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# CORPORATE INNOVATION MANAGEMENT STRATEGIES

A Comparative Analysis of Volvo CE, Scania R&D &  
ABB CRC

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## Abstract

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Title:	CORPORATE INNOVATION MANAGEMENT STRATEGIES: A Comparative Analysis of Volvo CE, Scania R&D and ABB CRC.
Purpose:	The study that has been conducted is a comparative one, where the group compared different innovation management strategies used by three different globally- known Swedish firms that are in the manufacturing industry. The study is aimed at describing, analyzing and making conclusions of the innovation strategies used during the process of product development in the chosen companies by comparing their similarities and differences.
Method:	The Study was carried out using a comparative study drawing on the qualitative data.
Conclusion:	Volvo CE and ABB CRC have similar strategies in internal idea generation because both firms have formalized systems, by using strong online data bases for idea sharing and evaluation. Volvo CE uses a pronounced forum called “Innovation Jams” for online idea sharing among Volvo Group employees whereas ABB CRC uses a strong data base called “ABB Inside” to evaluate ideas within the group. On the other hand, Scania R&D’s internal idea generation process is more informal as it is based on “person-to-person”. When it comes to external idea generation, Scania R&D has a more established strategy of using suppliers and customers for inspiration of ideas. However, ABB CRC generates inspirations from customers through its business centers, whereas Volvo CE has no customer system in place. But one thing that is common in all the three companies is that they are highly collaborating with universities for idea generation and human resource.
Key words:	Innovation, Corporate Innovation, Closed Innovation, Open Innovation and Idea Generation.

# Table of Contents

- Acknowledgements ..... i
- Abstract .....ii
- 1. Introduction ..... 1
  - 1.1. Background..... 1
  - 1.2. Research Question ..... 2
  - 1.3. Purpose..... 2
  - 1.4. Delimitations ..... 3
  - 1.5. Target Group ..... 3
  - 1.6. Disposition of the Thesis ..... 3
- 2. Research Strategy and Method..... 4
  - 2.1. Comparative Study ..... 4
  - 2.2. Data Collection ..... 4
    - 2.2.1 Secondary Data..... 5
    - 2.2.2 Primary Data..... 5
- 3. Theoretical Framework..... 7
  - 3.1. Innovation ..... 7
  - 3.2. Corporate Innovation ..... 8
    - 3.2.1. Closed Innovation..... 9
    - 3.2.2. Open Innovation..... 12
- 4. Empirical Findings ..... 15
  - 4.1. Volvo Construction Equipment (Volvo CE)..... 15
    - 4.1.1. Products..... 16
    - 4.1.2. Innovation at Volvo CE ..... 16
  - 4.2. ABB Corporate Research Center (ABB CRC) ..... 18
    - 4.2.1. Products..... 19
    - 4.2.2. Innovation at ABB Corporate Research Center ..... 19
  - 4.3 Scania Research & Development (Scania R&D)..... 22
    - 4.3.1 Products..... 22
    - 4.3.2 Innovation at Scania ..... 22
- 5. Analysis..... 26
  - 5.1. Innovation ..... 26
  - 5.2. Closed Innovation Vs Open Innovation ..... 27
  - 5.3. Motivation..... 30
- 6. Conclusion..... 30
- 7. Recommendations ..... 31
- List of References ..... 32
  - Books ..... 32
  - E-Books ..... 33
  - Article..... 33
  - Web Sources ..... 33
  - People ..... 34
- Appendix 1..... 35

# 1. Introduction

This part of the thesis is a general presentation of the topic and a brief background to the research and the main reason for carrying out the study.

## 1.1. Background

Corporate Innovation has become a major concern for multinational companies in today's global economic environment, which makes it a very important subject for any profit making firm. It has become more apparent that innovation and entrepreneurship have not only affected the small and upcoming firms but the large corporations as well. Large corporations are spreading globally to take the advantage of the human and natural resources of other areas and some have built different independent units and divisions throughout the world in order to enhance their competencies.

The world economy has become globally interdependent, bringing in new forms of relationships between economies, states, and societies in a structure of irregular geometry. Capitalism also underwent a course of intense renewal, with flexibility in management; decentralization and networking of firms both internally and externally as well as considerable empowering of capital vis-à-vis labor, with the simultaneous decline of influence of the labor movement; increasing individualization and diversification of working relationships. The end of the second millennium (late 1900) saw different events of historical meaning convert the social setting of human life. A technological revolution centered on information technologies, being renewed at an increased speed and became the material basis of civilization (Castells Vol. 1. 1996:1).

By the last quarter of the 20<sup>th</sup> century, it was a time of change and there was a revolution in the field of innovation which affected every aspect of life throughout the globe. This innovative change "has transformed the way we think, we produce, we consume, we trade, we manage, we communicate, [.....]. A dynamic, global economy has been constituted around the planet", (Castells, Vol. 3. 1998:1) which has connected people and their activities throughout the world. As a result there was a huge expansion of capital growth which included heavy investments in the development processes and activities and at last made the foundations for the interdependence global economy.

Due to this, there was an increase in competition and as Grimm et al (2005:5) explained, the past two decades have seen the restructuring of business and industry through globalization, global renewal of capitalism, successful moves of government deregulation and privatization plus enormous technological innovations. They further indicated that the reformation has already had a big impact and is likely to go on to affect the way businesses are carried out well into the twenty-first century. Most people believe that a new age of fast paced competition is rising as a result of these major changes. Due to the dramatic rise in competitive actions and reactions between firms, the latest competitive era has become distinctive. The time it takes for firms' to reach

decisions has been reduced whereas increasing the speed at which new ideas are generated and developed for use. The proactive companies generated a greater market power and advantage than the less proactive ones.

Due to the advanced technological industrial development, multinational companies are coming up with different ways to get new ideas to survive and be successful in the strong competitive environment and at the same time to satisfy their consumers. For this reason, consumers are also anticipating a variety of new products and product development. In order to stay strong in this global market, the multinational firms have opened their doors to external ideas. According to Zack (1999:6), the ability of firms to earn rates of profit in excess of their costs of capital depends on how attractive the industry in which they are located is and how established their competitive advantages are over rivals.

Globalization continues to contribute to the growth of multinational firms and enabling them to expand their research and development (R&D) activities. As stated by Boutellier (2008:4) this is evident due to international trade which also encourages the idea of firms to be developed more systematically with the establishment of local production and utilization of inexpensive labor. The use of global R&D centers and units makes it possible for the multinational firms to adjust to world-wide dispersion of talent and technology creation. As a result of this, multinational corporations are coming up with different strategies in generating ideas to be competent in their industries and always developing the business to stay ahead of competition. There are some corporations that have adopted external idea generation more than internal and vice versa. One would wonder how these are carried out and what the motivating factors behind the strategies chosen are.

In this thesis, the group has addressed the topic of corporate innovation by choosing three Swedish hi-tech leading corporations in the manufacturing industry that are competing in global markets. These companies include Volvo CE (Volvo Construction Equipment), ABB CRC (Asea Brown Boveri Corporate Research Center) and Scania R&D (Scania Research & Development).

## **1.2. Research Question**

How do multinational manufacturing companies manage innovation? What are their strategies in internal and external idea generation?

## **1.3. Purpose**

The study that has been conducted is a comparative one, where the group has compared different innovation management strategies used by three different globally- known Swedish firms that are in the manufacturing industry. The study is aimed at describing, analyzing and drawing conclusions of the innovation strategies used during the process

of product development in the chosen companies by comparing their similarities and differences.

### 1.4.Delimitations

The subject of innovation is very important and it would have been more interesting to explore further by making frequent visits consisting of more interviews and observations to the firms, just to have a wider perspective on how they innovate. Our primary findings are based on information collected from the people interviewed. This thesis would have carried more weight to know how external actors like suppliers, customers and universities viewed their collaboration with the firms, but due to insufficient time allocated to this process it was not possible to get their views.

### 1.5.Target Group

This thesis is likely to give an academic insight to fellow business students and other students interested in the topic of innovation. Hopefully, it will also be of benefit to management of corporations the study was carried on as well as other corporations in the same industry in trying to find ways of coming up with innovations and keeping them going.

### 1.6.Disposition of the Thesis

Since innovation has a wide theoretical base and to make comparisons, the group picked the concepts and models developed by different authors that are necessary for this study. The empirical findings focused on issues that could easily relate to the theoretical framework. The analysis is the chapter in which the group linked the theoretical framework and the empirical findings to see what the three firms have in common with one another and what they do not have in common. It is from the analysis that the group drew the conclusion and recommendations.

The following figure illustrates the disposition of thesis.

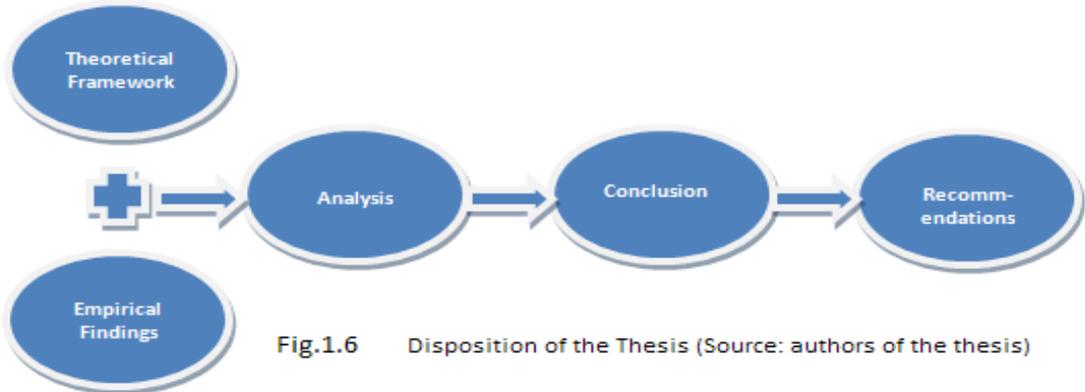


Fig.1.6 Disposition of the Thesis (Source: authors of the thesis)

## **2. Research Strategy and Method**

For this thesis, the group conducted case studies on three companies in order to make a comparison. According to Winstanley (2009: 85), the researchers need to have an idea of what they want to study in order to get a view point they are coming from. As such there is need to narrow down the study so that relevant data is acquired.

### **2.1.Comparative Study**

Chiesa & Frattini (2009:59) explained that a comparative method is one in which merits of one project are evaluated by comparing it with other projects. While Ghauri & Gronhaug (2010:202) mentioned that “Glaser & Strauss (1967) pioneered the constant comparative method as an analytical procedure in which the analyst compares incidents in the data with other incidents appearing to belong to the same category, exploring their similarities and differences.” With the proceeding of the analysis and development of categories, the researcher compares suitable evolving ones with the incidents in the data.

According to Yin (1989:23), “A case study is an empirical inquiry that investigates a contemporary phenomenon within its real –life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used”. In relation to this, Ghauri & Gronhaug (2010:109) defined a case study as a description of a management situation which often involves the collection of primary data through verbal reports, personal interviews as well as observation. In case studies data can also be collected from financial reports, archives, budgets/operating statements, market/competition reports.

The group carried out case studies on Volvo CE, ABB CRC and Scania R&D respectively and the reason behind this was that these companies are global actors and well known for their innovation as well as research and product development processes in their industry. The three firms belong to the manufacturing industry and the group thought it would be interesting to compare their innovation management strategies.

### **2.2.Data Collection**

The main difference between quantitative and qualitative research is of procedure and not of quality. In quantitative research, findings are collected by statistical procedures or by other different quantification methods where as “qualitative research is a mixture of rational, explorative and intuitive, where the skills and experience of the researcher play an important role in the analysis of data” (Ghauri & Gronhaug 2010:104-105).

The group carried out this study with the use of a qualitative interpretative method. According to Fisher (2010:72), this method is the kind where the researcher “would begin the interview with only the broadest view about how the conversation might

develop and may indeed encourage the interviewee to determine the direction in which the discussion flows.”

Our data collection involved both secondary and primary data. The secondary data included past research papers, literature reviews, and company websites. The primary data involved qualitative interviews which were semi-structured with different personnel at the chosen companies.

### **2.2.1 Secondary Data**

Secondary data is the kind of data that has been collected and recorded by other researchers other than the ones carrying out the research. This data can be interpreted, compared and related for the research topic at hand. This data can be collected by, reviewing policy documents, analyzing statistical data, looking for patterns within national data, evaluating major research project and initiatives, interpreting survey results and comparing national or international concerns (Winstanley, 2009: 85-86). The secondary data was derived from reviewing literature, company reports and previous research on the topic at hand.

#### **2.2.1.1 Literature, Company reports and Research projects**

The technique used in accessing literature and articles was through Mälardalen University library and Google scholar. The group used Diva to access other uploaded research projects and past studies carried out on the subject of innovation. The companies' Annual Reports on their websites were also accessed. Collection of secondary data was the first part the group dealt with before gathering primary data.

### **2.2.2 Primary Data**

Primary data is the kind of data collected using questionnaires, interviews, observations, measuring and recording something, diaries or reflective journals and taking part in an event or activity. In other words it is data collected by the researchers themselves (Winstanley, 2009: 86). The primary data was derived from carrying out interviews, the firms' own publications and website information.

#### **2.2.2.1 Interviews**

The interviews conducted were semi-structured and these included telephone, email and face-to-face, as summarized in Table 2.3. As Fisher (2010:175) has indicated that semi-structured interviews are neither pre-coded nor open, but are the kind of interviews where the interviewer has a guideline to keep them in check on what the main issues that need to be covered are. It allows the respondent to respond to the questions in the ways that best suits them. This is provoked by referring to incidences that the respondents could have been faced with regarding the topic at hand. The

respondent refers to a particular incident and it is up to the interviewer to encourage them in giving full details to get answers to questions at hand.

The main advantage of carrying out interviews is the flexibility because it allows you to direct the discussion according to unexpected vital information that may arise (Winstanley, 2009:145). At the same time you have the opportunity to change the discussion depending on the need of data required.

All the interviews were recorded and jotted down at the same time, by each group member in order to avoid the risk of misinterpretation and safeguard against technical difficulties. The guidelines used in the manner the group members posed the questions were similar with all three firms, to make it easy and fair in analyzing and concluding this comparative study.

Since innovation is a wide subject, the study was not deeply rooted in one particular area of the innovation models but was a scan of the innovation management strategies carried out in the three firms. In order to avoid forming own preconceptions as we carried out the interviews, the group's position during this process was by all means neutral.

The respondents were chosen on the basis of the connections they had with the firms as well as the subject at hand. Choosing who to interview was based on snowball sampling, which Fisher (2010:184) refers to as the kind where key people to interview are identified through personal contacts who would be in a position to identify the right people to interview for the study in question and in turn refer to more and more interviewees to respond to questions that come up during the whole process.

We interviewed Åsa Norrby & Henrik Berghäll of Volvo CE, Professor Rebei Bel Fdhila of ABB CRC and Katarina Lund of Scania R&D. These respondents were chosen due to their experience, background and role regarding the area of innovation management.

Table 2.3: Summary of the interview process

<b>Company Name</b>	<b>Date &amp; Time</b>	<b>Respondent</b>	<b>Designation</b>	<b>Venue &amp; Nature of Interview</b>
Volvo CE	30-03-2011 11:00 a.m. - 11:54 a.m.	Åsa Norrby	Innovation Development Leader	Volvo CE Eskilstuna (face-to-face, telephone and e-mail)
	13-05-2011	Henrik Berghäll	Manager Powertrain Control	Telephone & e-mail
ABB CRC	19-04-2011 9:40 a.m. - 10:27 a.m.	Rebei Bel Fdhila	Senior Principal Scientist	ABB CRC Västerås (face-to-face, telephone and e-mail)
Scania R&D	05-05-2011 9:30 a.m. -10:42 a.m.	Katarina Lund	Industrial Researcher	Scania R&D Södertälje (face-to-face, telephone and e-mail)

(Source: authors of the thesis)

### 3. Theoretical Framework

This is aimed to give an introduction to theories on innovation and management and more specifically on models of open and closed innovation by giving a general discussion of their benefits, challenges, as well as how they are managed.

#### 3.1. Innovation

What organizations have in common according to Bessant & Tidd (2009:5), is that a great deal of their success comes from innovation. Even though size or asset possession can add to their competitive advantage, the outline is gradually favouring organizations that can mobilize knowledge, technological skills and experience to create novelty in their offerings as well as the methods used in creating and delivering them.

Innovation is important in firms, especially in ones that are multinational and find themselves in a global competitive environment. The increasing interest in innovation is as a result of what is known as “the wall of complexity.” The fact that this complexity in innovation is increasing, it continues to create an ever higher peak for companies that find themselves in commercial as well as public sectors, to continuously be driven to deliver the utmost in sophisticated technologies, processes, policies, as well as end products and services in the markets and industries where they are used and managed. The most important aspect in organizing and managing innovation in companies lies within the degree of success in which those companies are willing to create and sustain value in this increasing complexity through innovation. As all fields of technological and market life-cycles collapse, and complexity increases, the world of complexity is going to destroy any chance of sustainable value creation (Harris, 2003:118).

According to Chris Townsend et al. (The Rise of Innovation Management Tools, 2008), a recent global study showed that 93% of senior business executives indicated innovation as a top strategic priority, because the economy is now globalized and the persistent internet is driving the constant change being experienced in today’s businesses. As such, in order to stay on top of these changes, top executives are up for continuous as opposed to ad hoc innovation, which is followed by the coming up of new markets for tools on how to manage innovation. What the providers have in common is the vision of continuous innovation as a key discipline to be actively managed and not a technical crisis to be solved.

An early and still important theory of entrepreneurship and innovation is by Schumpeter who distinguished two sources of innovation; Schumpeter’s ‘mark I’ and ‘mark II’, the first one is the independent small entrepreneur, whose actions are based on intuition in bounded rationality, and is always trying out new things and the second one refers to the large, rationalized Weberian firm whose innovation source comes from specialized planning teams (Nooteboom, 2000: 63-64).

There are notions of innovation, emphasizing different things. This may include Bessant & Tidd's (2009:3) view, as innovation being the ability to see connections and identifying opportunities to take advantage of it. Whereas Drucker (cited in Bessant & Tidd, 2009: 16) states that it is a specific method of entrepreneurs to exploit alteration as a prospect for diverse business and that it is a discipline that can be learned and practiced. According to Harris (2003: 10) innovation is "the successful introduction of new ideas".

Innovation as defined by Edison "is more than simply coming up with good ideas: it is the process of growing them into practical use" (Bessant & Tidd, 2009:16). This is the definition the group considered more suitable, as it is a simplified version of what most other authors have indicated except for the different wordings, and it covers products, production processes, managerial ways, the way an organization is designed or structured etc.

### **3.2. Corporate Innovation**

Large businesses could strategize by corporate venturing. Corporate venturing helps larger corporations manage upcoming, entrepreneurial businesses independently from the ongoing or main activities. Sometimes it is in the interest of larger firms to invest in smaller firms and different types of corporate venturing businesses which are strategically important for them (Chesbrough as cited in Burns 2008:13).

Burns (2008:12) view regarding strategy is one of the core aspects of corporate entrepreneurship and innovation. He defined corporate entrepreneurship as the description of "entrepreneurial behavior in an established, larger organization. The objective of this is simple - to gain competitive advantage by encouraging innovation at all levels in the organization - corporate, division, business unit, functional or project team levels". In the same regard Burns (2008:12), cited Zahra et al as having suggested different facets with different combinations to entrepreneurship at the level of a firm, and one of them indicates the content of entrepreneurship being "corporate venturing, innovation, proactivity." The sources of entrepreneurship could either be internal or external, where as its focus being either formal or informal.

Companies also innovate better over-time where the process of corporate innovation is applied to their innovation management strategies. This is an important innovation management strategy, because the process incorporates exploring knowledge as well as learning in an organizational context, in order to better innovate for product development processes. There is a fact that virtually all entrepreneurial initiatives face some degree of survival risk induced either by structural or strategic context. The firm needs to explore how its innovative and competitive capabilities can be redefined, renewed, or replaced while ensuring that the result changes in policies, priorities, and procedures will be accepted throughout the organization (Dess et al., 2003:358).

Innovation helps companies in developing an integrated set of routines, which are strongly associated with successful innovation management strategies. Such routines give rise to distinctive competitive ability, for example, being able to introduce new products faster than anyone or being able to use new process technology better especially in a competitive environment (Bessant & Tidd, 2009:77).

Teece & Pisano as cited in Bessant & Tidd (2009:165 & 168) have developed a framework for innovation which emphasizes the dynamic competencies of firms and differentiated three elements of corporate innovation strategy. These are competitive and national positions, technological paths and organizational & managerial processes. In this regard, the authors further summarized two corporate innovation strategies, 'rationalist' or 'incrementalist'. The rationalist strategy's first step consists of describing, understanding and analyzing the environment, followed by determining the procedure in the light of the analysis and then carrying out the chosen procedure. On the other hand, the incrementalist involves being aware that the firm has only very imperfect awareness of its surroundings, of its own strengths and weaknesses, and of the expected rates and commands of change in the future. The steps involve making deliberate changes towards the stated goal, measuring and evaluating the effects of the changes and adjusting the goal and deciding on the next change.

### 3.2.1. Closed Innovation

Chesbrough (2003: xx) calls the traditional way of innovation as closed innovation, he has indicated in his words, "I call the old paradigm Closed Innovation. It is a view that says *successful innovation requires control*". To emphasize this point, Chesbrough further states that firms need to generate their own ideas so that they can expand on them, assemble them, advertise them, distribute them, service them, fund them, and to be able to sustain them on their own. This paradigm encourages firms to be strongly independent, because the quality, availability and capability of others' ideas' cannot be relied upon.

According to Chesbrough (2003:xx), the logic behind closed innovation was that large organizations spend heavy amounts on R&D which enabled them to discover and implement new ideas and then they introduced new products and services in the market which led to more sales and higher rate of returns as compared to their competitors. Then these companies reinvest more in their internal R&D, which led to further developments and breakthroughs. At the same time as they are more conscious about the intellectual property (IP), their competitors could not exploit their ideas.

Moss Kanter (2000:172) placed emphasis on how organizations should cooperate more and increase relationships with its staff in order to ensure continuing close connection for the gathering of internal ideas. These interactions within organizations have positive effects on internal sourcing of ideas, for instance, those that are evaluated and selected

for the development of new and existing products. This theory is vital and thus applicable to organizational innovations as well as technological or product innovations because the staff, that is scientists, engineers and researchers are the very people whose ideas are considered and profited from.

Figure 3.2.1 illustrates the paradigm of closed innovation. In which research projects are initiated from the firms' technology department. They go through an evaluation process where they are filtered for further consideration. From which some are chosen to be developed for the market.

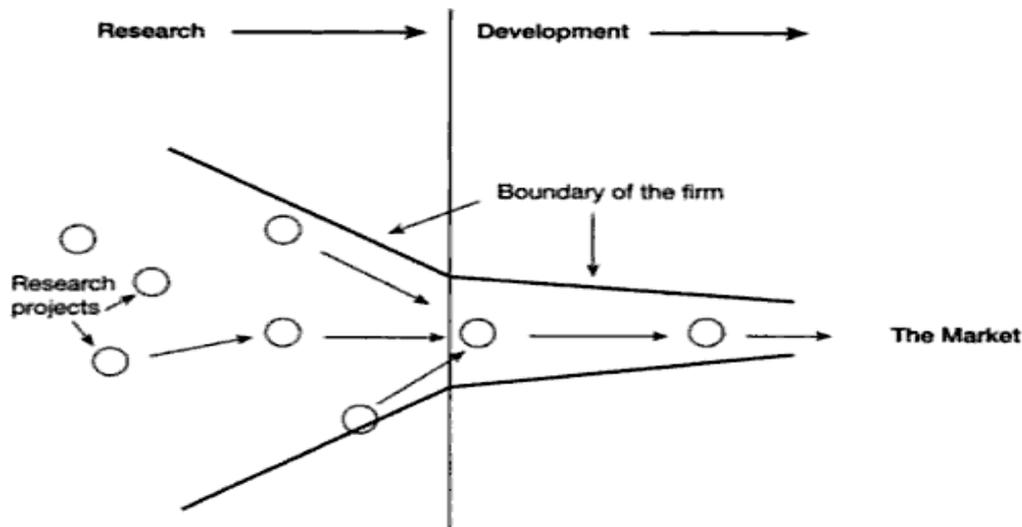


Fig 3.2.1 The Closed Innovation Paradigm for Managing Industrial R&D  
(Source: Chesbrough, 2003:xxii)

### 3.2.1.1. *Managing Closed Innovation*

In managing closed innovation which is based on an inwardly focused culture, companies need to make various considerations regarding the evaluation of ideas that were generated. This would require the science and technology departments of such companies to make evaluations in selecting which ideas were necessary, in order to enhance efficiency in their product development processes. Such evaluation processes determine the ideas that are to progress in various markets, they progress through the process, and some of the projects are stopped, while others are selected for further work. The very best of these ideas are then chosen to go through to the market (Chesbrough et al., 2006:2).

Companies should also be in the position to better motivate its staff that are involved in internal R&D for production development. This is because well evaluated ideas from such staff, are what makes it possible for such companies to be able to invent and innovate in a competitive environment. Inventing through internally generated sources do not only help companies in gaining competitive advantage over their competitors, it can also be used as a management tool in continuously building innovative teams that would ensure the delivery of successful innovation over time (Harris, 2003: 27).

Moss Kanter (2000:197) described that, “those organizations that permit replanning, give the working team sufficient operating autonomy, and measure success or allocate rewards for results rather than adherence to plan are likely to have higher rates of innovation production.”

In order to diffuse new ideas, it may be necessary to form a group for the mere purpose of activating the new ideas (Engel et al. 1981 as cited in Moss Kanter, 2000:201). This can be achieved by ensuring that group members are active agents of diffusion, hence managing the process by ensuring the idea is transferred to specific people that can use it. Part of their duty is to systematically collect the information necessary for the innovation to get to the users. The product managers may take up this role within an organization (Moss Kanter, 2000: 201).

### **3.2.1.2. Challenges of Closed Innovation**

Chesbrough (2003:34-39) has listed about four factors of why closed innovation was eroded towards the 21<sup>st</sup> century which are presented below;

*Increasing mobility of skilled workers:* This is the first factor which led to erosion of the closed innovation. The supply of trained and skilled professionals and knowledgeable people has increased tremendously after the world war and also cold war. And on the other hand in the labor market, the mobility of well-trained and highly skilled workers possessing professional knowledge has also increased from the organization having internal R&D to the suppliers, consumers, consultants and universities.

*Venture capital expansion:* After the 1980s huge capital was invested in the market and skilled workers departing the large organizations had no financial problems to build up their own businesses. The research and development of companies were at greater risk.

*External options for Ideas Sitting on the Shelf:* There may be external options for those ideas which are still waiting on shelves to be developed into products. As consumers won't wait for better and improved products for an indefinite period, the competitors will make efforts to provide better products and disheartened employees can sell their ideas to them, in the new huge venture capital market.

*The increasing capability of External Suppliers:* Now the companies can rely on external suppliers for the quality and quantity of components required for their products due to the expansion of universities, availability of highly skilled workers and huge capital market.

Internal ideas may not be necessarily enough to make innovations over-time and this could thus pose a threat to companies. It is obvious that opportunity exists because need exists, so it is not surprising that close customer or user contact is an important innovation activator (Moss Kanter, 2000:173).

Intellectual property (IP) which nowadays increases revenues to most companies and at the same time bring opportunities for new ventures is also a challenge in closed innovation. This is because in a closed system, companies are known for just gathering IP in order to give internal researchers the flexibility to come up with ideas, but not necessarily focusing on investing to further develop patents and in most cases, they are never used because such companies tend to minimize cost (Chesbrough et al., 2006:4).

Moss Kanter (2000:201) indicates that transfer and diffusion of innovation could have downs when the innovation developers and the ultimate users do not interact as it could raise high uncertainty issues on getting anyone to use the innovation as it is unknown whether or not anyone would be interested in it.

### **3.2.1.3. Benefits of Closed Innovation**

Internally generated sources encourage organizational learning for the flow and share of knowledge in developing ideas and also make it possible for companies to develop and introduce products much quicker for various markets. Companies need to be aware that “systems innovations are not only the combined end result of many distinct minds and ideas, but the result of learning beyond what is already known” (Harris, 2003:81).

The ability of companies to trust ideas they evaluate for product development from internal sources gives them the flexibility to patent and own the rights to such ideas. Considering the fact that internally generated ideas come from within the same environment, the cost involved in the R&D process is thus minimal. Most companies that source internally, may in a competitive environment seek patents less to support the commercial development of specific invention than as a means of avoiding costly litigation (Chesbrough et al., 2006:194).

### **3.2.2. Open Innovation**

Chesbrough et al. (2006:1) have defined Open Innovation as “the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively”.

With regards to the paradigm of open innovation, Chesbrough et al. (2006:1) state that it is a model that supposes the firms can and should utilize external and internal ideas, as well as internal and external actors to market, so that they can enhance their technology. The logic behind open innovation' according to Chesbrough (2003: xxv) stands on a landscape of sufficient knowledge, which must be ready to be used to add value to the specific company which created it.

Figure 3.2.2 illustrates the paradigm of open innovation. Here, research projects are initiated from either internal or external technology bases. New technologies can penetrate at different stages of the process. Projects go to new or current markets in

various ways. In open innovation “there are many ways for ideas to flow into the process, and many ways to flow out into the market” (Chesbrough et al., 2006:3)

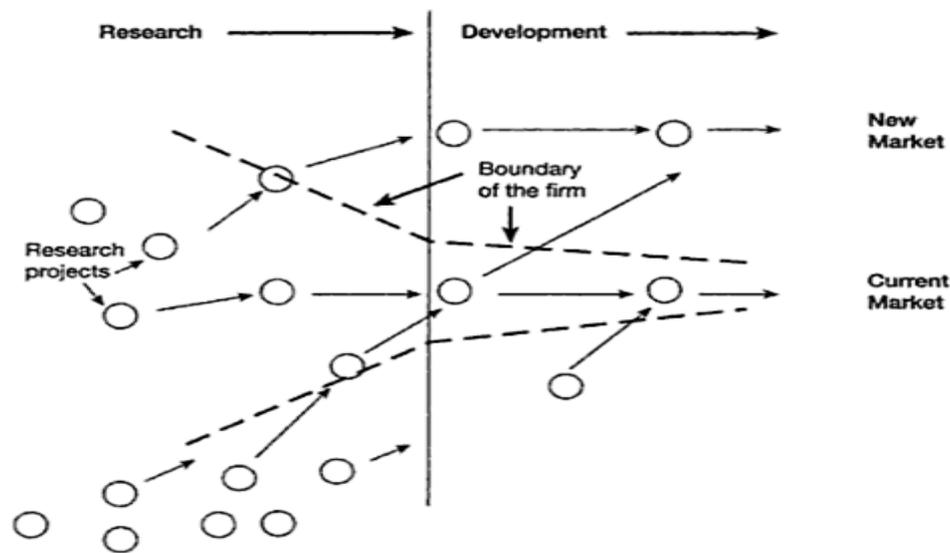


Fig 3.2.2 The Open Innovation Paradigm for Managing Industrial R&D  
(Source:Chesbrough, 2003: xxv)

Teresko in Industrial Week (2004) has indicated that open innovation neither means outsourcing of R&D nor closure of internal R&D but it is strategy of discovering and coming up with new ideas that could be complementary to the current R&D projects. Not only does open innovation remove the geographical, technological and corporate boundaries that stand in the way of new product development as well as new markets. But it also gives access to “knowledge and technologies that would take years and millions of dollars to develop in-house. The approach makes it possible to shorten product development cycles and leapfrog the competition. And it makes it possible to harness so-called 'disruptive technologies' instead of being blindsided by them”.

### 3.2.2.1. *Managing Open Innovation*

Intellectual Property (IP) is a big part of open innovation as Chesbrough (2003:56) has stated, many firms refer to their legal departments for licensing and patent protection decisions. IP is a big part of a company’s technology strategy and should be managed at a strategic level within a firm because if sold, it can bring in profits and at a high risk of being diffused and imitated by competitors. IP management should be done by planning a company’s technology strategy with the belief that it could be diffused or imitated.

The logic of open innovation according to Bessant & Tidd (2009:297) is that there is need for organizations to open up their processes of innovation, by “searching widely outside their boundaries and working towards managing a rich set of network connections and relationships right across the board. Their challenge becomes one of improving the knowledge *flows* in and out of the organization, trading knowledge as much as goods and services”.

### *3.2.2.2. Challenges of Open Innovation*

Teresko in Industrial Week (2004) states that there are rewards that arise from linking internal product development with external technologies. However, a strategy of open innovation can also bring unanticipated corporate challenges which may include cultural adjustments.

The development of mechanisms which can enable the practice of external idea generation is a major challenge, because it includes less about understanding the concept than its operation (Bessant & Tidd, 2009:297).

West & Gallagher's diary as cited in Chesbrough et al (2006:84) has mentioned three challenges of open innovation, which are Maximization, Incorporation and Motivation.

- **Maximization:** The firms require applying wide range of approaches to gain maximum results to their internal innovation. They should not only concentrate on production but can also license their IP, pool patents, pooling issues and sometimes even they are willing to share their technologies to enhance the demand of other products.
- **Incorporation:** Another big challenge is the ability of firms to identify the relevant external knowledge and then incorporate this knowledge to their projects more quickly than their competitors. If firms are not able to do this then external ideas and knowledge are not beneficial to them.
- **Motivation:** It is assumed that open innovation is like a continuous stream of external ideas but it is a big question that who will continue to provide IP externally which could be used by the company. The firms need to motivate external sources to make sure that there is continuous supply of external ideas and relevant technologies.

### *3.2.2.3. Benefits of Open Innovation*

Different authors have written about the benefits of open innovation. For example Sherman and Schultz have indicated on open boundaries and possibilities, "the way things happen and the way behaviors occur are always through an ongoing opposition between differing requirements, desires, demands, interests, or values. There are always things to be reconciled" (Sherman & Schultz, 1998:108).

Sherman & Schultz (1998:108) further described that when two or more people meet together with differences, those differences need to be sorted out and the firms, as purposeful complex adaptive systems, cannot ignore the possibilities to resolve such differences. There is a big edge of learning for firms who have opened themselves to these great possibilities as compared to those firms which don't. Then businesses get

new ideas and new ways of thinking. In case a business follows only the old ways of thinking, in result it will limit its possibilities.

Open innovation is beneficial to firms considering the knowledge that it brings in helping them to further develop their production processes. Fabrizio (2006:134) mentioned Teece (1986) & Chesbrough (2003a) that, “The body of science represented by university-based research is an important and growing contributor to industrial innovation and that firms become willing to identify and exploit this external knowledge in developing competencies”.

The idea in enabling outward flows of technologies allows firms to let technologies that lack a clear path to market internally, seek such a path externally. This makes the internal businesses of the firm to now compete with these external channels to market in areas such as licensing, ventures and spin-offs that can create additional value for new technologies (Chesbrough et al. 2006:9).

Table 3: Summary of the characteristics of open and closed innovation

Open Innovation	Closed Innovation
<ul style="list-style-type: none"> <li>• Abundant external ideas</li> <li>• Universities, Customers, Suppliers are an important source</li> <li>• More opportunities in idea generation</li> <li>• More Venture Capitals</li> </ul>	<ul style="list-style-type: none"> <li>• Abundant internal ideas</li> <li>• Employees are a major source of ideas</li> <li>• Less opportunities in idea generation</li> <li>• Less Venture Capitals</li> </ul>

(Source: authors of the thesis)

## 4. Empirical Findings

This chapter focuses on data related to the three companies; Volvo CE, Scania R&D and ABB CRC. The data is derived from websites as well as interviews with Åsa Norrby Innovation Development Leader Volvo CE in Eskilstuna, Henrik Berghäll Manager Powertrain Control at Volvo CE in Eskilstuna, Rebei Bel Fdhila, PhD, Senior Principal Scientist in Process Modelling, Automation & Technologies at ABB CRC in Västerås and Katarina Lund, Industrial Researcher at Scania R&D in Södertälje.

### 4.1. Volvo Construction Equipment (Volvo CE)

Volvo CE is part of the Volvo Group AB and currently a global enterprise whose main roots are in Eskilstuna Mekaniska Verkstad. Its background is lined with several acquisitions and mergers. During its development, the company has passed through more than forty different name changes and it prides itself in its ability to create

innovative solutions for customers' direct and projected need, as they continue to renew their concepts and industry standards (Volvo CE, The Company, 2011).

Starting 1832, Volvo CE produced simple tools for lathes, grinders and iron chests on demand by consumers. By the 1850s the company started producing its own steam engines, where in 1853 the first Swedish steam locomotive emerged, but the big seller in that year was the locomobile. The steam roller was produced in 1906, followed by the first Swedish farm tractor in 1913 which was followed by many other tractor models which became the ground for construction equipment like motor graders, wheel loaders, backhoe loaders etc (Volvo CE, Products, 2011).

For the year 2010 Volvo CE spent about SEK m. 1,972 on research and development (Volvo Group Annual Report, 2010).

#### **4.1.1. Products**

Volvo CE's product portfolio includes wheeled and crawler excavators, articulated haulers, wheel loaders, motor graders, pavers, compactors, milling equipment, tack distributors, road wideners, and material transfer vehicles as well as a range of compact equipment like wheel loaders, backhoe loaders, skid-steer loaders and excavators (Volvo CE, Products, 2011).

#### **4.1.2. Innovation at Volvo CE**

Volvo CE started with few machines and developed into a total provider. Volvo has been active in the innovative processes since the 1800's, but due to the recent financial crisis they came to a halt. Volvo's way of working with innovation development is radical as opposed to investigating first, i.e. they do not spend time in investigating on how to work with innovation, instead they act on innovation development at the same time as they investigate the area and measure the effects later on in the process (Norrby, 30-03-2011).

##### **4.1.2.1. Internal Idea Generation**

About 2 years ago, Norrby's supervisor Jenny Elfsberg carried out a survey to see if the climate at Volvo CE is an innovative one, and she came out with the result that employees had ideas but they did not know what to do with them which led to Volvo CE to work in collaboration with Volvo Technologies, another unit within the Volvo Group AB. In turn Volvo CE adopted theories and practices used at IBM of Innovation Jams and use of Innovation Coaches (iCoaches). These practices were further developed to suit Volvo AB. The Innovation Jams are global online brainstorming sessions that take place twice a year where a subject is presented for different units and personnel of Volvo Group AB all over the globe to go online, present their ideas, discuss and interact with experts on the subject. The session runs for 48 hours, during this period top 10 ideas are

picked and then 200 hours are allocated by 10 projects (ideas picked), so that an investigation on how the ideas can be developed in Volvo AB is carried out. The discussions are not how to develop the idea, but investigations on how the ideas can be developed to bring in profits. They do not conduct cross-functional meetings so much but rely on Innovative Jams that are in place twice a year (Norrby 30-03-2011).

Innovation Coaches (iCoaches) are like innovation ambassadors who give tips on innovative models. At the moment they are appointed in Emerging Technologies and some other places. But in future there is a plan to hire them all over the Volvo CE. The iCoaches are trained on how to create effective brainstorming sessions and they inspire others. They are found globally in Volvo Group AB within the Emerging Technologies (Norrby, 30-03-2011).

As different units collaborate within Volvo Group AB it is seen that different parts work in different ways but the questions and obstacles are the same. All units and all employees within the group through the Innovative Jams are involved in innovation processes. (Norrby, 30-03-2011).

#### *4.1.2.2. External Idea Generation*

The idea generation is only within the Volvo Group AB and does not extend to the group's suppliers or customers, even though the thought has come up, it has not been effected yet due to issues of secrecy. The company would want to solve its issues internally first before taking them out to the external parts. Norrby, further pointed out that the company is confident in what they do and she believes that customers do not always know what they want, it is up to the engineers to figure out what is the customers thought behind what they say they want, which is the unwanted need. If Volvo only listens to what the customer needs, Volvo's products may not develop in the way they want and may not be profitable (Norrby, 30-03-2011).

Volvo CE works a lot with networks as opposed to employing people to work on it. Innovation is about quality, knowledge sharing and inspiring. Even though there are some traces of external idea generation, it is very rare and hardly developed. There is a mail box for external parts that wish to submit ideas but it is not an important part of Volvo CE's idea generation. External parts are not explored deeper yet, they have a channel in how they communicate with customers which is not specified (Norrby, 30-03-2011).

Volvo CE is also eager to look into how the company could build better relationships with its existing suppliers and customers and use them in a more innovative way, as well as how other companies are handling the process so that they can learn from them. The companies Volvo CE prefers to look on to in this regard are manufacturing and production companies, not necessarily within the same industry or competitive environment. The company already has researchers working on collaboration for

supplier relations, but what they don't have are researchers working on generating external ideas and in fact, they don't have external idea generation managers (Norrby, 30-03-2011).

Every year Volvo Group offers a number of internships that are closely linked to education that is vital for the group's anticipated manpower requirements as well as to complement the education system with appropriate experience. This also helps students to explore career options. The group collaborates with local schools and universities to offer these internships (Volvo Global Group, 2011).

#### **4.1.2.3. Types of Customers**

Volvo CE operates in both Business-to-Businesses (B2B) and Business-to-Customer (B2C), but mainly deal with B2B. B2C is seen in cases where individuals buy smaller machines like garden machines and small excavators etc for personal use (Berghäll, 13-05-2011).

#### **4.1.2.4. Motivation**

According to Norrby "since 2010 Volvo CE stopped giving physical rewards to people that bring good ideas to the company with the view that rewards act as a down-ward spiral, that is if you give rewards, you have to continue giving rewards, increasing the amount and this is an innovation killer." Volvo CE's notion in this is that the reward should be mental and bringing out ideas should feel like something natural, that people need to come up with their ideas willingly, which is a reward in itself and also if people take part in the Innovation Jams, that is also a reward. Volvo CE based this decision on research being carried out on financial rewards, which according to Norrby, shows that "rewards are not durable in the long-run." The drive for individual recognition is more valued at Volvo CE because it is what helps the company to grow and this is also a reward to the individuals who are involved in idea generation processes. The motivation, however, is when people see that their ideas are evaluated and probably used. On the other hand, ideas that are good but not used are further looked into (Norrby, 30-03-2011).

### **4.2.ABB Corporate Research Center (ABB CRC)**

ABB Corporate Research Center (ABB CRC) in Sweden is located in Västerås and together with other ABB R&D centers, it develops technologies for future products and services for ABB's core businesses. The corporate research center consists of scientists and engineers, who work hard towards novel technological achievements that help strengthen, develop technologies for future products and services which act as their main research and development efforts, and are focused on ABB's core businesses, that is, Automation and Power (ABB CRC Sweden, 2011).

ABB CRC is not just working for “a company,” because ABB is a number of divisions and each has some business units. It is considered as two main technology parts, Automation and Power. The business units have specific technology or process or engineering solutions portfolio and have the appropriate know-how and competence to deal with that. As an example ABB Metallurgy has the know-how in electro-magnetics and this is used mainly in the metallurgy area, metal casting etc. ABB CRC is active in several areas like electrical cables, transformers, control systems etc (Bel Fdhila, 19-04-2011).

ABB’s continued growth in R&D investment brought an increase in R&D spending to 24 percent over the past four years which amounted to 120 million dollars in 2010. Its research operations are in eight countries, in line with the strategy to maintain a high focus in this area (ABB Annual Report, 2010: 8, 40 & 60).

#### **4.2.1. Products**

ABB CRC is focused on software architecture and processes, automation control and optimization, mechatronics and robot automation, automation networks and wireless technologies, electrical machines and power electronics, power systems and apparatus, nanotechnology and advanced materials technologies, chemistry and environmental technologies (ABB CRC Sweden, 2011).

ABB is a leading company in power and automation technologies. It produces and sells a large number of electrical devices and components. Some of them are used to build ABB’s own systems and others are sold to companies and may be visible, for example in electrical installations that are in daily use (Bel Fdhila, 19-04-2011).

#### **4.2.2. Innovation at ABB Corporate Research Center**

The research center is the life-blood of a technology-driven company like ABB, which balance a culture of innovation with a sharp focus on core activities. ABB researchers are at the center of this dynamic process and the research center works not only to identify promising new ideas, it also needs to be able to convert those ideas to successful products, systems and services (ABB, The Power of Innovation, 2004).

The communication flow between teams within ABB CRC has changed over the years. Communication and collaboration is very cooperative and much easier today. Everyone is free to post his or her idea on the database, but apart from the relevant person, only the idea owner has access to it (Bel Fdhila, 19-04-2011).

##### **4.2.2.1. Internal Idea Generation**

The most important innovation aspect at the ABB CRC is the ability of the scientists and researchers to work extensively through a product or a project, for example cables and transformers from anywhere. These people work side-by-side using different applications from distances to give help and support to each other. This is also seen as a

competence in the sense that it influences ideas and such influence can bring inventions from one side to another. Another innovation competence is the ability of experienced people within ABB CRC, from one unit to another to come out with their ideas. This is because, if one is working with the end-product, then one is obliged to improve their product so people are internally producing innovation in the area from internal know-how and that's how ABB CRC uses closed innovation (Bel Fdhila, 19-04-2011).

ABB CRC is central and works with many applications. There are 250 permanent and 30 temporary researchers in the Scandinavian research center in Västerås, Sweden which is the largest. ABB CRC always wants the right person to do the job and each research center handles different processes. Ideas are often shared between these various research centers at ABB, but if an idea comes from ABB Sweden, it is developed at ABB CRC in Västerås. However, scientists from ABB in other countries can also contribute in the development of these ideas, likewise ABB CRC (Bel Fdhila, 19-04-2011).

The research center also involves people from outside to work on both Automation as well as Power Technologies. ABB CRC tries to make people available for all needs. Most ideas are derived from projects, where persons in-house attend a brain-storming session to bring in these concrete ideas. The ideas generated from these sessions are then posted on an internal database in order to evaluate new invention. The idea then goes to the expert who passes it on to the patent department if it's worthy of patenting. Scientists at the ABB CRC are free to come up with ideas and put those ideas on the database and indicate to whom it may concern. However, some applications get feedback, positive or negative. If an idea is being considered worthy it is hidden and only visible to the inventor (Bel Fdhila, 19-04-2011).

ABB CRC has an internal website called "ABB Inside" for encouraging ideas in major areas. This invention disclosure database is not accessible to everyone, but to key persons within ABB and is used for ideas to be evaluated. Meetings are organized with people who have ideas about the invention. The inventor needs to negotiate ideas and clear misconceptions, and should also be able to convince, defend the idea, justify where the idea is coming from and why it should be invented, and also be able to justify the idea commercially. Meetings are held almost every week at ABB CRC, where the patent department meets to collect and discuss a number of ideas. Not all ideas are durable and thus, must be evaluated by numbers because it is important that they are beneficial to ABB as the return on investment must be properly determined. The money available is not always enough to invent every idea and in that regard, most ideas are not patented (Bel Fdhila, 19-04-2011).

#### **4.2.2.2. External Idea Generation**

The research center also welcomes ideas from ABB Business Units which communicate directly with customers and then collaborate with ABB CRC, because ABB CRC does not

directly contact the customers, unless they are invited by the ABB Business Units. ABB CRC believes that customers' requirements help the company to improve its inventions in new things. ABB Group sells large units of its products to customers whom they have long-term relationships with. Regular meetings with such customers are held to follow-up and see how the products sold are performing in reality. Feedback could be through telephone or e-mails etc, and there is the agreement of exchange of information. (Bel Fdhila, 19-04-2011).

ABB CRC considers ideas and acts upon them, with the notion that ideas are useful when acted upon. This is because the business units at ABB make sure that they are doing a usable business. ABB CRC prioritizes ideas from business units because of financial grounds, the finances from these businesses help develop its research. The majority of what ABB CRC does, should suit the ABB Business Units first, because these businesses pay huge sums of money in tax to run their activities and thus needs to be satisfied. ABB's top priority is its products, which they sell to their customers (Bel Fdhila, 19-04-2011).

The ABB CRC collaborates with many universities in Sweden, other parts of Europe and the rest of the world in order to be a supplier of cutting edge technology to the ABB Business Units. Some ABB CRC personnel are also adjunct professors at universities to influence the education to have the right engineers. The main challenge of collaborating with universities is that it is time consuming because apart from working at CRC they also lecture at the universities (Bel Fdhila, 19-04-2011).

#### **4.2.2.3. *Types of Customers***

ABB CRC operates in both B2C and B2B customers. The main aspect is the B2C where it sells to end users. The B2B aspect is where certain companies collaborate with ABB CRC in certain shared projects to sell components (Bel Fdhila, 13-05-2011).

#### **4.2.2.4. *Motivation***

Financial investments are used as a motivating tool by ABB CRC if inventors produce ideas that are evaluated. This is a small amount to enhance and encourage researchers to come up with more ideas. Moreover, the higher in the patenting process an idea goes, the more money is given to the idea owner (Bel Fdhila, 19-04-2011).

Bel Fdhila explained that ABB CRC always needs to improve the products and solutions of ABB Group systematically, in order to be competitive. The CRC should come up with ideas to improve innovation effectively. There are two important factors that run the activities of the ABB CRC, the first one is when there are ideas internally and the second is where there is a customer need through ABB Business Units (Bel Fdhila, 19-04-2011).

### **4.3 Scania Research & Development (Scania R&D)**

Scania R&D Group is in operation in about 100 countries and has about 34,000 employees, 2,400 of which work with research and development and have their main base in Sweden (Scania Group in brief, 2011).

#### **4.3.1 Products**

Scania's products include trucks which are used for distribution, construction and long-haulage purposes, buses and coaches for public transport operators and coach companies, and engines for industrial use, power generation and marine vessels (Scania Products & Services, 2011). Production of components, engines, trucks and bus chassis are done in Södertälje, Sweden. (Scania Södertälje, Sweden, 2011).

#### **4.3.2 Innovation at Scania**

Scania Group has a global integrated production network, which means that the methods used as well as the quality and environmental standards are uniform in all the production units. The Scania Production System (SPS) was developed internally by the company's own employees; it includes methods and principles that lead to continuously ongoing improvement work. Even though all units have common methods in how they work, ideas for improvement are encouraged and discussed. Whenever there are new solutions, they are tested and evaluated all the time, any adjustment done at one unit systematically affects other units globally in the production network. The Scania Retail System (SRS) is a systematic method of attaching the same philosophy within Scania's service and retail network, this adds to the value of the customer, reduces lead times, encourages employee initiatives and loyalty and add to high returns for the company (Scania, Focus on continuous improvement, 2011).

Scania has a 4 percent budget of its sales (which were SEK m. 78,168 in 2010) over a year for the purpose of research and development. About 60 percent of this amount of R&D is invested on engine transmission. Due to this heavy share of investment, Scania has a globally leading position. All resources of research and development are concentrated at Scania Technical Centre in Södertälje, Sweden (Scania Annual Report, 2010:37).

Scania will build a unique advanced wind tunnel at its Technical Centre, Södertälje for heavy vehicles. On completion of this project in 2013, new opportunities will be opened for Scania to simulate most of the world's climatic conditions to test the different vehicles and their parts during the R&D phase independently of the weathers and also types of transport (Scania Annual Report, 2010:39).

Scania has guidelines in the R&D unit that everybody follows, however, there is also room for individual initiatives in trying out new things or ways when it comes to idea

generation. Scania has its R&D unit in Sweden, and additional small development units close to the production facilities. The smaller development units focus on field quality issue, i.e. redesign of products already in production. One reason for concentrating the R&D operations to one geographical location is according to Lund because “in a big company, it is difficult to have many R&D units” (Lund, 05-05-2011).

#### **4.3.2.1 External Idea Generation**

When it comes to bringing in any ideas from outside, Scania R&D does work a lot with universities, suppliers and customers in certain fields. Linköping (LU) and Kungliga Tekniska Högskola (KTH) are the main universities that Scania is collaborating with. For example, with KTH, Scania R&D is collaborating to come up with ideas on how trucks will work in the future. There is talk about the caravans which would be connected to trucks to work like trains. Scania R&D looks at these activities as sources of inspiration on ideas. In collaborating with universities, Scania R&D also works with master thesis students, for insourcing of ideas, because these students bring in their ideas to work on problems that Scania might have and thesis projects of this kind are continuous. Master thesis students are not employed at Scania but are encouraged to work around problems that Scania might have and are a source of idea inspiration and sometimes human resource. The universities also work together in terms of funding for projects which happens regularly (Lund, 05-05-2011).

Scania R&D have suppliers from whom they buy parts, however with some suppliers, Scania designs what they want to buy, whilst with other suppliers they collaborate to design the parts together, which for the R&D unit, is also a source of inspiration. The company engineers and suppliers work together to come up with the best solution and Scania carries out quality control. It's cheaper for Scania to use supplier competencies, because having certain competencies in-house all the time would prove very expensive. Scania also wants to be unique but yet use suppliers' competencies to develop certain components, with the help of their engineers. These suppliers have other customers to whom they also want to sell the new technology, making it very difficult to keep parts developed together exclusively for Scania (Lund, 05-05-2011).

When it comes to generating ideas from customers, Scania R&D does it through its marketing and sales units, who meet customers for response and especially feedback on the performance of the products. The feedback gives Scania R&D inspirations for ideas. This is achieved through a 'field quality report system' from their customers. When something happens in the field, the service units or distributors report it in some kind of system. This is used as a way in knowing how Scania products are doing in the market, whether or not they are working in ways that they should. With this database, Scania gets information on what parts are faulty. Through pictures, however, they might determine the problems in order to be able to analyze them, in addition those parts can

be sent to the R&D unit for further analysis. This input is important because it brings in inspiration for ideas and Scania often gets such from the customers (Lund, 05-05-2011).

Another source of ideas is a forum for those who drive Scania trucks called KingsClub (Lund, 05-05-2011). KingsClub is an online meeting place for those who drive Scania trucks and the like. It is a club where people can discuss important issues for drivers (<http://kingsclub.se/site/>). Drivers are able to chat and discuss what they think of the trucks, what they feel needs to be worked on. Designers put up questions on this forum and depending on the answers, they are inspired to work on matters or solve problems (Lund, 05-05-2011).

Scania R&D has a transportation company to transport its goods to and from the production unit in Holland. The input from those drivers and the data retrieved from the trucks serve as inspiration for ideas. Analyzing and learning about how drivers drive is a part of how Scania innovate. Drivers are also invited to attend workshops, where they can discuss the problems they face with the trucks and their perspectives are also a source of idea inspiration. Lund mentioned, "Scania have more insourcing of inputs than ideas" (Lund, 05-05-2011).

Apart from the KingsClub which is pretty new, the other external idea generation initiatives like the use of the master thesis students and suppliers have been going on for quite a while (Lund, 05-05-2011).

### **5.3.1.1 Internal Idea Generation**

Scania R&D does not have specific innovation managers or a central idea unit, but have people involved in the process. However when it comes to innovation, communication takes place within the whole R&D unit on person-to-person basis as there is no database where ideas can be shared. With regards to the implementation of a database for idea sharing, Lund pointed out that "it would be a big potential for a company like us." But somebody has to take care of it and culture has to change for everyone to use it. For solutions, departmental managers meet and discuss ideas from their units and engineers meet cross-functionally to try to think in new ways during brainstorming sessions (Lund, 05-05-2011).

Scania is currently more focused on internal idea generation, as Lund explained, it is more of maintaining an organizational climate of internal generation of ideas first before considering external idea generation. The company has a strong-line organization where people of the same department work together on sharing of ideas. However, when it comes to interdepartmental sharing of ideas it's normally on person-to-person basis. For instance, there are specialist units that work with plastic and can also share ideas with other persons in different units. There is also a structure when it comes to patenting of such ideas. There are guidelines at Scania R&D in writing for a request for investigation to see if an idea is worthy to make a patent out of it, which is usually the first step. The

patent department helps in identifying whether an idea is good or not for patenting, by saying “yes or no,” but do not evaluate its quality. The ideas that are deemed protectable are then selected and the un-protectable are thus dropped from the patent application process. Complete documentation is required for those ideas that are selected for patent application. However, ideas that are not protectable by patent can still be developed further and introduced as part of the truck or bus. The designers at Scania R&D have the flexibility of contacting the patenting department themselves to make follow-ups of ideas (Lund, 05-05-2011).

There is an initiative where problems are presented and discussed called “creativity coaching”. Coaching is more like consultation on how the problem can be solved. Lund said she is the first resource in coaching of ideation activities that is available for the whole R&D unit. However, several design teams have similar functions available locally (Lund, 05-05-2011).

She further pointed out that, there is a tendency for young engineers to be more prone to share their ideas among others and to take a collaborative approach in the ideation process. This is a little bit different from the classical picture of the innovator as a lone genius (Lund, 05-05-2011).

#### **5.3.1.2**    *Types of Customers*

Scania products are always used professionally. Many customers are large transportation companies that buy trucks that others will drive (B2B). Some customers who buy at Scania are also drivers and the company also sells spare parts for after sales services, as well as financial services which make it B2C (Lund, 05-05-2011).

#### **5.3.1.3**    *Motivation*

Line managers at Scania do motivate employees to be more innovative and perform effectively. Scania sometimes uses monetary rewards to motivate its staff whose ideas are patented and even increase the amount rewarded, when those patented ideas are developed and the amount may further increase in this order; patent application, patent approval and when the patent is internationally recognized. Another motivating tool is more of self-recognition for some employees, who feel that being employed at Scania is a reward in itself to challenge their capabilities to learn and share ideas that would be beneficial to the company. According to Lund, “for most people, creativity and idea sharing is fun and because it’s part of their job, they tend to enjoy their job more”. Often the motivating tool from management is the encouragement to be productive. Lund further indicated, “creativity along with competence and leadership is what keeps Scania going” (Lund, 05-05-2011).

Table 4: Summary of Empirical Findings

<b>Element</b>	<b>Volvo CE</b>	<b>ABB CRC</b>	<b>Scania R&amp;D</b>
Products	Construction Equipment	Automation & Power Technologies	Trucks, Buses & Engines
Budget for R&D	SEK M 1,972 for 2010	\$ 120 m (for ABB Group in 2010)	SEK M 3,127 (4% of sales in 2010)
Closed Innovation	Employees ; Internal data base, Innovation Jams, iCoaches	Employees; Internal data base,	Employees; Creativity coaching
Open Innovation	Universities, Customers	Universities, Customers	Suppliers, Customers, Universities,
Types of Customers	Mainly B2B	Mainly B2C	Mainly B2B
Motivation	Non-Monetary Rewards	Monetary Rewards	Monetary Rewards

(Source: authors of the thesis)

## 5. Analysis

Exploring into different innovation management strategies carried out in three multinational corporations, namely; Volvo CE, ABB CRC and Scania R&D has been interesting. It has helped the group to see how their internal and external interactions go as far as innovation is concerned as well as the thoughts behind their choices of innovation strategies used.

### 5.1. Innovation

The concept of innovation has been in existence for a long time but prevailed during most of the 20<sup>th</sup> century. It has become apparent that firms with the desire to stay ahead in this competitive era have started off with spending on research. So they could develop technologies to come up with products that would bring in high profit margins in that, they would continue carrying out more research and so on.

It is apparent that there is innovation in all the three companies as empirical data showed that these companies are involved in the processes of idea generation, developing them and commercializing to the end users. In this competitive economic environment these companies have realized the importance of being proactive by investing time and money to come up with new ideas and to explore new ways of conquering the global market. What these companies have in common is that they are market leaders in their industry which is manufacturing, they are global as well as eager

to use advanced technologies in their production processes. As Harris (2003:118) has indicated, the fact that the 'wall of complexity' in innovation is going way up, it continues to create an ever higher peak for companies that find themselves in commercial as well as public sectors, to continuously be driven to deliver the utmost in sophisticated technologies, processes, policies, as well as end products and services in the markets and industries where they are used and managed. This is what Volvo CE, ABB CRC and Scania R&D are doing.

At the same time these multinational firms have the financial resources and they are able to spend a lot of money on research and development (R&D) as shown in the empirical data. Even though it is not their core business but this heavy investment in R&D is enhancing growth opportunities and playing a vital role in strengthening their market positions which is beneficial to them.

Another similarity between these companies is that they are all global actors and have business units within them. They all fall under a "group" that is, Volvo Group, Scania Group, ABB Group. This can be related to Schumpeter's theory mark II as cited in Nooteboom (2000: 63-64) which refers to the large, rationalized Weberian firm whose innovation source comes from specialized planning teams. This aspect can also be connected to Burns' theory (2008:13) which states that corporate venturing helps larger corporations manage upcoming, entrepreneurial businesses independently from the ongoing or main activities.

The three firms are all using an incrementalist strategy as described by Teece & Pisano in Bessant & Tidd (2009: 168), this is seen in the way they collaborate with their external actors like universities, suppliers and customers etc, so they are well informed of what is going on around their environment. This collaboration has helped the companies to know about how these actors are contributing to the global innovation and how these contributions can be beneficial to the companies. The companies are involving external actors because they believe they can acquire and enhance their knowledge base through them. After getting new information and ideas whether internal or external, the three firms have a procedure in how they manage them. In case of ABB CRC and Volvo CE, by opening up platforms for idea sharing they are making deliberate changes to create room to reach the objective, where as Scania R&D uses workshops and brainstorming sessions. After that, certain ideas are measured and evaluated which is followed by adjusting objectives if need be and deciding on the next change or step.

## **5.2.Closed Innovation Vs Open Innovation**

It is obvious that all three companies are more engaged in closed innovation as opposed to open innovation. Both ABB CRC and Volvo CE have strong centralized internal online data bases where their employees can communicate ideas to the R&D department. In

case of any issue or problem, they present it on data base and the experts in those areas give new ideas and suggestions on how to go about them for possible solutions. The main difference in both companies is that in ABB CRC, apart from the R&D unit, it is only the idea owner that has access to his or her idea. In that case, other employees have no chance to contribute or develop that specific idea which is a weakness because if other employees have access to discuss ideas with each other and share views and thoughts, it could be more beneficial to ABB CRC. According to Sherman & Schultz (1998:108) when two or more people meet together with differences, those differences need to resolve and the firms, as purposeful complex adaptive systems, cannot ignore the possibilities to resolve such differences. There is a big edge of learning for firms who have opened themselves to these great possibilities as compared to those firms which don't. Then businesses get new ideas and new ways of thinking. In case a business follows only the old ways of thinking, in result it will limit its possibilities.

Whilst in Volvo CE, everyone has access to others' ideas as they have online brainstorming sessions on how to develop ideas. This strengthens the way ideas are gathered, discussed and evaluated more efficiently. However, Scania has no internal online data base where ideas can be put, discussed and evaluated. This is a weakness for the company because with the absence of a formalized system in internal idea sharing, they are not using their internal competencies to the fullest. But mostly rely on person-to-person and brainstorming workshops like creativity coaching, depending upon the need of a problem to be solved. This can be connected to Chesbrough's (2003: xx) theory which states that, firms need to generate their own ideas so that they expand on them, assemble them, advertise them, distribute them, service them, fund them, and on their own, be able to sustain them. This paradigm encourages firms to be strongly independent, because the quality, availability and capability of others' ideas' cannot be relied upon. Scania's person-to-person communication can also be related to Moss Kanter (2000:172) thoughts where she makes emphasis on how organizations should cooperate more and increase relationships with its staff in order to ensure continuing close connection for the gathering of internal ideas. It is clear that the interactions at Scania R&D have positive effects on their internal sourcing of ideas, because close relationships promote trust which is vital for their innovation processes because its human resource are the people whose ideas are considered and profited from.

The three companies are spending heavy amounts on R&D to discover and implement new ideas which enables them to introduce new products in the market and get more profits. As a result of this, they are able to re-invest in carrying out more R&D thus leading to further breakthroughs. This is a strength for the three firms because it gives them an advantage in generating more competent ideas.

As far as open innovation is concerned, the use of universities is applicable in all the three companies. As the universities are the main source of knowledge so these companies are collaborating more with them with a notion to bring in new ideas to their

companies which is a positive impact on getting new technologies as well as having some of the university students as a source of human resource. This collaboration is a strength for these companies. This relates to views presented by Fabrizio (2006:134) that the body of science represented by university-based research is vital and growing in contributing to industrial innovation. The fact that the three companies are collaborating with learning institutions shows that universities are a growing source for innovation.

The three companies are involved in open innovation processes because they all want to have access to competencies and technologies that they might not have in-house because of financial and time aspects, this is in line with Teresko's (2004) views, which explained that open innovation neither means outsourcing of R&D nor closure of internal R&D but it is strategy of discovering and coming up with new ideas that could be complementary to the current R&D projects. Not only does open innovation remove the geographical, technological and corporate boundaries that stand in the way of new product development as well as new markets. But it also gives access to "knowledge and technologies that would take years and millions of dollars to develop in-house. The approach makes it possible to shorten product development cycles and leapfrog the competition. And it makes it possible to harness so-called 'disruptive technologies' instead of being blindsided by them".

Compared to Volvo CE and ABB CRC, Scania R&D has a stronger supplier network and they have realized the importance of collaborations in certain areas of innovations. This is a strength for them because it is cost- efficient. However, Scania R&D also limits how far they can cooperate due to the risk of leaking core competencies to competitors.

As far as innovation through customers is concerned, Scania R&D and ABB CRC look at customers' problems or needs as a source of inspiration for new ideas. Whereas Volvo CE indicated that they do not rely on customer ideas for innovation as they believe customers do not always know what they want. The lack of this in Volvo CE is a weakness, because they are missing out on external competencies which could be of great help to their firm. The stance by the three companies as far as idea generation from customers is concerned, is different because even though Scania R&D does not fully rely on customers for ideas, the company uses its customers more for the benefit of idea inspiration. A good example is the Kingsclub forum which Scania has put in place. It is a strength because it enables them to manufacture according to current market requirements, hence making it easy to sell their products. ABB CRC gets inspired by their customers but do not have a system like Scania, they depend on their business centers to get customers' feedbacks for them. Volvo CE has no system in place for how their customers inspire them as that area is not a source of the company's innovation. This could be connected to Chesbrough's (2003:xx) notion that companies need to generate their own ideas so that they can expand on them, sell them and sustain them and that firms should be strong enough to be independent in generating their own ideas.

### 5.3.Motivation

These three companies have the awareness to maintain the continuous supply of ideas within and outside of their organizations. As far as closed innovation is concerned, ABB CRC and Scania R&D have the strategies of financial motivation along with recognition at different stages to their employees in case of a new idea which can be patented, while Volvo CE stopped financial rewards about two years ago and only maintain motivation by recognition. As Harris (2003:27) puts it, companies should be in a position to better motivate its R&D staff because well evaluated ideas are the ones that make it possible for companies to invent and innovate in a competitive environment. Motivation also helps the company to continuously build innovative teams that would ensure successful innovation in due course.

With regards to open innovation, these companies have agreements with universities to maintain these collaborations for new ideas, through supporting thesis students as well as giving lectures at the universities, this relates to the theme of Chesbrough et al (2006:84) that, firms need to motivate the external actors and sources to make sure that they can get external ideas on a regular basis.

## 6. Conclusion

From the analysis above, we have seen that there are a lot of similarities on how Volvo CE, ABB CRC and Scania R&D strategize in generating internal and external ideas. Volvo CE and ABB CRC have similar strategies in internal idea generation because both firms have formalized systems, by using strong online databases for idea sharing and evaluation. Volvo CE uses a pronounced forum called "Innovation Jams" for online idea sharing among Volvo Group employees whereas ABB CRC uses a strong database called "ABB Inside" to evaluate ideas within the group. On the other hand, Scania R&D's internal idea generation process is more informal as it is based on "person-to-person".

When it comes to external idea generation, Scania R&D has a more established strategy of using suppliers and customers for inspiration of ideas. However, ABB CRC generates inspirations from customers through its business centers, whereas Volvo CE has no customer system in place. But one thing that is common in all the three companies is that they are highly collaborating with universities for idea generation and human resource.

The use of universities in external idea generation has increased, it is clear that the three companies are strategizing in cooperating with universities more. They are clearly exploiting this external knowledge base to their benefit. They appreciate the fact that in order to continue increasing their competencies they need to work closely with universities and continue researching on issues that may arise. They feel more secure in working with learning institutions than their suppliers or customers in the open

innovation process. The more they become dependent on their suppliers, the more they will have to give out some competencies that might be at the risk of being exposed to their competitors.

## 7. Recommendations

From the analysis and conclusion the group was able to see that the three companies value internal idea generation more than external. The group however, has the following recommendations for these companies.

Volvo CE could try to encourage its existing key suppliers and customers more for innovation. Using these as sources of inspiration for new ideas, the way Scania R&D and ABB CRC are using their customers could help Volvo CE a lot as the end users are good inspiration givers because they are actually using the products.

ABB CRC should be more flexible to their other employees apart from the idea owner, by giving them access to 'ABB Inside' so that they can also share their views and thoughts regarding the development of ideas through this online system.

Scania R&D can work more on its internal database system so that they can make the most of the existing personnel's ideas. Scania is a big company with different professionals and should take advantage of existing staff more in their innovation processes. Scania R&D has a huge potential internally, if a database is implemented for sharing of ideas because it is such a big company with a diverse competence.

The group felt that all these firms should try to engage more in open innovation as it enhances ideas and interactions between firms that have resources to carry out research and the ones without the means. Not only has open innovation increased competition, it is a source of competence growth.

Finally, the group thought it would be interesting to carry out further studies that can incorporate perspectives of the external actors like universities, suppliers, customers and internal actors like employees. This will give a wider view of how these actors look at idea generation.

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## Appendix 1

Interview Questions:

### **Prevalence of Innovation**

The prevalence of the R&D department

Idea Generation Process

Presence of Innovation Managers

### **Is it Open or Closed?**

1. What is the role of staff in the R&D department? Are they focused on researching and development or do they also allow outside solutions?
2. Are you engaged in any Open/Closed Innovation project/s? Collaboration and co-development?
3. In which business area has your involvement with Open/Closed Innovation been in?
4. Has there been a change between the past and now in how the R&D department operates?
5. Does the firm's strength to innovate over time lie on externally or internally generated ideas?
6. What are the firms' main sources of external knowledge? (Suppliers, Competitors, Customers, Learning institutions, private labs, other nations etc)
7. Why did you choose to engage with either Open or Closed Innovation?
8. Before you took the decision to engage with Open/ Closed Innovation, what were your greatest concerns/reservations?
9. How was the process like?
10. How are innovations rewarded?
11. How does the firm motivate individuals to generate and contribute their IP?
12. What would the firm deem efficient so far from open/closed innovation processes?
13. How has open/closed innovation added value to the firm's innovation processes overtime?

### **Challenges**

14. What challenges have you faced when implementing Open/Closed Innovation?
15. How does the firm identify the relevant knowledge from external/internal sources?
16. How does the firm handle the issue of intellectual property in open innovation?

### **Management of Innovation**

17. How does the firm evaluate open/closed innovation strategies in order to enhance new forms of innovation?
18. What kind of Customers does the company have?
19. How common is open/closed innovation strategies used in the firm?
20. What kind of challenges has the firm faced with open/closed management strategies?
21. Do the actors that involve in open innovation processes from the firm, aim to change or influence people's perceptions of the company?
22. What is it that the firm felt could have been done differently?