they were presenting. The international jury of experts was instantly impressed and eventually Curana won the DME Award. Also when Curana takes part in fairs they invest a lot in how they present themselves. This way potential customers immediately know what they're about.

4.5.2 Working with partners

Curana employs only 10 people but next to that they work together with 20 external designers and other professionals. So the management of these external people is very important to make the company operate without any problems. The added value of the external people is that they have different views on things. An external designer from Saflot Creative Consultants, Adriaan Debruyne, who works together with Curana, describes his added value as follows:

> "As an external designer in a company such as Curana, my added value is that I already worked in many different fields. I got a cross-pollination of different technologies, various working methods, I know materials, the consumers, the trends. All this is harder to find in someone who works within a company." (Design Vlaanderen, 2007)

To make these collaborations work it's crucial for Curana to be open towards them. Dirk Vens puts it this way: "On this subject it's important to consider designers not simply as employees, but they must be associated in the story of the company" (Design

Vlaanderen, 2007). This way the external people can really exploit their knowledge and capabilities and help guide the company in the right direction. Of course, to be open, you have to be able to trust your partner. That is difficult, but crucial in any open innovation adventure. The relation that Curana was able to build up with its external designers is of this kind that it accelerates Curana's innovation process in an unseen way. Adriaan Debruyne describes the process as follows:

> "Both of our antenna are open to society and technologies, and we record a lot. And we bring this to our collaboration, it creates sparks. If, at a particular moment, we're in a brainstorming session, it can rapidly result in very concrete ideas which sets the bar very high." (Design Vlaanderen, 2007)

Another precondition for a good collaboration is that every company or organisation you closely work with contains 'believers'. These people are the engine of the project and make sure that when difficulties arise the engine doesn't stop working. In the story of B"Lite, Curana almost went bankrupt because the 'believers' at the original spray-casting company left the project. Luckily, for Vens and his team it all worked out, but this could have meant the end of Curana. Dirk Vens also indicates another reason for the failure of the collaboration. The spray-casting company was at the time a big player compared with Hanziplast and this has some disadvantages. First, bigger companies are most of the time not interested to work with smaller companies because their market share is too small. A second and more important disadvantage is the lack of the right state of mind. You don't find real entrepreneurs in big companies because they have another culture. These entrepreneurs are usually the believers of the company and when they're not present it's difficult to work. So a difference in culture between companies is a huge obstacle that usually cannot be taken. That's why Dirk Vens believes that big companies should work with big ones and small companies with small ones.

At Curana they work together with all kind of partners: customers, suppliers, knowledge centres, universities, competitors, ... Dirk Vens believes that every partner has his own place in the open innovation strategy and that if you leave too many out of the process, it will fail. There has to be something in the partnership that makes every partner better and secondly the partnership has to be managed well. Problems like extra costs brought forth by the project or who gets the patent when the product is finished have to be managed well to keep the collaboration going. At Curana, they see their partners as an

extension of the company so when they face a problem, Vens and his team will help them come up with a solution.

Of course when the partnership is successful, the successes have to be shared. The partners of Curana all profit thanks to the increase of revenue but it's also important to share other things like attention, when an award is won, or other benefits that were brought forth by the partnership. An example where this turned out really well, was when Curana had to give a lecture about a product they developed with Hanziplast. They gave it to Hanziplast, which allowed Hanziplast to build up their own international reputation. At the same time, Vens saved himself some time. This kind of action strengthens the relations between the partners. And hopefully when the partnership has to face certain difficulties these actions pay off.

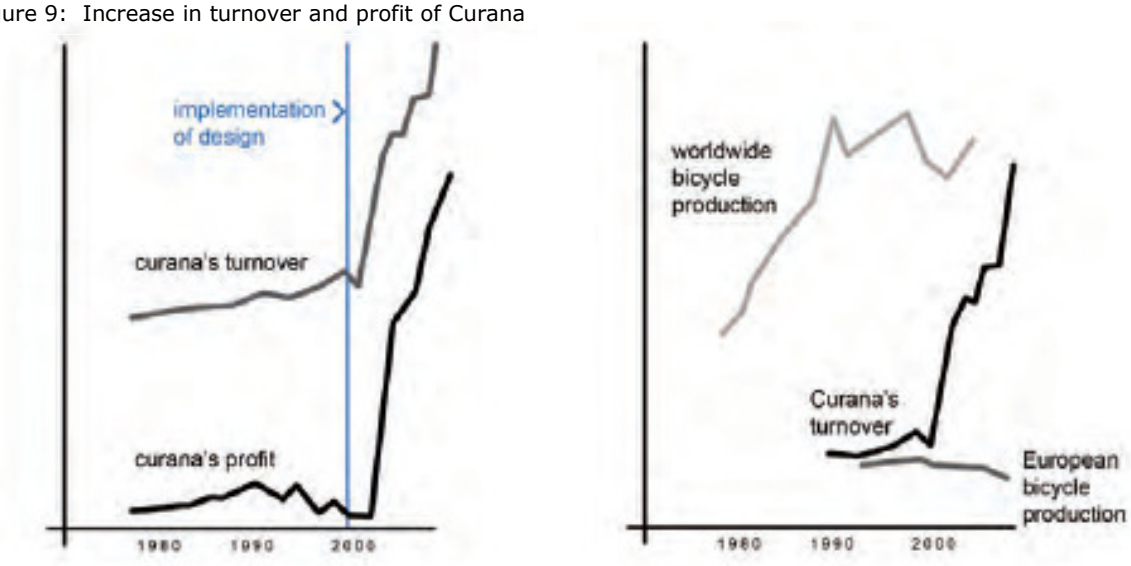
4.6 Evolution of Curana

The previous parts clearly show that Curana went through a number of changes. The biggest change is probably that they evolved from a producing minded company to a product minded company. The evolution in the bicycle business during the 90s forced them to take this action. The decision to develop a revolutionary product, and where for the first them in Curana's history the objective wasn't to produce the product themselves, almost lead to bankruptcy. They took a huge risk but the change in strategy paid off, like you can see in the graphs below.

Since 1999, when they chose to focus on design, the turnover has increased with a factor 4 in six years to 3 million euro, without any significant investment in personnel. Another remarkable fact is that 90% of the products they sell were developed in the last 6 years. These numbers show what open innovation can mean for a company. Next to these tangible advantages there are also other things that are maybe worth more. Their strategy has made them the most innovative company in the bicycle business. This has made their products indispensable to all the European bicycle manufacturers like Batavus, Sparta, Cannondale, Koga-Miyata and others. These customers now even want Curana to put their name on the products they sell because Curana is becoming a brand on its own and is an added value to any bike. That's why they developed the brand 'by Curana' or 'byC' (pronounced as 'bike'). Dirk Vens believes it's important that brands

have an identity. As I mentioned earlier, a bicycle is becoming part of a lifestyle and the bicycle manufacturers have to understand that price isn't everything. So it's Curana's strategy to offer concepts and to develop unique products rather than constantly holding the cost of the development into account. And as the results show this is the right strategy.

Figure 9: Increase in turnover and profit of Curana



Source: DME poster Curana

Dirk Vens also looks to the future and knows that they have to stay innovative and keep investing in new partnerships because the competition with developing countries will keep on growing. Also the dependence of Curana of some of the major European bicycle manufacturers forced them to look for a solution and chose to extend their working field to the aftermarket.

Their success from the previous years also drew the attention from other industries. They got offers to develop products that had no connection whatsoever with bicycles. This could also have been a potential solution for the future of the company but Dirk and his brother Geert decided to stay in the same business, because otherwise they would evolve into an ordinary design office. Another disadvantage would be that they would have to build up an entirely new name and network. The unique network they have now took years to build. They rather want to focus on the current business and extend their activities here. Their goal is to become the worldwide trendsetter in the bicycle business.

Their activities on the aftermarket, or co-branding, are beginning to take shape. Together with one of their customers, Cannondale, they had to create a bicycle for G-Star, a clothing brand. Curana created some of the accessories to go with that bike. The DVide, which I described earlier, is also a product for the aftermarket but is of course very much related to their earlier activities. The co-branding really fits into Curana's strategy of creating a certain lifestyle around their products. Only recently they signed a deal with a famous design office in London, called Goose (Nieuwsblad, 2008). They work together with all the big brands like Puma, Nike and Levi's, etc. This partnership will surely boost Curana's progress again but Dirk and Geert will have to keep on developing their brand strategy to cope with the difficulties ahead.

4.7 Conclusion

The first conclusion is that the reason for applying an open innovation strategy for Curana is the growing competition from all over the world.
Secondly, we saw that the choice for innovation almost led the company to bankruptcy. So we can state, that for small companies, with their limited resources, changing to an open innovation involves certain risks. But choosing the right partners is crucial for success because with the right partners innovation doesn't have to be expensive. These partners have to believe in the project. Also the role of the large bicycle manufacturers is important. If they refused to sell Curana's products, their efforts would have been useless. But on the other hand, these manufacturers also allowed Curana to sell their product in huge quantities.
Next we can conclude that the role of IWT, as financier as well as consultant, was very valuable for Curana.
A fourth conclusion is that for a small company like Curana, every employee should be involved in the innovation process and everything the company does send out, must be linked to innovation, to really change to an innovative company and build up a reputation.
The fifth conclusion is that Curana's strategy of 100% offensive was successful, with the help of external designers. Most important was the openness toward each other that really paid off. Also the sharing of success is crucial to maintain good relations.
The sixth conclusion is that the profits increased rapidly through open innovation.

To end, we can conclude that open innovation cannot stop the changes in the market which are forcing Curana to change to a brand strategy, but that open innovation gave them the possibility to change to the brand strategy.

CHAPTER 5 : CASE 2 ALUPA

5. Case 2: Alupa

5.1 Introduction

Figure 10: logo Alupa

www.alupa.be

Alupa is one of the leading producers of vacuum metalized paper in Europe, based in Genk. Metalized paper is mainly used for labels in the cigarette business and the beer and soft-drink market. Next to this main occupation, Alupa also produces more complex products like gift wraps paper. The last one is used as a solution to counterfeiting but the hologram-paper also gives something extra to a brand. Recently the company also started with metalizing fibres for sport equipment and the automotive sector but innovation is still in an early stage. Since 1986, Alupa has been able to build up a reputation concerning quality and now it employs more than 100 people.

In 2006, IlloChroma, the group to which Alupa belonged, went bankrupt. The group was split and Alupa was taken over by Ackermans & Van Haaren, one of Belgian's largest holding companies. This takeover was the start of a new journey for the company. Ackermans & Van Haaren is active in four sectors: contracting, dredging and concessions; Real estate and related services; financial services; private equity. Alupa belongs to the private equity group. This group contains about twenty companies. The holding invests in these companies to gain profit from them.

To make Alupa profitable again they had to focus for 100% on the core business, but this was just the start of the changeover. Secondly they invested in a new ERP system to streamline the value chain furthermore. Thirdly, the output from the machines was optimized. Fourthly, Alupa's research department continued to enhance products and the production technologies in terms of quality, runability and appearance. Finally, because they were no longer a part of the Illochroma group, they could now address to more printing offices that used to be competitors of Illochroma. The demand increased and they invested in a new metalizing machine to respond to the increase. Within the year Alupa pulled itself out of the red numbers. Moreover, in their first year, 2006-2007, as an independent company, under the shareholdership of Ackermans & Van Haaren, the sales grew with 25%.

This positive trend continued in the following years and this year, 2009, they expect the sales to grow an additional 10%. With the arrival of the new machine, a part of the total capacity was unused and could be used for new applications. They wanted to broaden their productmix and Hugo Princen, the R&D manager of Alupa, started searching for new innovative products. In the past they already did some experiments in metalizing textile but never on a large scale. So it was clear for Hugo Princen they had to research and explore the possibilities of metalized textile further if they wanted to expand in this direction.

5.2 Metalized textile

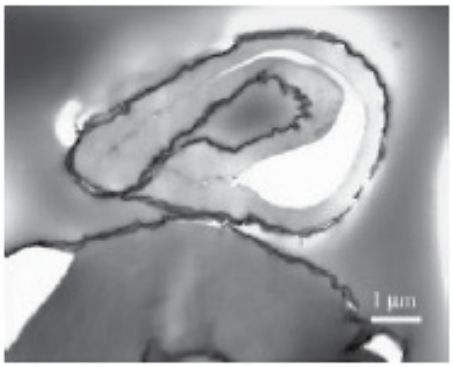
The decision to choose for textile to enlarge the productmix was made at a meeting about open innovation, held inside the company. Because they had no contacts at all in the textile industry, the idea to enter the textile industry was to do a study about the advantages of the aluminiumlayer on textile. In this way, they could promote the new product in a credible way. Hugo Princen did some desktop research to identify possible partners that could help in the research process. Through the universities of Leuven and Gent he got in contact with Centexbel.

Centexbel is the Belgian Textile Research Organization. It was founded in 1950 by Fedustria which represents the textile, woodworking and furniture industry. The goal of Centexbel is to let Belgian textile companies be competitive. They pursue this objective by offering different services to the textile companies. Those services include objective advice, the expertise of 100 employees, access to Centexbel's network, etc. Centexbel immediately saw potential in Alupa's idea of metalizing textile. A project was started up to get a subsidy from IWT (chapter 4).

Together with Centexbel, the University of Gent and a supplier, a partnership was formed to start testing the characteristics of metalized textile. In the labs of Alupa, samples where metalized: basic materials like textile, fibre glass and wallpaper, and sent to the other partners for testing. These materials where covered with different sizes of thickness of metal layer. The samples are being metalized according to the vacuum deposition process (Centexbel, 2009). The metal is heated in a vacuum chamber in a way that it sublimates from a solid state to free atoms. The free atoms then move around in

the chamber and end up as a thin layer on the textile. The figure 11 below shows the section of a coated cotton fibre. The thin dark edge is the metal layer.

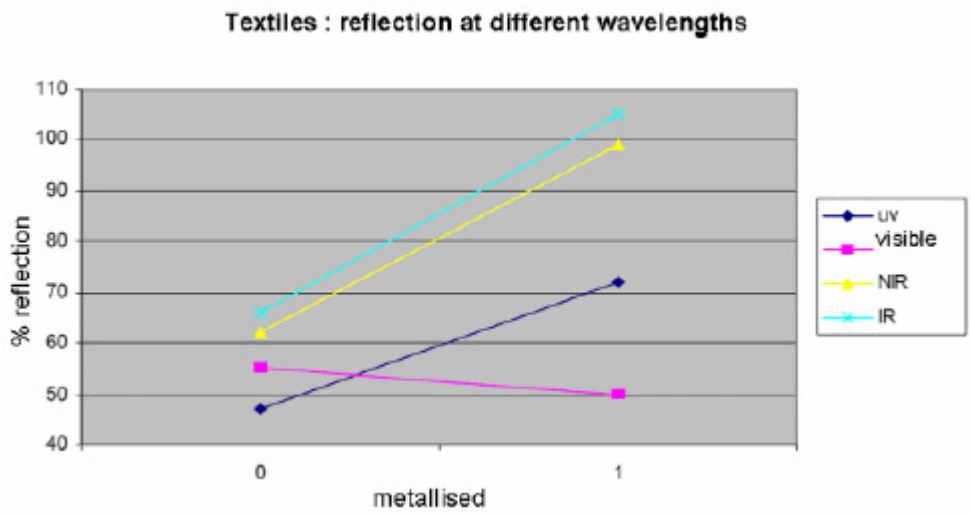
Figure 11: Metalized textile



Source: NC State University – Engineering News, 5-12-2007

The different characteristics that would be tested by Centexbel were: the shine, the conduction, transmission of different wavebands of light, reflection and the anti-bacterial effect. The University of Gent did research after the textile itself. Centexbel tested the shine, the conduction and the transmission of different wavebands of light. These tests are finished, so now they have the results for these characteristics. Figure 12 shows the results of reflection. For example, the picture below shows that metallised textile will reflect UV and IR light without changing the influence of visible light substantially.

Figuur 12: Results of reflection



Source: Centexbel INFO, 2-2009, p.12

The supplier did the research concerning the anti-bacterial effect of aluminium. The anti-bacterial effect means the textile is able to eliminate bacteria. This is an advantage, especially for the hospital applications mentioned in the next paragraph. However, the test from the supplier had a negative result, the aluminium layer did not have the anti-bacterial effect. The University of Hasselt and its Institute for Material research (IMO) are now running a second series of tests to investigate the use of Cu- and Ag-ions to obtain the anti-bacterial effect. They also looked which combinations are possible and if Alupa or its supplier is able to mix these substances. These results were positive, there are mixtures that have the anti-bacterial effect and Alupa now knows which supplier can offer them the samples with the right mixture of CU- and AG-ions. Now, Alupa is making new samples of metalized textile for Centexbel so they can test them again on the anti-bacterial effect.

There are different applications for metalized textile. In a first application, the product is used as interior in luxurious cars. The basic material would consist of fibreglass. Secondly, in hospitals it can be used for wallpapers and covers on mattresses. In this kind of application the basic material consists of nonwoven fabric. Nonwoven fabric is an untraditional fabric that is not woven or knitted but made from long fibres, bonded together by a chemical, mechanical, heat or solvent treatment. An example of a nonwoven fabric is velt. The anti-bacterial effect will play an important role to gain a competitive advantage over competing products in this market. The next application is situated in the transport business. More precisely the transport of chips and other electronic materials or devices that could be affected through the discharge of electricity. These chips or materials could then be covered with the metalized textile to prevent the discharging. With the market of chips and other electronic devices getting bigger everyday this could be a potentially very attractive market.

Hugo Princen also mentioned some other applications which Alupa is thinking of. The results for the reflection of different wavebands of light show that metalized textile could be used for blinds. Secondly, the anti-bacterial effect could make it usable in the agrarian sector. With the textile being germicidal it would be perfect for the transportation and protection of baby plants. These last two applications are still in an early stage. However, in the fibreglass market, Alupa has already been able to gain a part of the market. For the nonwovens area and the transport business they are still looking for possible partners.

5.3 Strategy

According to Hugo Princen, open innovation for a SME has to be very target minded. He wants to see results from every partnership as soon as possible. Next to him only a few others at Alupa are available to search for new opportunities. Six employees control the quality, five laboratory workers and Hugo himself. So it's very important for them that whenever they put time in a partnership, it's not a waste of time . Until now, every partnership of Alupa has been very successful. Whereas other companies sometimes have difficulty with the way universities and other institutions work, Alupa had no problem at all. Hugo Princen indicate that they work closely together with these people and that they constantly do that with the same people. This creates good relationships of course. Another reason for the smooth collaboration according to Hugo Princen, is that the last ten to fifteen years, universities have been opening up to working with companies instead of focusing solely on pure scientific research. This change in policy of the universities makes it a lot easier for smaller companies to work with them.

An important advantage, for Hugo Princen, in working with Centexbel and the universities was that these organizations know everything about subsidies. They are constantly involved in working with, and in the case of IWT, in approving subsidies. For a company like Alupa it's very difficult to find out which subsidy is available and more important, what's required to qualify for it. The research organizations and universities are interested, because when the subsidy is granted, they get more money for their own research. In this case almost all the money for the subsidy came from Europe through the EFRO (the European fund for regional development). The advantage for Alupa of course is that they don't have to pay for the entire research. This way they don't have to bear all the risk.

Secondly, at Alupa they neither have the manpower nor the technology to perform the different tests. As mentioned before they have 12 people who are occupied with the development of products. At Alupa they are well equipped to test metalized paper, their main occupation. For metalized textile on the other hand, their equipment is not sufficient. That's the main reason why they needed partners. Even for the metalized paper, although they are well equipped, they go to the University of Hasselt to perform certain tests. Through their contacts at the university they are able to frequently use their testing equipment.

Centexbel was without a doubt an important factor in the partnership. It's not only a research centre. All the textile producers are a member of this centre. Through their collaboration with Centexbel, Alupa has now access to that vast network of partners. Centexbel not only executed research for Alupa, they also wrote a paper about this research and distributed it between the producers. Recently, Alupa was able to give a presentation to the textile producers about their metalizing process for textile. Another presentation will be given in Gent in cooperation with the University of Gent in the nearby future. The network and presentations make it a lot easier for Alupa to make contacts in the textile business and to build up a name and reputation. As mentioned before Alupa has already taken a part of the fibreglass market but for the other markets they are still looking for partners. The relation with Centexbel and the university of Gent will certainly accelerate this process. Concretely, a number of producers sent samples of textile to Alupa. The samples were metalized and sent back for evaluation, some even received an industrial manufactured sample.

This case is an example of working together with suppliers, universities and other research organizations but at Alupa, they do not limit themselves to these partners. They also work together with their clients when developing new products. Currently, they're developing a new product for a client who can commercialize it afterwards. Alupa takes the manufacturing part for their account and the client does the testing of the product on the end user. At this moment the process has reached the testing stage.

A final part of their strategy, but not less important, is to involve all of their employees in the innovation process. Alupa's employees are very much interested in new products and try to come up with new ideas of how to improve the products and processes. The experience of these employees is priceless to optimize the production processes. The management of Alupa tries to encourage their employees even more by organizing internal info sessions about the working of new processes. New projects won't be kept secret but shared so everyone knows which direction the company is heading. When a new project is started up, it first requires a lot of work in the laboratory. It's difficult in this phase to involve the employees. However, in the next phase of the development, when industrial manufactured samples are being produced, their knowledge is indispensable. This openness translates itself into the structure of the company. The hierarchical part is minimized so there are no social barriers in the collaboration between the different levels, meaning this happens very fluently. At Alupa they believe that it's

crucial for a small company to get every person involved. The employee should also realise that their involvement is crucial to the success of the project. For a small company like Alupa every extra revenue is important. Helping in developing new products and processes is actually an investment in more job security (VKW Metena, 2008).

5.4 Future

Hugo Princen says they are and have been constantly searching for new products and production processes. They were always interested in partnerships with other organizations and companies, even from the moment the company was raised. The strong relation Alupa has with the university of Hasselt is an indication of their long term interest in open innovation. Only recently, they moved their attention to the textile industry because they had the possibilities to do so.

The partnership around metalized textile is not the only one Alupa is involved in. Currently they established a partnership with a German partner that has good contacts with a German research centre. Together they try to optimize the technique of moistening different sorts of paper, in this way they also continue to optimize their existing products. In the development of new varnish, they are closely working together with their supplier. By investing every year in optimizing their processes and creating new products they try to stay ahead of the competition. Because as Hugo Princen said: "Not going forward means you're going backwards".

5.5 Conclusion

A first conclusion we can make from this case is that they already were being innovative even before the takeover but that the takeover offered new possibilities. Secondly, the initiative for the partnership came from within the company. Hugo Princen believed in this project and went on the search for partners. Thirdly, organizations like Centexbel, (knowledge of subsidies and network) and IWT (financing of projects) are essential for the success of the partnership. A fourth conclusion is that they work with all kinds of partners (clients, suppliers, research organizations and universities) and the fact that

they do not experience any problems in working with them. For the universities this could be explained through their long term relations with companies but for the other partners we could presume that the experience of Alupa as well as Centexbel and IWT in innovating with other partners is an advantage. Finally, we can conclude that at Alupa, they find it very important to involve all their employees in the innovation process.

CHAPTER 6 : CASE 3 TELEVIC

6. Case 3: Televic

6.1 Introduction

Figure 13: logo Televic

Source: www.televic.be

Televic is a medium-sized company located in Izegem, that celebrated its 60th anniversary in 2006. Televic develops and produces multimedia and communication products for four niche markets: transport, nurse call, conference and education. The company is organized in four business units that each focuses on one specific niche market. The company also has business establishments in Bulgaria, France and the United Kingdom. The group employs 300 people. At the facility in Izegem, 190 people are employed of which 55 researchers.

In 1946, the company was founded to produce radio receivers. This market was dominated quickly by large entreprises and Televic converted its focus to professional systems, forerunners of the systems they produce today. In 1978, G. Maes became the new general manager and under his leadership the R&D activities of the company grew enormously. He attracted a lot of a new engineers and started up collaborations with Belgian universities. In this way, Televic became one of the most sophisticated companies in their business during the 80s.

In 1998, L. Danneels and T. Verstraeten took over from G. Maes and became CEOs of Televic. In comparison with their predecessor, Danneels and Verstraeten wanted to take Televic to the next level, therefore gained control of the company by means of a buy-out. Televic did not have any financial problems at the time, but the new CEOs were convinced of the fact that standing still is going backwards; they wanted to focus more on growth and innovation. The change-over of management had a great impact on the company. One of their decisions was to extend the research department. The number of researchers increased from 20 in 1998 to 55 in 2008. Televic doesn't organize its researchers in one research department for the whole company. Each business unit has its own research department.

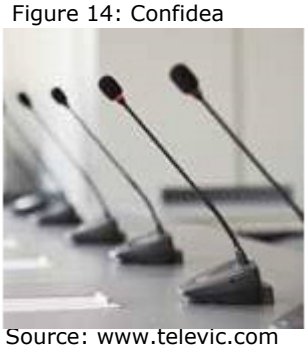
In the following paragraphs I will first discuss the development of Confidea, a new product from the conference business unit. Secondly, I will analyse the development

process of Xtramira, a product from the nurse call unit. Thirdly I will discuss Televic's innovation strategy.

6.2 Confidea

6.2.1 Idea of the product

Figure 14: Confidea



Source: www.televic.com

One of the latest successes of Televic is their new wireless conference system, called Confidea. The idea for this system came from Televic. They wanted to develop a system that would deal with the biggest problems wireless systems are facing. The first problem is the interference with other wireless systems. For instance, every participant of a conference might have his own laptop, cell phone or blackberry with him. All these devices are provided with wireless possibilities like for example Bluetooth. Other wireless computer networks might also be present in the vicinity. All these different systems will make it more difficult for an additional system to operate perfectly.

A second problem that had to be solved was battery issue. A reliable battery is the problem of every wireless device. Meetings in the European Parliament for example can go on for hours. It's crucial that the conference system is still active when important decisions have to be taken.

The last problem is security. Confidea can also be used to vote. When people use the system to take decisions, it might be important that the outcome doesn't leave the room. Therefore the system has to be protected against intruders who want to eavesdrop or falsify the voting (Gesquiere, 2009).

6.2.2 Development process

As mentioned before, Televic employs 55 researchers which is a lot for a company that employs 300 people in total. These researchers allowed Televic to develop the electronic and mechanical parts themselves because they already had a long history in making digital conference systems. Nevertheless they had no experience in developing a wireless

system. Especially not the kind of system they wanted to make. Therefore they went on the search for partners. This lead to the following list:

- Flemish partners: IMEC, IWT and Intec (University of Gent)
- European partners: Sennheiser and TUHH (Technishe Universität Hamburg-Harburg)

In the development process, IMEC was the most important partner. IMEC is the largest research centre of nano-technologies in Europe. It is located in Leuven and employs 1600 researchers from all over the world (Inc, Leuven, 2008). It developed its knowledge of wireless systems by year-long experience in creating chips for these systems, knowledge Televic did not have. Televic had developed some technology on lower frequencies in the past but the requirements of the new system were so high, the old technology was insufficient. Together with IMEC they went to IWT for financial help. When IWT approved the project the development could start.

To address the problem of interference, the system was designed to work on high frequencies (2.4 and 5 gigahertz), this would extend the range of usable frequencies. New intelligent spectrum management algorithms were designed to give the wireless system the ability to search for a new optimal frequency when other wireless networks intervened. In this way Televic could guarantee that their system would work flawlessly at all time. Another problem was the time lag, meaning the time between the input and output signal. The system would be used in conferences, therefore the time lag had to be as small as possible, otherwise the time between the speaker saying something and the public receiving the message would be too large. When people have to listen an entire day to speeches, this becomes annoying. To address the problem a whole new protocol had to be developed in collaboration with the partners.
The other two problems, mentioned earlier, were solved as followed.
The battery problem was solved by developing a battery pack provided with smart power management that could operate for 20 hours. The status of the batteries can be checked via the integrated webserver.
An authentification tool and encryption algorithms assure security, which was also an issue.

Both Intec and the TUHH assisted in the development process but IMEC was the most important partner. Their assistance also involved the training of Televic engineers (Inc., Leuven, 2008). IMEC also performed a feasibility study which allowed Televic to reduce the time-to-market. The advantage for IMEC is that they can use this technology for other applications. Televic did sign an agreement with IMEC to prevent them from using it in a way that would hinder Televic. Another incentive for IMEC was that the project perfectly aligns with their own objectives to enhance open innovation in Flanders. Sennheiser was involved in determining the characteristics of the system but not in the actual development process because Sennheiser and Televic have an OEM (Original Equipment Manufacturer relation) relation. This means that Televic produces products which Sennheiser sells under their name. They both have their own markets so their interests don't collide but it's natural that Sennheiser formulates specific requirements about the product's possibilities.

6.2.3 Results

Confidea is a one of kind conference system. There is no system that has the same characteristics. The product was presented to the public at the Prolight and Sound fare in Frankfurt. A fare is the ideal place to show the supremacy of Confidea. Every company has its own wireless system to show, but Televic was the only one that got their system to operate. Being the leader in the professional conference system business, they have clients like the European Parliament and the United Nations organisation.

6.3 Xtramira

6.3.1 Idea of the product

Xtramira is a new product from Televic's nurse call division. The original idea was to develop an alarm system for elder people and people who have been ill for a long time. The product would be an answer to the evolution in the care sector. According to Televic the following topics are crucial in the future care sector:

- Shift from intramural to extramural care

- While elder people live independently for a longer period of time, the preservation of the quality of life and social welfare
- The need for care that doesn't limit its focus to disabled persons with emphasis on self-help
- Modified flats and houses with additional comfort and safety measures
- Increased mobility of residents and nurses
- The need for nurses need to be organized more efficiently
- the increase of informal care

6.3.2 Coplintho

To know more about the needs of the customer and the specific functions the product had to fulfil, Televic joined the Coplintho project. This home care project was started up by IBBT (Interdisciplinary Institute for Broadband Technology) to investigate the role ICT could play in the care process of home patients. IBBT, founded by the Flemish government, is an independent research organisation that stimulates ICT innovation. The goal of the project is described in the following way:

> The most important driving force of Coplintho is the support and social integration of people who are cared for in their home environment, with attention to the stimulation of "independent living" and a more active participation in their own health process.

As research organisation, IBBT has close relations with universities. The following research groups were involved (IBBT, 2007):

- UGent (IBCN, MIG)
- KULeuven (CUO, ICRI)
- UHasselt (EDM)
- VUB (SMIT)

Other partners (IBBT, 2007):

- Androme (innovative ICT-company)

- Custodix (specialized in **data protection solutions for eHealth)**
- Televic (develops networks for nurse-call)
- MediBridge (protection of transport and storage of medical data)
- AZ Sint-Elisabeth Zottegem (hospital)
- UZ Gent (hospital)
- Wit-Gele Kruis (home care)

The relations with the other partners were set-up by the senior research associate of Televic and the different research groups. The outcome of the project was a communication platform that would also have telemetric abilities. In this way the target group would be able to maintain a social life and have easier access to medical services. With input from the partners mentioned above, Televic designed a prototype. The prototype was introduced to the partners of Coplintho but the response was rather negative. Televic had come up with the design of a computer device, comparable to the design of an Apple computer. The partners judged the product was too expensive. Secondly and even more important, the target group of the product -elder people- are mostly reluctant to use computers.

6.3.3 TranseCare

After Coplintho, Televic started up a new IBBT project. Because it was supported by IBBT, the same research groups where involved. However the other partners were somewhat different. Medibridge and the AZ Sint-Elisabeth Zottegem didn't participate anymore but two new partners joined in: 'Solidariteit voor Gezin' (homecare organisation) and In-Ham (group of partners active in the sector of disabled persons) (IBBT, 2007). With the information gathered earlier from Coplintho they could now make another effort to develop a new product.

Figure 15: Xtramira

Source: (Televic, Case study: Telesenior - OCMW Kortrijk, 2009)

The next idea was to develop a video call box with the size of a video recorder extended with a remote control, a little webcam like camera and a wireless pendant. The video call box can be connected with the owners television.

Televic kept in mind their earlier problems, like the too complicated devices, and adapted the interface, that appears on the television, and the remote control. These systems are both very simple and easy to control. The product got the name Xtramira. It has three major functions: image based communication, telemetry (a technology for remote measurements and reporting the information; through Xtramira, people can transfer data over media like television and telephone) and personal alarm system. With this new idea they tried to make it as easy as possible for elder people. They only have to connect video call box to their television and from their couch they can contact friends or make emergency calls in a very easy way as you can see in the picture above. The video call box is the device located on the right to the television on figure 15.
The telemetric abilities will reduce the visits from nurses. Televic is also thinking about integrating the system with smoke and CO2 detectors.

6.3.4 Results

The idea isn't ready yet for the public. The design of the video call box and attachments can still be upgraded. The biggest problem however with these products according to Brecht Stubbe (senior research associate of Televic), is that clients thinks the product is very interesting but they don't want to pay for it. Nevertheless, the OCMW (centre of social welfare) from Kortrijk in cooperation with internet provider, Telenet, already bought 150 Xtramira devices (Televic, Case study: Telesenior – OCMW Kortrijk, 2009). The reactions from the elder people were very positive. They were at ease knowing they could always call for help. Less positive was the reaction of a ministre in a program on national television. He stated that Xtramira would take away the necessity of home care. Televic responded with the fact that video call box cannot be used for actual medical help only for alarming emergency services who can then offer early advice that could save someone's life.

6.4 Open innovation approach

6.4.1 Senior research associate

Televic is a medium-sized company. This is reflected in their approach towards open innovation. In contrast with the previous cases Televic is able to appoint one employee whose sole activity is to manage innovation projects. At the moment this is Brecht Stubbe. It's their job to set up new projects, monitor the progress in the beginning, search out to patent innovations and work out appeals for subsidies. This way the senior research associate coordinates the research of the four business units because each business unit has its own research department.

The presence of such a person offers a lot of advantages. In every open innovation project it's important that someone in the company believes in it for 100%. At Televic they always have at least one person who really believes the project can succeed, because he started it up. Moreover the senior research associate is best positioned attract and motivate other employees for projects. This does not guarantee that every project is a success. Finally, if problems occur during the innovation process, the senior research associate can immediately intervene and search for solutions. It's easy for partners to know they always have someone they can address their problems to, when those arise.

6.4.2 Networking

Another part of their strategy is networking. Gathering knowledge and information from partners is one thing, but it's also important to build up good relations. Therefore, Televic invests a lot of time in networking. The senior research associate also has to attend meetings of user committees. At first these meetings might not seem interesting and a waste of time but through these meetings it's very easy to get in touch with experts. Experts are expensive but sometimes their knowledge is vital. Televic also maintains good relations with universities. In cooperation with these universities, Televic assisted in 15 theses each year. According to Piet Verhoeve these theses not only allow you to build up relations but they can also be used for exploring new technologies (Martens, 2006). And of course these students could be potential employees for Televic. In 1998, when

they started with opening the innovation process, those relations with universities and other research organizations were not yet there. It's important to gain trust in the research world. Piet Verhoeve indicates that they were able to overcome this obstacle by attracting people from the research world (Martens, 2006).

6.4.3 Difficulties in an open innovation strategy

A first problem concerns the different business units. The company is organized in a way that these business units act as separate companies. Although these business units work in different markets, they all apply the same approach towards open innovation according to Brecht Stubbe. He states that the only difference is that they work with different partners. Nevertheless, the lack of a central research department results in alienation between the research departments of the business units. As senior research associate, it's also Stubbe's job to make sure they keep in contact. The company also organizes regular info sessions to exchange information.

The second problem originates from the fact that innovation projects in Televic's business can take five to six years before a commercial product emerges resulting into something. For a SME, this long development time can be a serious problem, because they don't have much resources and cannot always keep on waiting for results. Nevertheless, Televic chose to address a certain percentage of manpower to long term projects. To create a balance between short term and long term, they try to be inventive and use halfterm results of open innovation projects. In this way they try to make these projects profitable on the short term.

6.4.4 Intellectual property

In the past, Televic hasn't given much attention to intellectual protection. Recently, an incentive of the government has made patents more attractive from a fiscal point of view. Companies can now register patents as a cost in their bookkeeping. This changed Televic's view on IP. In the past, patents were too expensive, especially because in their business the speed of the market is very high. They innovate at a high rate so patents will only be effective for a few years, which makes them even less profitable. Another

problem is the experience of SMEs when confronted with the legal departments of large companies and universities. When SMEs start working with IP, they have to develop these skills very fast, which could be a serious barrier. The need for IP is rather small because Televic operates in niche businesses. These niche products do not attract large companies. For the transport market, Brecht Stubbe even stated that this is a very complicated market where a lot of rules, 150 to be more specifically, apply. The lack of knowledge about these rules is another barrier for companies that might be interested in entering this market. Nevertheless, the incentive of the government instigated Televic's interest in IP. Currently, they have four appeals in progress, including one for Confidea.

6.4.5 Tifani

Televic introduced Tifani in order to involve their employees in the innovation process. Tifani stands for "Televic Innovation Funnel and Ideas". To make their employees curious they announced it with the slogan: "Tifani is coming!". Tifani is a tool that allows the management to structurally process ideas from within the company. Employees can fill in a form with some questions about the idea to simplify the selection process. These ideas can range from pointing out new customers to a new product. It's not like an ordinary suggestion box because when the form is sent in, it will go through a stage-gate plan and a coach will be assigned to the idea. Also the employee will be informed about the progress through mail. The business unit manager then determines whether an idea passes a gate and goes to the next stage. Every year the company selects the best ideas and the owners are rewarded. This reward is supported by the government because it's taxfree. To stimulate the inventiveness of their employees even further, Televic also organizes brainstorm sessions.

6.4.6 Results

Televic's open innovation strategy has paid off very well. In 2005 they were the first company ever to receive the price of most promising company from the Flemish government. From 1999 to 2005 they were able to triple their revenue and the employs increased from 100 to 190. This increase has continued over the last years, they even

expanded abroad. In three of their business units: conference, nurse call and transporting they know belong to the top 3 in Europe (Vandenberghe, 2008).

6.5 Conclusion

The first and most important conclusion from this case is that we see a difference with the previous cases. Televic is able to make better use of open innovation possibilities. They were able to appoint someone that is continually involved with open innovation projects. This allows them to join in more projects and projects on the long term. Another indication is the fact that they are usually at the centre of a project as one of the most important partners, so they manage the network of partners.
Secondly, the company changed its research structure from central to diffused towards the business units. Although this doesn't lead to a different strategy between the units, probably because they are still coordinated by the same person.
The third conclusion is the strong involvement of their employees with different initiatives with Tifani being the most important one.
Also it takes time to develop these relationships with innovation and technology providers.
The last conclusion is the change in their increase of attention towards IP influenced by the government.

CHAPTER 7 : CONCLUSION

7. Conclusion

In this conclusive chapter, I will first compare the three cases -which were described in the previous chapters- with the literature in chapter 3. The second part of the chapter will be devoted to my own conclusion from the cases.

7.1 Cases vs existing literature

The first topic that will be compared to the cases are the external sources of innovation. All three SMEs make use of several external sources as mentioned in the literature. A remark towards this subject is that the three SMEs had good relations with universities and research organizations, but customers were somewhat left out of the story. The only good example was Transecare, where Televic used user commissions to develop the product.

The second topic in chapter 3 was the motives. The importance of product development and market related motives were clearly more present in the cases. Only Alupa showed efforts towards optimizing their processes through open innovation.

The barriers for SMEs were the third topic. Alupa and Televic indicated they never had much problems. Dirk Vens of Curana clearly indicated that the difference in state of mind between partners was the most difficult barrier to overcome. The lack of resources is a problem for every company, even though there could be a lot of money available, there is always the possibility to spend even more. Even large firms cannot spend an unrestrained amount of money to innovation.

The fourth topic was the strengths and weaknesses. Strengths like flexibility, business specialization, entrepreneurial persons and speed of decision making are all present in the cases.
The weaknesses on the contrary where not that evident. Lack of absorptive capacity was clearly not a weakness at Alupa and Televic. These companies both had a well equipped R&D department. Of course they did use external partners to gain certain information but

all three companies had a lot of inhouse knowledge. This might also explain the success of the projects.
The problem of finding partners is also underestimated. None of the companies indicated that they had problems in their search for partners. One condition is that you have to look for partners, they won't come to you.
Small market share was also a weakness that wasn't reflected in the three cases. All three companies take in an important position in their business.

The fifth topic I will compare to the cases is the difference in between SMEs. As I will clarify later on in this chapter (7.2), this is an important conclusion, because there are differences.

The last topic that will be compared to the cases is the innovative landscape in Flanders. The efforts of the government paid off for the three companies. They made extensive use of governmental is focused on assistance. The three cases indicate that the government on financial and network measures. It's remarkable that the lack of attention by the government to user innovation and intellectual property also reflects in their strategies. Both subjects did not have a priority in the analysed SMEs. This indicates that the government plays an important role in the innovation process of an SME. Another fact that supports this is the increase of attention of Televic on intellectual property after the government decided to make IP cheaper for SMEs.
Hence, the three cases show that the incidence and success of open innovation in SMEs depends to some extent on the institutional environment in which the government can play a significant role through direct and indirect policy measures.

7.2 General conclusions

In this section I will summarize the most important conclusions of this thesis.

7.2.1 SMEs are, more than larger companies, embedded in social and institutional organizations

From my research I can conclude that SMEs work a lot with organizations that have the goal to enhance open innovation practices. Large companies on the contrary usually don't need the financial support and advice offered by them. They are better equipped. Examples of these organizations in the cases are IWT, Centexbel and VOKA. Another remark in this context is that there is a great difference between these social and institutional organizations. All three of the earlier mentioned companies were able to get support from IWT. This shows that IWT is not restricted to certain sectors. Centexbel on the other hand, only supports companies that are active in the textile, woodworking and furniture business. The advantage of such a sectoral organisation is that they can offer more specific support like the paper they wrote or the network of textile producers. IWT's support on the other hand is much more focused on the financial aspect, but they can offer help to a more diversified group of companies. VOKA is a regional organisation. Their main occupation towards SMEs is to provide them with information through lectures and get them in contact with regional partners. I believe regional support is more important to SMEs because unlike large companies, they have more regional interests. Large companies usually have offices all over the world and are not bound to a particular region. They will search for partners all over the world. SMEs, due to their limitations, will start searching for partners in their immediate vicinity. Therefore I believe regional assistance is important in the early development of innovation strategies for SMEs.

7.2.2 Entrepreneurship in a SME is crucial

In the analysis of the different product developments, the conclusion can be drawn that entrepreneurship has to be present within the SME. In all three cases the initiative for the project came from within the company. For example: Curana went to Pilipili to take a

new start and Hugo Princen of Alupa started the project by surfing on the internet for possible partners.

A second remark towards this topic, is that these innovation projects have a huge impact on the SME, negative when they fail and positive when they lead to success. We saw this in the development process of the B"Lite. The project almost failed because one partner lacked motivation. Therefore the people involved have to be motivated for 100%. Those people, that are the engine of a project, an inspiration for everyone involved and take the project to the next level are called innovation champions. A very good example of such a person is Dirk Vens. The advantage for a SME is that it can give these people the freedom they need to fully exploit their potential. In large companies it's far more difficult to get that kind of freedom. Of course innovation champions are not widespread.

7.2.3 Long term innovation is a problem for SMEs

SMEs already have problems with short term innovation. Long term innovation is even more difficult. Investments have to made upfront and results will only come out after a couple of years. Therefore most small companies cannot handle this kind of innovation. As shown in the case of Televic, medium-sized entreprises are better equipped to cope with this problem because they have more resources.

In some sectors long term research is not that important, but in other sectors it is. For example the chip industry requires extensive research. Small companies in these kind of sectors need to address the problem if they want to stay competitive. The strategy of Televic shows that with the necessary resources this problem can be solved. That's why these companies should get more support from the government. The government can determine certain fiscal measures that would make long term research profitable for SMEs. For Curana on the other hand, long term research is unusual. They are more focused on getting the product out in the market as fast as possible. Of course this doesn't apply for all their products, B"Lite for instance was a long term project. It's obvious that this long term problem doesn't apply to every sector.

A second solution to this problem would be the strategy Televic applies. As mentioned in the case, they try to be inventive with half-term results from long term research. In this way, they were able to create a balance between short term and long term innovation.

7.2.4 Dependence of SMEs to large companies in the open innovation process

The first two cases showed that large companies in the value chain play an important role. In the case of Curana, the first project depended on the collaboration with large bicycle manufacturers that gave guarantees on selling the product. In the case of Alupa, the takeover by the holding was crucial. It gave Alupa the possibility to extend their product mix. On the one hand these large companies can be a threat to the partnership. If they leave the partnership, the story is usually over.
Another threat is a takeover. Small companies with unique competences are always attractive for larger companies in the value chain. The large company would rather do a takeover then develop these skills on its own. The last problem is getting the large company to collaborate. There are differences between a SME and a large company. It's difficult to convince these big partners of your idea. But it's even more difficult to convince a large company to change the culture or a part of the structure to get more out of a partnership. Especially when the gain for the large company may not be large.

On the other hand, the two first cases show that collaborating with large firms offers a lot of possibilities too. First, they have more resources, Alupa for instance can count on the holding Ackermans & Van Haaren when they have financial problems.
Secondly, they have a large area of distribution, which was crucial for success in the case of Curana. Thirdly, although I don't have any examples in the cases, I presume that the reputation of such a company will contribute to the relations with other partners like universities or research organizations.

A final remark is that Televic, as a medium-sized company, doesn't have this problem. I doubt the only reason for this is that they have more resources at their disposal. They are, as earlier mentioned, active in a niche market and the fact that they developed specific skills has made it easier for them to collaborate with large companies. We see the same evolution inside Curana. Instead of convincing large companies to cooperate, their creativity cost the tables to turn and large manufacturers are now coming to them.

The difference between Televic and Curana is that Televic is less vulnerable to a takeover because they are bigger.

7.2.5 There are significant differences between SMEs

Although I only discussed three different SMEs, I can conclude that there are several differences between these companies towards open innovation. The biggest difference was between Televic and the other two cases. Medium-sized companies involved in open innovation clearly have more possibilities. The best example is their function of senior research associate, which allows them to be involved in several projects at the same time, including long term projects.

The long term research problem was only mentioned in the Televic case. Besides the difference in size, the other two companies are low tech SMEs and Televic is a high tech company. Therefore, I conclude that the financial problem is more applicable to high tech than low tech firms.

There are also sectoral differences. Centexbel for example was an initiative of the sector to stimulate innovation. The other two cases didn't mention the existence of such an organisation. This doesn't mean that every sector should have such an organisation because in other sectors it might not be necessary. In the case of Alupa their contribution was far from useless.

These conclusions show that it's impossible to formulate one open innovation approach that works for every SME. Therefore SMEs should not copy other strategies blindly. Even within a sector different open innovation strategies can be suitable. I think that there are some basic rules about open innovation but every company should work out a strategy that suits them.

7.2.6 Change management should be a part of an open innovation strategy

Except for the second case, we saw that open innovation had a great impact on the company itself. A very good example is Curana; management was able to transform their

company from production based to product based management and now they apply original brand management. These kind of changes entail certain difficulties. To give you a better insight in what these problems could be for internal organization, I will quote Rob Veldt (2009) who tried to imagine what open innovation would mean to:

1. involved **people** (employees, clients, suppliers, other stakeholders) in terms of new ways of working, incentives, fading distinction between work and (social) networks;
2. **operations** ((e-)processes and (e-)infrastructure) in terms of (e.g.) web access, communities, facilitation of knowledge and creativity sharing;
3. **policy** (written and unwritten rules) regarding (e.g.) intellectual property, privacy, outside communication; and
4. **culture** (e.g. openness, learning, networking) to create the right (and safe) atmosphere.

Source: Veldt (2009)

This will give you an idea about where problems can arise. Change management is a useful tool to tackle these problems upfront. John Kotter has developed an eight step change model. By analysing these steps, you will see that change management is necessary when applying open innovation practices. The eight steps of the change model are:

1. **Increase urgency** - inspire people to move, make objectives real and relevant.
2. **Build the guiding team** - get the right people in place with the right emotional commitment, and the right mix of skills and levels.
3. **Get the vision right** - get the team to establish a simple vision and strategy, focus on emotional and creative aspects necessary to drive service and efficiency.
4. **Communicate for buy-in** - Involve as many people as possible, communicate the essentials, simply, and to appeal and respond to people's needs. De-clutter communications - make technology work for you rather than against.
5. **Empower action** - Remove obstacles, enable constructive feedback and lots of support from leaders - reward and recognise progress and achievements.

6. **Create short-term wins** - Set aims that are easy to achieve - in bite-size chunks. Manageable numbers of initiatives. Finish current stages before starting new ones.
7. **Don't let up** - Foster and encourage determination and persistence - ongoing change - encourage ongoing progress reporting - highlight achieved and future milestones.
8. **Make change stick** - Reinforce the value of successful change via recruitment, promotion, new change leaders. Weave change into culture.

Source: (Kotter, 1995-2002)

A lot of these guidelines can be found back in the cases. First, the step to involve as many people as possible. Each company I analysed tried to involve all of their employees in the innovation process, by actively engaging them or at least inform them. Secondly, the cases pointed out that it's important to have the right people in the right place and that these people are highly motivated. These competences can also be found back in the 8 steps. If there is someone who should be responsible for the execution of these steps, it should be the innovation champion. He is best qualified to convince colleagues or external partners. As mentioned before, SMEs are more flexible towards change than large companies. Therefore they experience less difficulties in managing change.

Finally, I would like to point out the importance of the last step. When a company wants to be successful in open innovation, it's crucial to keep going. It's not because one project led to success that one can sit back and profit from it. Open innovation practices require a lot of energy and motivation especially in a SME where resources are limited. To end with the words of Hugo Princen: "Not going forward, means you're going backwards".

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