Adapting competence to technological shifts

A case study about collaboration and managing the dynamics of core competencies within technical-based firms

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Abstract

A large managerial problem today, are the quick changes occurring in technology areas. In order to stay competitive companies needs to be able to adapt, gain new knowledge and change in accordance with technological improvements and shifts. The amount of competencies needed to be successful has increased and manage all of them is impossible. This study shows that using outsourcing, as a managerial tool is vital for companies today, as is network and collaboration.

An automotive company has been studied with the purpose of getting a holistic view on how technical companies manage and survive technological shifts. As well as how companies adapt core competencies according to the market needs. The authors want to understand the implications of almost obligated collaboration and how companies can sustain competitive through managing core competencies within collaborations and network organisations. This is accomplished by a review of existing literature and development of a theoretical frame of reference. We have visualized the results of this study in two explanatory models. The models address how to secure critical competitive competence for the future through collaboration and network and how long term competence is managed in a fast changing business environment.

Keyword:
Outsourcing, Networking, Collaboration, Competencies, Adapt, Knowledge
Acknowledgement

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Thanks to Peder Fast that made it possible for us to get in contact with high level managers within the company. Thanks to Frank Johnsson who told us about his long experiences about outsourcing and the importance of change for companies.

The subject has given us a wider understanding of how to deal with technological shifts and the importance of networking. The experience we have learned is that it does not matter how good you are unless you are willing to cooperate with other people. Nobody within this industry will survive on its own.
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CAD - Computer aided design
DUX - digital user experience
HR - Human resource
IT - information technology
R&D - research and development
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1. Introduction

This chapter consists of an overview of the thesis subject. Background and significance of the topic is presented and arguments for the relevance of the subject. The research purpose and the problem posed is discussed and the research question is derived from the problem.

1.1. The need of evolving competences

In order to stay successful in the business environment today, companies has to face problems of discontinues technological changes (Sandström 2011). The effects from discontinuities have in the paper from Tushman and Anderson (1986) been shown as an important factor regarding the environmental conditions. Awareness of threats that could change the market is something firm's need to continuously consider when developing their products (Becker, Knudsen & Swedberg 2012; Sandström 2011). Schumpeter’s idea of “creative destruction”, about creating new combinations to consumers that pushes the development and could change preferences of the market, consumer needs and expectations. If companies fail to prepare and respond for those kind of changes they will lose their competitiveness (Becker, Knudsen & Swedberg 2012; Cojocaru & Cojocaru 2014; Kang & Montoya 2014; Foster & Kaplan 2001; Tushman & Anderson 1986).

In order to stay competitive it is therefore important to continuously develop, keep and/or change the competencies within a firm (Sandström 2011). Sharing knowledge and jointly develop new products and services creates competitive advantages and develop capabilities that is hard to copy. Multinational organisations that possess knowledge in how to stimulate and support collaboration can strategically use resources better into subsidiaries and divisions all over the world (Foster 1985; Hansen & Nohria 2004; Kang & Montoya 2014; Foster & Kaplan 2001).

The innovation environments within the technological industry are probably at its highest level ever when it comes to continuous technological evolution. Companies are facing quick changes from both competitors and shorter product life cycles. This forces companies to continuously create start-ups and undertake constant innovation in order to be successful (Cojocaru & Cojocaru 2014). Due to technological progress and intertwined technologies the complexity and knowledge need has increased (Bullinger, Auernhammer & Gomeringer 2004). Most products are developed with multi-technology, thus the complexity and the knowledge content have increased (Narula 2004). Today, multiple competencies are important for sustainability in the technological business environment. This means that in addition to core competencies, new complementary competencies are needed. Focus on exploitation and further development of existing core competencies is needed for successful innovators. Because of increased amount of needed knowledge and necessary competencies, maintaining all R&D and to develop all competencies internally, is too costly and complex for most companies (Bullinger et. al 2004; Narula 2004).

Core competence was first introduced as a concept in the beginning of 1990 by Prahalad and Hamel. The focus was on the idea of diversification and on firm growth and to transfer good practices into new products and markets (Ljungquist 2013). Its originality has since then been challenged by other approaches on how to deal with the dynamic business environment. The
growth idea is still current, however the environment has changed and now consist of open innovation networks, complex supply sources, empowered, connected customers and that competitors continuously enter and exit markets (ibid). Even though the concept implies dynamic businesses, its main focus is on emphasize issues of competence identification. Increased focus on companies’ dynamic capability and therefore management of core competencies needs to be more dynamic (ibid). A competence-based perspective will increase companies’ awareness on how important breakthrough development is in order to find growth opportunities.

Competencies are also important to consider regarding outsourcing, in order not to loose important competencies for future development (McDermott & Coates 2007). Using outsourcing, which is a strategic tool that can create shortcuts to find a more competitive product, will not contribute much to building people-embodied skills (Prahalad & Hamel 1990). Outsourcing of vital competency could impact future opportunities and new capabilities. Therefore awareness of a firm’s core competencies will create a competitive advantage if the firm succeeds to distinguish and control them effectively (McDermott & Coates 2007).

An example of technological shifts and the impact on the business environment is how competencies developed within firms as Sony and Apple between the years 1979 and 2001. In 1979, Sony launched a portable Walkman and became the market leader. This lead to Sony to be considered as a top innovative company. In 2001, Apple launched their Ipod and the market completely changed as a result of introducing new technology. Even though Sony held all the necessary competencies, technologies etc. for launching a new era of portable players, the Ipod became in 2004 the market-leading product and Apple overtook Sony as an top innovative company (Cojocaru & Cojocaru 2014).

This case highlights that innovation can appear at any place in the industry and not just in the company who has all the prerequisites to provide a new innovation. Key success factors for Apple was how they used their networks and competencies to be effective in management of innovation, coordination and cooperation. Various companies in Sony group manufactured 80% of the parts needed in the Ipod (ibid). This was one key factor that Apple took into their business plan, compared to Sony, they used vertical marketing (Zdenko, S. 2011). By creating software systems, apps and iTunes for their Ipod they expanded their market shares while Sony continued focusing on hardware. A new digital era approached, which resulted that Sony closed their selling’s of Walkman in 2010 (Cojocaru & Cojocaru 2014). By developing their competencies in different fields, Apple completely changed the market. They gained advantages and became the leader of a new technology era while the others fallen behind (Cojocaru & Cojocaru 2014; Sandström 2011).

“Managing the proper level of creative destruction requires management to ask experts questions rather than to fall into the more familiar pattern of providing experts answers” - Foster & Kaplan 2001, p. 190.
“Some individuals come across a great idea and they exploit it. You cannot manage for that. The best you can do is to put people in touch with one another and see what happens. In our business all innovation is incremental in any case” - Foster 2001, p. 188.

“To survive, organisations must execute in the present and adapt to the future. Few of them manage to do both well”. – Beinhocker 2006

“It is not the most intellectual of the species that survives; it is not the strongest that survives; but the species that survives is the one that is able best to adapt and adjust to the changing environment in which it finds itself”. - Megginson 1963

1.2. Problem Discussion

Today it is close to impossible to manage all competences needed to stay competitive (Narula 2004; Prahalad & Hamel 1990). The technological market has changed during the past 40 years (Park & Yoo 2016) and the amount of competences, critical for competitive advantage has increased (Cojocaru & Cojocaru 2014). A company can according to Prahalad and Hamel (1990) only sustain and manage five or six core competencies. In order to stay competitive, external resources are needed and the use of suppliers, outsourcing and collaboration are important parts for technological firms (Prahalad & Hamel 1990; Bullinger, Auernhammer & Gomeringer 2004; Cojocaru & Cojocaru 2014; Insch & Steensma 2006).

A lot of research has been conducted focusing on the benefits and risks regarding outsourcing. A main motive to use outsourcing has been to reduce operational costs and several articles are published about the economical benefits of outsourcing. Being able to focus on core competencies within the firm is stated as another main reason. Some identified risks with outsourcing are dependence on suppliers and loss of know-how (Quélin & Duhamel 2003). Motives and risks of outsourcing may not always correspond with focus on core competence and loss of know-how. Managing this contradiction within an environment where developing competence is evident will contribute to competitive advantages (Nonaka 2007).

In a previous study regarding the pharmacy industry from Mehta, Shreefal, Peters & Lois S (2007), the impact of outsourcing was analysed. In order to speed up the R&D and adapting to a fast global changing market, there were some companies in the pharmacy industry that used contract research organisations. This gave them advantages to be faster to market but they lost some of their core control and core competence. As a result of outsourcing some of the competence developed from R&D was lost to the contract organisations. In the long run the pharmacy companies became dependent on the contract organisations and the competence the contract organisations had developed (Mehta & Peters 2007).

1.3. Purpose of Study

The technological environment today is changing fast and continuously (Miles & Snow 1992; Insch & Steensma 2006; Mullin 1996). It is important for companies to be active and have a
committed organisation who are ‘hungry’ to challenge themselves and make the best of their competencies in order to create new products and create growth opportunities (Nonaka 2007; Prahalad & Hamel 1990). An important question is therefore how a company could manage those challenges and the competencies that are needed in order to sustain a competitive position. The aim of this study is to understand the implications of the almost obligated collaboration and how companies can sustain competitive through managing core competencies within collaborations and networking. The purpose is to get a holistic view of how companies manage and survive technological shifts and adapt core competencies according to the market. Changes’ occurring in the marketplace is a substantial difficulty; companies in the business environment today are often faced with conditions of discontinuous technological changes. Companies who are successful are continuously working with these issues (Sandström 2011). The ability to utilize and acquire knowledge and apply this to the development of new products is important for the success in the future. How to do this, is one of the more pressing management challenges today (Hoecht & Trott 2006).

1.4. Research Question
Outsourcing has previously mostly been used as a tool to reduce cost and increase efficiency and thus creating a competitive advantage. Outsourcing has been badly labelled by several significant academics in the field because of too much focus on short-term profitability with little focus on long-term profitability, know-how and core competencies. Changes in the technological field has lately significantly increased thus also the amount of competencies needed for competitive advantage (Cojocaru & Cojocaru 2014). Today it is close to impossible to manage all competences needed to stay competitive (Narula 2004). Thus, the need for collaboration, outsourcing and organisational networks has increased (Cojocaru & Cojocaru 2014; Insch & Steensma 2006). This poses the questions:

- How does technological companies secure critical competitive competence for the future?
- How is long-term competence development managed in a fast changing business environment?

The aim of this paper is to investigate these questions through studying an automotive company in Sweden and analyse how they have managed their competence need over time and how they have managed changes in the environment.

1.5. Thesis structure
In chapter two, a literature review and theories regarding the subjects is presented. The aim of this chapter is to give an understanding of concepts on core competencies, knowledge management, different collaborations and their impacts in the competitive advantages of companies. Chapter three describes the methods used to answer the research question, including research approach and strategy. Chapter four presents the empirical findings acquired through qualitative interviews. The empirical data compiled is used answer the research question. Chapter five analyses the empirical findings in relation to the literature review and relevant theories. In
chapter six the conclusions and answers to the research question, future implications and future research is presented.

2. Theory

The theory section gives an overview of concepts and theories of companies' competencies, how the definition has evolved, developed and how core competencies is divided in different focus perspectives. A model to describe the dynamics and flow of competencies in an industry and what is important in order to survive technological shifts is also described in this section.

In the beginning of the 1980’s a change in the business strategy environment started a revolution (Miles & Snow 1992; Lonsdale & Cox 2000). Companies around the world were responding to an increasingly competitive environment resulting in a movement to a new organisation structure, from resembling the traditional pyramid of a central organisation structure to a more flexible structure with networks (Miles & Snow 1992; Lonsdale & Cox 2000).

The company structure before the organisation-revolution was vertically integrated. The four main motives behind this type of structure was, potential to achieve economies of scale, exercise greater market power, greater security through product range and greater control i.e. raw materials, distribution channels etc. (Lonsdale & Cox 2000). Larger vertically structured companies underperformed started to underperform because they were not able to meet cost reduction demands and achieved disappointing rates of return (Kakabadse & Kakabadse 2002; Lonsdale & Cox 2000). Suggestions that a company should focus on fewer activities, their core business and the desirability for a focused approach to business strategy gradually emerged. Re-evaluations about the need to be vertically integrated and self-sufficient in companies followed and the idea of "core" became dominant (Miles & Snow 1992; Lonsdale & Cox 2000). Companies moving away from high levels of vertical integration and utilization of outsourcing were the most notable trend in the world of business during the years 1980-2000 (Leavy 2001).

To help companies effectively respond to technological threats and opportunities. A technological policy consisting of a portfolio of choices and plans has been developed. Those choices are separated in six different areas (Maidique & Patch 1978):

- Selection, specialization and embodiment.
  Which technologies the company should invest in, that are promising, provide opportunities, lower costs etc.

- Level of competence.
  How much efforts the company should put into for the technology that is needed for gaining important knowledge.

- Sources of technology.
  How the external sources that the company has should be relied upon.

- R&D investment level.
How much of the company’s level of investment should be placed in the technology, staff or external expenditure etc.

- Competitive timing.
  - How the company strategically positioning themselves within the industry and when entering new markets or product segments.

- R&D organisation and policies.
  - How the company’s values and guidelines are set in order to protect the company’s know-how, if they should have a central R&D lab and how it should be structured etc.

The source of technology, a part in the model, Six dimension of choice treats what extent external sources should be relied upon for technology. The decision whether to rely on outsourcing, contract research or licensing etc. or not, is an important part of corporate strategy and technology policy. Another part of this model is, level of competence, deciding how proficient a company should be in understanding and applying the technology in question. How much dedication should be put on application knowledge of the technology opposed to advanced knowledge through research and how close to state of the art do the company need to be in order to stay competitive (ibid).

2.1. Changing competence requirements

Technological discontinuities and introduction of new technology is a great challenge facing companies and technological discontinuities are increasing. When a new business opportunity emerges through innovation, it can create a need for new competencies and begin development of existing competence for a company. The new competence requirement can simultaneously be a destroying factor to existing competencies. (Christensen 2006; Foster 1985).

Foster (1985) found that only a few companies are surviving technological discontinuities. This is because many companies do not understand the limits of their technology and finding the limits can be very difficult. The improvement potential regarding a technological area is determined by the difference between technological limits and the current state of art. Investigating the potential of new technologies may lead to opportunities to exploit competitive leverage. A reason why it is hard for companies to detect technological discontinuities is because existing competitors has more to lose from introduction of new technologies, while new entrants have a lot to gain. Barriers and blindness to detect new technology and not realizing the advantages has affected almost all industries (Foster 1985).

Foster (1985) states that the essence of managing technology is the ability to make smooth and timely transitions to new technologies that has better performance and improvement potential. He also argues that it is easy to copy competitor’s market research but it is harder to copy core technologies and even harder to copy the methods of developing new technologies (Foster 1985; Hansen & Nohria 2004). Thus, having superior methods to adapt and learn new technologies gives companies a competitive edge (Christensen 2006; Foster 1985; Hansen & Nohria 2004). To
survive, it might be enough to continue doing what the company is doing well. But to excel, they always need to evolve, innovate, change - destroy and create (Foster & Kaplan 2001).

Johnson (Appendix 1) argues in agreement with Collins (2009) that most, if not all companies eventually fails. Collins (2009) devised a framework aimed to increase understanding why companies fail. The framework consists of five stages of decline. Most corporations fall eventually and research suggest that a large parts of organisations decline are self-inflicted and a big part of the recovery could be controlled. There is no evidence showing that all companies reaches its downfall and dissolution and as long as stage five is not reached a company could recover and succeed (Collis 2009).

![Figure 2.1.1. Five Stages of Decline (Collins 2009)](image)

Noticing the entry into the five stages of decline early on has showed to be beneficial for recovery and renewal. Taking action in stages one to three is important. In this framework strategic decisions, primarily during stage four, that could avoid or delay the decline further is untested strategies, big acquisitions, desperate measures, radical business changes, restructuring and search for visionary leaders outside the company (Collins 2009). Mistakes made during stage four could have severe consequences since failure at this stage will bring stage five forward earlier. Outsourcing could be an example of several of these strategic decisions, radical business changes, restructuring etc. Although outsourcing could be beneficial, outsourcing also brings a high-risk level.

2.2. The egg model

The Egg model describes factors that affects innovation and product development within companies. The innovation process is divided into four parts idea generation, project proposal, project and product. Factors needed to successfully proceed within the innovation process are creativity, project champion, evaluation system and project management. All factors are influenced by knowledge of the market need, working towards products for the market and consumers need, and technological knowledge, feasibility. Among these the most important one is creativity, since it is important in order to develop ideas tailored to needs and possibilities within the company (Twiss 1992).
Creativity

Creativity is creating new ideas that could happen instantly by chance and something that cannot be planned. This is what makes people dedicated and creates innovations that can create desires to new technologies or applications of an existing technology that customers are willing to pay for.

The result of the innovation comes from the individuals or groups that have developed the idea and with their creative mind-set. The innovation would not be created without this creativity (ibid).

Project champion

The perspective of a project champion is likely to be associated with radical innovations that arise naturally within an organisation. To be effective it requires a high level of commitment and drive. This combined, for all aspects of a project, with total responsibility and is usually led by a project manager.

It is the people within the organisation that are the ones that innovate and not the organisation itself. They are the ones who are creative and entrepreneurial and therefore need the organisation create structures and procedures that fit the people's needs and harness their abilities (ibid).

Evaluation systems

To evaluate how much time and effort should be devoted to a project and evaluate if it fits the identified need, a R&D manager evaluates through different techniques which is a difficult task since it is a critical decision area. Available techniques range from simple checklists to quantitative and qualitative analyses etc.

The use of knowledge in the early stage of a project is very important since it can help companies to stop the wrong projects from being initiated and become failures. All technological innovation exists from knowledge and it is too important to be left to chance.
There are many companies that lack an adequate system analysing and capturing new technology effectively. Adapting to or creating new technology is therefore often most successfully done by companies with an early entry to the market and with suitable timing. The successful companies apply new knowledge in their products and through this gains competitive advantages. How to see factors to capture technology knowledge is illustrated in figure 2.2.2. Managing the knowledge base (ibid).

![Figure 2.2.2. Managing the knowledge base (Twiss 1992, p. 95)](image)

Project management

There is a huge need for effective project management. Bad control would result in costs that could hamper the project's financials as well as time frame. The company might also lose the competitive edge of being first to market and the product itself gets a shorter life cycle by being delayed in entering the market. However, it is better to have a badly managed project with potential instead of having a well-controlled project that for sure will fail.

A challenge for R&D management is having a system that continuously can adapt to changing requirements. Most of the management failures in this area is either by lack of necessary experience or an inability to assess the needs (ibid).
2.3. Core Competence

The definition of core competence has been developed through the years by several authors. Selznick (1957) who first approached the concept about how to treat values and strategically use competence to protect a company’s integrity. Through different value activities, he used the distinctive competence to describe the company’s competitive advantage (Selznick 1957; Shu, Yang, Yang & Wu 2006).

What defines a firm's core competencies is what the firm have learned to harmonize in multiple technologies (Hoecht & Trott 2006; Prahalad 1993). According to Prahalad (1993) core competencies can be identified with asking three questions:

1. Is it a significant source of competitive differentiation? Does it provide a unique signature to the organisation?
2. Does it transcend a single business? Does it cover a range of business, both current and new?
3. Is it hard for competitors to imitate?

2.4. Acquire and managing competencies

In order not to lose competence and future ability to compete, strategic management needs to identify core competencies and specialized skills and understand how to retain the company's competitive core (Hoecht & Trott 2006). Companies searching for competitive advantages focuses on, critical resources, core capabilities or key success factors often all referred to as core competences. Competitive advantage comes from a small number of factors and the way companies compete is through acquire and develop those core competencies (Magretta 2012).

The first step to manage a knowledge-creating company is to build a redundant organisation. It will encourage frequent dialogues and communications that will help to build a “common cognitive ground”. This will make it easier for the employees to share their tacit knowledge and through sharing overlapping information between members of the organisation, they will better understand what others have difficulties to explain. New explicit knowledge will just as well, by redundancy, be distributed through the organisation to be internalized by individuals (Nonaka 2007).

Redundancy product development can be used in different strategic approaches. Companies can have competing groups, working with the same project. By discussing different team’s solutions, advantages and disadvantages, will encourage to look at the project from different angles. With help from a team leader who guides the teams through the process, an approach that creates the “greatest” common understanding can be developed. Companies can also use strategic job rotations between different areas of technology, functions, R&D and marketing. It will give individual's direct experience that contributes to knowledge redundancy to overcome barriers and
to understand the business from several different perspectives within the organisation. It will then make it easier to put knowledge into practice (Nonaka 2007; Fægri, Dybå & Dingsøyr 2010).

Chiesa & Manzini (1998) states different organisation modes for technological collaboration that could improve the competencies for companies. These are in agreement and in addition to the seven development mechanisms to acquire needed technology, resources and competence, mentioned by Roberts & Berry (1985).

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<td>Internal development</td>
<td>Using the organisation's own resources to build technical knowledge and know-how inside the company that provides a key learning capability. This capability is path dependent and develops over time through continuous interaction of prior knowledge and current actions. Internal development could also promote innovation. Unfamiliarity in the technical area can lead to errors and lack of knowledge may lead to long development time (Roberts &amp; Berry 1985; De Clercq &amp; Dimov 2008).</td>
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<tr>
<td>Acquisition</td>
<td>Acquire a functioning company of interest in order to access a technology or technological competence through purchasing. This could reduce development time in relation to internal development and create new routes to market that will strengthen the company’s network position by increased market shares. Acquisition could also lower initial costs when entering into new technology. The main reason of acquisition is to get access to key resources mainly intellectual property and also competence in research and development. The new technical area could still be complex to enter even after an acquisition and integrating the different companies could be complicated (Roberts &amp; Berry 1985; Zaefarian, Henneberg &amp; Naudé 2011; Chiesa &amp; Manzini 1998). A new company could also emerge from that different companies are having the same interest of a technology itself or/and the technological competence, to that they merges with each other to gain advantageous as whole. Minority equity, a partial acquisition of a company without any management control. Is also a way to get access to the competence of interest (Chiesa &amp; Manzini 1998).</td>
</tr>
<tr>
<td>Licensing</td>
<td>To incorporate a specific technology outside of the company's own development could be done through licensing other companies’ products or technology. The risk of investing in product development is reduced and being able to use others experience from development and technical expertise could make integration of new technology easier. Through licensing companies get dependent on licensing company and internal technical knowledge is not developed (Kotler et al. 2013; Roberts &amp; Berry 1985; Chiesa &amp; Manzini 1998).</td>
</tr>
<tr>
<td>Internal ventures</td>
<td>A strategy similar to internal development but the development is conducted through a separate company established within the organisation. This benefits from using resources within the organisation as well as</td>
</tr>
</tbody>
</table>
developing internal competencies. It is more risky compared to external ventures but if it is succeeded, the company can have a venture with full control with own goals, organisational processes and corporate culture. The aim of internal ventures is often also to create an entrepreneurial function, but it can be difficult to build up the same behavior, motivation and culture (Roberts & Berry 1985; Vuori, Artto, Sallinen 2012).

**Joint venture or alliance**  
This mechanism to acquire new technology is best suited when development investments are too large for the company or when the price of failure is too big for the company. Sharing of resources and investments as well as different contributions may create a symbiosis between companies. A potential risk in joint ventures and alliances are conflicts and disagreements (Kotler et al. 2013; Roberts & Berry 1985; Merrifield 2006; Chiesa & Manzini 1998). Joint R&D is a mechanism where organisations agree to carry out research in a specific technological area together. In order to achieve a specific technological innovation, several companies and public institutes can collaborate towards a goal, this is called a consortium (Chiesa & Manzini 1998).

**Venture capital and nurturing**  
Involvement in growth and development of small companies through investments, participation and eventual acquisition in the future. This allows an early but partial entry into new technology with a small amount of commitment. The aim is to secure resources and vicinity to possible entry in growing technologies. If successful, it can create advantage of direct access to complementary assets and customer relationships. This strategy entails the risk of competitors competing for involvement with same companies (Roberts & Berry 1985; Vuori, Artto, Sallinen 2012; Maine 2008). A similar approach is R&D contract and research funding which is to found costs for institutes or universities in order to provide opportunities for small companies to pursue new technology (Chiesa & Manzini 1998).

**Educational acquisition**  
This type of acquisition aims to acquire a smaller company or experts in a certain technological discipline, only to gain competent personnel within the technical field. This is a more quick and efficient way to get knowledge than the other mechanisms described with venture capital and successively train own personal with help from that company. A drawback of this method is higher financial engagement and thus higher risks. Also the risk of losing key personnel due to lack of motivation when the company choses to obtain technology and knowledge rather than developed it within the company (Roberts & Berry 1985; Chiesa & Manzini 1998).

Other mechanisms not mentioned by Roberts & Berry (1985) are networking and outsourcing. Those could also be used as a way to gain knowledge and resources (Chiesa & Manzini 1998).
By acquiring new knowledge through collaboration, companies can, according to Hansen & Nohria (2004), achieve benefits of:

- Cost savings through the transfer of best practices.
- Better decision making as a result of advice obtained from colleagues in other subsidiaries.
- Increased revenue through the sharing of expertise and products among subsidiaries.
- Innovation through the combination and cross-pollination of ideas.
- Enhanced capacity for collective action that involves dispersed units.

(Hansen & Nohria 2004)

Firms should not cooperate across units if they do not get benefits from it. But they should if they find out that they will reap economic benefits from it (Hansen & Nohria 2004; Kotler et al. 2013). Just like Apple did when using technology from Sony into their own and achieving new knowledge to become more competitive (Cojocaru & Cojocaru 2014). Cooperations could also be too time-consuming, that employees are participating in all kind of meetings that does not have any substance for the firm and thereby slow their performance (Hansen & Nohria 2004).

2.4.1. Barriers for gaining new competencies.

According to Hansen & Nohria (2004), barriers to acquire competencies that will affect the development of core competencies are:

<table>
<thead>
<tr>
<th>Unwillingness to seek input and learn from others.</th>
<th>Employees might find that other problems are not their problems to fix, a norm of that you take care of your own problems. Or they feel that others do not have anything to teach them. (Hansen &amp; Nohria 2004; Tidd &amp; Bessant 2013; Kathoefer &amp; Leker 2010). It could be a result of the not invented here syndrome. It is a term in R&amp;D where a group of engineers who believe they possesses the knowledge in a area and therefore do not seriously think outsiders can produce important findings and ideas. It is a dismissive attitude toward ideas by others since if they did not think of it with their experience it is not important. (Katz &amp; Allen 1982; Tidd &amp; Bessant 2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inability to seek and find expertise.</td>
<td>It might be that the company does not find the knowledge they need in other firms at an acceptable cost, somewhere they know it exists, and therefore will the costs of finding this knowledge overweight the benefits and the searching ends. Like ‘a-needle-in-a-haystack’ problem and will hinder the possibilities for collaboration (Hansen &amp; Nohria 2004).</td>
</tr>
<tr>
<td>Unwillingness to help.</td>
<td>Competition might affect people not to share what they know. For example if two subsidiaries is selling to the same market with the same type of technologies. Their developing might be similar and therefore affect the employees to ‘protect their own skin’ by thinking on their own performance. They might feel they do not have time for helping others or</td>
</tr>
</tbody>
</table>
they do not care, they just do what they are told to do (Hansen & Nohria 2004).

Inability to work together and transfer knowledge. Even if the people within companies are willing to work together, sometimes the knowledge is too ‘strange’ that the transferring of information is too hard. It might be necessary that the ones who will cooperate already have some kind of relationship to understand each other. About ‘tacit knowledge’ that is hard to explain to someone from outside of the firm what they are doing since you have to learn the process. And thereby might the other company find it too difficult to manage (Hansen & Nohria 2004).

Another limit to acquire new core competencies is that there is a limit of how many core competencies a company can handle. Realistically a company cannot handle more than five or six competencies (Prahalad & Hamel 1990; Domberger 1998).

Two things that are certain about shifts in the business environment is the uncertainty (Sandström 2011; Nonaka 2007) and the need to managing competence with a long lasting perspective (Nonaka 2007). Changes can happen extremely fast with impacts from market shifts, technologies proliferate, the rapidly increased number of competitors and products offered becomes useless (Sandström 2011; Nonaka 2007; Tushman & Anderson 1986). The companies’ managing to survive shifts is the ones who constantly creates new competence, share the competence through people within the organisation and quickly adapts to new products and technologies. Those activities and a focus on continuous innovation are what defines a “knowledge creating” company. Due to misunderstandings of what the true nature of competence is, some companies fail to handle competencies and exploit them. Only a few managers really manage to grasp “the true nature of the knowledge-creating company” (Nonaka 2007).

Core capabilities, which normally can be seen as “clusters of distinct technical systems, skills, and managerial systems”, are highly connected to values. The “capabilities” are considered core if they differentiate a company strategically” (Leonard-Barton 1992). Core capabilities have a downside that is called core rigidities. Core rigidities inhibit innovation and managers who are facing new product and process development projects by limiting the scope of vision how to take advantage of new capabilities. With new development projects it is important to consider the risks entailed with core capabilities and risk to backfire and hamper the need for change in emerging strategies (Leonard-Barton 1992).

Skills and processes captured in software or hardware within a company might suddenly become out-dated because of changes in the market. As a result the core capabilities could also become old and affect the company if the company is based on software or hardware systems fitted to the market. This is just as well rigidities’ that managers need to consider. Core rigidities are not neutral and they creates problem for projects with focus on creating new projects with non-traditional capabilities. They could impact on all projects a company is processing, even the ones that are similar with current core capabilities (ibid).
2.4.2. Creating Knowledge

Companies can quickly create new markets, respond to customers and sustain a strong market position with development of new products as emergent technologies through managing the creation of new knowledge (Nonaka 2007). Companies can use an internal platform for communicating ideas and discussions, it will give the company an advantage of that the ideas easily can be accessible across the entire organisation (Foley & Smeaton 2010). It is important to mentally prepare the individuals within the organisation for changes. Another element is managerial preparation and development of change strategies and clear communication to individuals within the company. According to Frank, having an organisation prepared for change both structurally and mentally is a very important part in implementing change (Appendix 1).

A tool for creating new knowledge and present ideals and ideas, are cryptic slogans/visionary statements. This might seem unimportant but it is a useful tool in how to manage a company (Nonaka 2007). If slogans are built from logic and reflect how the company wants to be seen, they are hard to question. It could however also inhibit opportunities since some employees might find themselves limited (Gonzalez & Pacheco 2012). But overall, slogans can create personal commitments among the employees by being appealing, compelling and inspirational (Nonaka 2007; Gonzalez & Pacheco 2012). This could be a key element on how a company can get help from their tacit insights, intuitions and hunches to evaluate the company as a whole. Therefore it is of importance that the firm have managers who are comfortable with images and symbols to mobilize that commitment and embodying tacit knowledge in actual technologies and products. Companies can have a collective sense of identity and fundamental purpose. The company’s values and the perspectives they have could be mediated through slogans (Nonaka 2007).

Creating new knowledge means that the company and all the people within it, re-creates themselves in a nonstop process of personal and organisational self-renewal. It starts with the individual whose knowledge transforms into organisational knowledge. If this knowledge is valuable for the company it will be available to others in the central activity within the company. It is not about what position an employee have that dictates the importance of the information he or she have to the whole knowledge-creating system. Still there are differences among roles and responsibilities but that is not what creating new knowledge is about. It is about creating new knowledge to the product of a dynamic interaction and it is explained between three roles (ibid).

Front-line employees The ones who are immersed in the day-to-day details of particular technologies, products, or markets. The real experts of the realities within the company. But with all their information, they often finds it very hard to make that information into useful knowledge or that they might be too narrow in their project that they could lose the perspective of a broader context (Nonaka & Takeuchi, 1995 p.15; Nonaka 2007).

Middle managers They are the ones who can direct the confusion of information toward
a purposeful knowledge creation. They “serve as a bridge between visionary ideals of the top and the “what is” mindset of the front-line employees by creating mid-level business and product concepts”. (Nonaka & Takeuchi, 1995 p.15; Nonaka 2007).

Senior managers They do the same as middle managers about directing the confusion. They are the ones who “provide a sense of direction by creating grand concepts that identify the common features linking seemingly disparate activities or businesses into a coherent whole” (Nonaka & Takeuchi, 1995 p.15; Nonaka 2007).

In most cases the value of knowledge is measured in economic terms, increased efficiency, lower cost etc. But in a knowledge creating company more qualitative factors are equally important: do this idea embody the vision of the company? Is the idea and expression of managers’ strategic goals? Is there a potential to increase the organisational knowledge network? This qualitative criterion is important in order of giving knowledge creating activities a direction. The vision of the company and the top managers needs to be well formulated; if it is to unambiguous it will be more like an instruction, than inspirational. A more open visionary statements gives the employees freedom the interpret it and set own goals. In order to visualize the company's future manager could use metaphors, symbols and concepts and make employees reflect about (Nonaka 2007, p.170):

- What are we trying to learn?
- What do we need to know?
- Where should we be going?
- Who are we?

This creates an atmosphere where the employees can formulate “what is?” And the job of the managers is to know “what should be?”. According to Nonaka & Takeuchi (1995) a true knowledge engineer within a knowledge-creating company is middle managers who are able to visualize tacit knowledge to employees as well as executives and make it explicit and incorporate the knowledge into new products and technology. And by asking ‘what is?’ and ‘what should be?’ transforming reality according to the company’s vision (Nonaka 2007).

2.4.3. Tacit & Explicit knowledge

Tacit knowledge is the knowledge that is highly personal, hard to learn/explain to others. It is about the individual's commitment/passion of doing something that has strong individual connections. Therefore is it hard to teach to others, it is the individuals “know-how” of how things should be done in their perspective and what he or she have learned through own experiences (Nonaka 2007). Explicit knowledge on the other hand is knowledge that easily can be shared; it is formal and systematic (Nonaka 2007). This could be through communication via
an instant messaging style where individuals can share pictures and text with each other (Foley & Smeaton 2010).

There are four basic patterns that exists in a dynamic interaction knowledge-creating company that describes the distinction between tacit and explicit knowledge (Nonaka 2007):

From tacit to tacit
Through observation, imitation and practice the individual learn from the other person’s tacit knowledge. He/she has learned how to be one of the team. It is knowledge that never becomes explicit and therefore hard to leverage by the organisation as a whole (Nonaka 2007).

From explicit to explicit
By collecting information from the whole organisation that then is written into a financial report or into a system that can be accessed from several places, information from many different sources will be new knowledge in that sentence that it synthesizes the information (Nonaka 2007; Foley & Smeaton 2010). Although a report does not necessarily extend their knowledge (Nonaka 2007).

From tacit to explicit
That the tacit knowledge is transferred in the sentence that it after its development easily can be learned by others (Nonaka 2007). With help from the person who have learned, later develops a system, method or product that fulfils what she/he has learned over time so it can be shared among others (Nonaka 2007; Foley & Smeaton 2010).

From explicit to tacit
The explicit knowledge that is shared throughout the organisation (Nonaka 2007; Foley & Smeaton 2010), is internalized by the employees who broaden, extend and reframe their personal tacit knowledge (Nonaka 2007).

The critical steps within this process of knowledge are articulation (tacit knowledge to explicit knowledge) and internalization (explicit knowledge to tacit knowledge) because it requires active involvement from the individuals, a personal commitment (Nonaka 2007).

By using metaphors as a distinctive method of perception, companies can express the inexpressible to their employees. In other words, they can by metaphor transfer tacit knowledge into explicit knowledge. Through imagination and symbols, individuals can understand something intuitively. In this way, people can easily express themselves, their knowledge and experience. Therefore are metaphors an effective method to commit people in the early stage of knowledge creation. But this alone is not significant, after employees have reconciled meanings in order to make tacit knowledge into explicit. The next step is analogy; this is a structured process of reconciling contradictions and making distinctions. The perspective of analogy is a perception of being logical and not fantasy influenced. By putting those concepts together into a model, the tacit knowledge will become explicit and then available to learn to the rest of the organisation (ibid).
Those three concepts of metaphor, analogies and models have connections to how a company defines the managerial roles and responsibilities within it and the design of its organisation. From a knowledge-creating company, this is what defines the “how” in “know-how”. How the structures and practices is connected to the company’s vision and innovative technologies and products (ibid).

2.5. Competitive advantage

The technological business environment today is characterised by rapid changes that changes the competitive environment among companies. The product life cycle is getting shorter and the usage of technological innovation creates new opportunities and markets. Technological business firms needs to be adaptable and aware of changes and technological shifts to stay competitive (Cojocaru & Cojocaru 2014; Insch & Steensma 2006; Hoecht & Trott 2006; Prahalad 1993; Tidd & Bessant 2013). This pushes companies to consider if they have all the competence needed, the technology and the financials also how to nurture, acquire and maintain competence within the firm and in the business (Cojocaru & Cojocaru 2014; Insch & Steensma 2006). Another important factor is to consolidate the companies technologies and production skills throughout the company and with this competence make it possible for individuals to quickly adapts to business change (Christensen 2006; Tidd & Bessant 2013).

To success and sustain competitive within a global business environment, the smartest ones recognize their important linkages and connections (Tidd & Bessant 2013). In a global world where distances earlier could have been a problem for making business, have today less impact since the Internet evolved and increased the possibilities for networking and collaboration (Tidd & Bessant 2013; Kotler, Armstrong, Harris & Piercy 2013). Companies have always and are still looking for ways to compete with competitors successfully, as Michael Porter explains in his work on how to find key strategic assets, ‘the generic competitive strategies’, the firm either should focus on a niche (focus), low cost (overall cost leadership) or differentiation (Chesbrough 2012; Porter 1998, p. 39). This approach has been challenged by others and redundancy in the company’s business model should be seen as opportunities instead of being a cost (Chesbrough 2012; Nonaka 2007).

Competitive timing attends to when to introduce new technology or products to the market. What are the benefits for leading advantages opposed to the risks of uncertain market acceptance? (Maidique & Patch 1978). Maidique & Patch defined four broad strategies for high technology industries.

| First-to-market/first mover advantage or leader strategy | This strategy aims to get products to the market before competitors. Benefits of this strategy could be exploited in two ways, skimming the market though high prices and get immediate profit or penetration approach, prizing low to get higher market shares and higher long-term profitability. In order to achieve technological leadership often requires a big commitment to R&D. A first-to-market leader needs to have resources and competencies that other larger companies... |
Second-to-market or fast follower strategy

Entering early in the growth stage in the product life cycle and imitate innovations by competitors. This strategy often requires a strong development capability, with a smaller focus on basic research than leader strategy. A discipline of holding back and then quickly make their moves before the industry’s competitive becomes too big. The focus lies in winning over customers from the technological innovations. This is done through learning from the innovators mistakes and a more developed, improved and reliable product is offered (Maidique & Patch 1978; Wunker 2012).

Cost minimization or late-to-market strategy

Cost advantage through economies-of-scale, jointness across production and distribution. This is accomplished through process and product design modifications and reduce overhead and operating costs. Channels and use networks are in this area also advantageous to minimize costs to see what others already have done. Entry into the market is done in the growth stage or later, once the market volume has grown to a stage where economies of scale can be achieved and to avoid investments before product design is relatively standardized (Maidique & Patch 1978; Wunker 2012).

Market segmentation or specialists strategy

Focus on fulfilling demand for small pockets in the market with special applications of the basic technology. Strong capability in applied engineering and flexibility in manufacturing is required to succeed with this strategy. Large-scale production competence may be hindering since a large number of special applications can be too complex to schedule and control. Entry is generally done in the growth stage of the product life cycle but can also be done later when the market is more segmented. (Kotler et al. 2013; Maidique & Patch 1978, p. 239-240)

Technical policies and competence levels should depend on company’s chosen strategy. For example if a company operates with leadership strategy and first to market advantage, the need for a high level of competence, state of the art competence, is desirable and focus on applied research is more important (Wunker 2012; Maidique & Patch 1978).

2.5.1. Advantage through core competencies

It is discussed how several core competencies could benefit firms when entering into new markets and developing new products using their competencies. Figure 2.4.1. showing how a core competence can be used with another competence and create core products that could be
used in several businesses (Prahalad & Hamel 1990). Prahalad and Hamel’s framework can help companies identify business opportunities and how to identify core competencies that support that intent. In order to do that, the firm should ask themselves:

- How long could we dominate our business if we did not control this competency?
- What future opportunities would we lose without it?
- Does it provide access to multiple markets?
- Do customer benefits revolve around it?

The advantage of Prahalad and Hamel’s framework is that it focuses on creating value by building or recombining competencies to enter new business areas. The framework recognises the interdependence on business and focus on opportunities to create value through leveraging competencies (Hill & Jones 2009).

Figure 2.5.1. The roots of competitiveness (Prahalad & Hamel 1990)

According to Prahalad and Hamel, identifying the company’s current core competence is important when deciding which business opportunities to pursue. They propose using a matrix similar to figure 2.4.2. Once current core competencies are identified to build and leverage core competencies in order to create business opportunities. Existing competence and new competence is separated in the figure 2.4.2. as well as existing and new industries (Hill & Jones 2009). The fill in the blanks quadrant is represented by the company’s existing competencies and products. It refers to improve a company's competitive advantage in the existing market by leveraging existing competencies. The white spaces quadrant is questioning how to best fill the gaps between existing market and new market by deploying and recombining existing core competencies. Premium plus 10 quadrant questions what new core competencies that must be built today in order to secure that the company remains competitive in the existing market in ten years. Mega-opportunities are where neither the company’s current competence or market position overlaps. Companies can pursue these opportunities if they are found particularly significant or relevant (ibid).
Other success factors are how the company succeeds to transform people's ‘tacit’ knowledge into ‘explicit’ knowledge in order to gain new/developed products that gives them a competitive advantage (Nonaka 2007).

2.5.2. Benefits through innovation

Companies reactions to what their competitors have done, their competitive reactions, have developed during the past 40 years. How competition affect one firm could for example depend on how their competitor changes its advertising expenditure level, which will create different reactions from competitors. This could just as well affect the demand from consumers (Park & Yoo 2016). A driving factor for changes and for economic growth is innovation. Innovation is changing from a traditional linear model where research and development were the basis of innovation into a wide network of sources and partners integrating complementary competencies. Those kinds of innovation networks set new challenges for companies on how to manage and develop their ‘networking’ competencies in order to be competitive. Today it is very hard for individual players to develop new innovations with all the competencies that are necessary in a knowledge-driven economy that rules today (Bullinger, Auernhammer & Gomeringer 2004).

In recent years the environment of innovation have become more open and firms are accelerating towards an ‘open innovation’ process which today is a successful approach. The process uses the internal and external knowledge in a more effective way in each organisation compared to a closed innovation system, figure 2.4.3. and 2.4.4. (Tidd & Bessant 2013; Chesbrough 2012; Edgren & Skärvad 2014, p. 176 - 181).
In an open innovation model companies choose to either launch their projects from internal or external technology sources. If a new technology appears it can enter the model at various stages of the process. The firms can instead of using their own marketing and sales force, work through out-licensing or spin-off venture to enter new markets. Even if there is lack of information regarding risks with the open innovation model, increasing amount of firms are applying open innovation to their business model (Chesbrough 2012).

Examples of some differences between closed innovation and open innovation are discussed by Edgren & Skärvad (2014) and presented below.

<table>
<thead>
<tr>
<th>Principles for closed innovation</th>
<th>Principles for open innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Sharp brains” within the business works for us.</td>
<td>We need to work together with more “sharp brains” both within and outside the company.</td>
</tr>
<tr>
<td>To earn money from R&amp;D, we must develop and exploit our research investments by ourselves.</td>
<td>External R&amp;D could create valuable value. Intern R&amp;D is needed to keep some of those values.</td>
</tr>
<tr>
<td>If we by ourselves create new knowledge, we will be the first ones on the market.</td>
<td>We do not need just by ourselves create R&amp;D results to make money from it.</td>
</tr>
<tr>
<td>The company that are the fastest one to have an innovation to the market is the winner.</td>
<td>It is more important to create an business model than to be first to market.</td>
</tr>
<tr>
<td>If we create the most and the best ideas on the market, we are the winner.</td>
<td>If we are the best one to use intern and extern ideas, we will win.</td>
</tr>
<tr>
<td>We should control our intellectual property so that our competitors not make money from us.</td>
<td>We should stimulate other companies usage of our intellectual property and vice versa if it develop our business model</td>
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(Edgren & Skärvad 2014, p. 182)
2.6. Outsourcing

Outsourcing is about expanding the boundaries of a firm and was widely accepted as a business strategy in 1989 (Mullin 1996). A broad definition of outsourcing is to be reliant on external factors (Mol 2007). With this definition any activity where an outside suppliers is active, is outsourcing, regardless if the activity ever has been made in-house (Hietalahti & Kuoppala 2009). Another definition of outsourcing is, a process of transferring an existing business activity, including the relevant asset, to a third party (Lonsdale & Cox 1998). Which implies that knowledge connected to the task being outsourced was, before outsourcing, within the firm.

An example to why companies are outsourcing their competencies to become more competitive is from the pharmacy industries. The whole business structure is changing from a closed innovation structure to an open. Since the business environment has become much harder because of new kinds of medicines that are much harder to develop than they were before. It costs a lot, takes time and the risks are huge, therefore are companies within this business nowadays more focused in developing new business models and to find research organisations with higher grades of innovation skills and skills in how to cut costs. Without outsourcing would therefore many of the companies in the pharmacy industry risk to die (Edgren & Skärvad 2014, p. 184 - 185).

Outsourcing always means a shift within a company's boundaries, although outsourcing is not the only way of alter the boundaries (Lonsdale & Cox 1998). There are three concepts close to outsourcing (Rundqvist 2009):

- Insourcing
- Backsourcing/homesourcing
- Offshoring

A definition of insourcing is the buying-in of vendor resources to meet a temporary need (Lacity and Willcocks 1998, cited in Rundqvist 2009). Backsourcing is when a process that is been outsourced is brought back in-house (Veltri and Saunders 2006, cited in Rundqvist 2009). Offshoring is when a company moves existing jobs to their own branches or subsidiaries in another country (Schultze 2004, cited in Rundqvist 2009). Thus re-locating facilities to other countries is not outsourcing as long as the business boundaries remains the same (Hietalahti & Kuoppala 2009).

Regulations from governments is a driving factor of outsourced jobs since it could push a company to offer temporary jobs to avoid some of the costs from the regulations. And to a developing country it provides additional savings. Outsourcing can also, besides savings, provide access to skilled services. Some of the problems for companies who offer services of outsourcing are lack of language skills, interpersonal relations, work ethic, and working knowledge. Manufacturing companies are some of those who are saving on outsourcing to reduce their manufacturing inventories. This saves a lot for the companies and mostly on non-earning inventories (Merrifield 2006).
There are differences between big and small companies who are outsourcing to what extent skills, relations can be outsourced. The impact of outsourcing is not too big on larger companies since the inherent resistance to change compared to small organisations, due to limitations in financials means for establishing the relationships. Car manufactures that are using outsourcing avoid unnecessary inventories compared to those who do not. Joint ventures helps smaller companies to join bigger projects since they normally lack in skills and financials for scale-up. This also increases the speed of developing projects. Online learning also impacts the accessibility of outsourcing since it provides learning over countries (ibid).

A parallel drawn to education systems, by Merrifield (2006), is that the teacher’s role is more administrative and the Internet is the new “black board”. Student who wants to learn can nowadays find the information quickly by himself or herself online. The global market is forcing manufacturing companies into outsourcing to become a company who’s competitive by finding the “next-generation” technology. The resistance to change often reject companies to be innovative and therefore is outsourcing also a strategic aim to avoid those problems. There is a need of both in-house and online projects to be competitive (ibid).

Companies that use outsourcing as a strategic tool have several different drivers. The different drivers can be divided into three categories: financial, strategic and other (Vagadia 2011). Even if the driving factors may vary between companies the most common strategic reasons, according to Vagadia (2011), to outsourcing are:

- Achieving best practice, because a service provider whose core business is the performance of a particular process will have better practices than a firm for which that activity is only one of many and peripheral.
- Enforcing appropriate cost disciplines and controls, because the introduction of a third party will require the need for better cost control and thorough documentation of the internal procedures and costs.
- Better leveraging the core competencies of the organisation, achieved through increased focus on core functions and processes.
- Gaining access to new technology and skills not available within the organisation.
- Reducing headcount and achieving cost reductions. Savings from economies of scale and scope can be achieved and be passed onto their clients. The company might no longer need to employ individuals for those processes which they outsources, saving on recruitment, training and other overhead costs (Kakabadse & Kakabadse 2005; Vagadia 2011).
Outsourcing can provide managers with several benefits, the ability to focus on core competencies, cost management, access to external expertise or technology, flexibility etc. Several risks are also apparent in outsourcing procedures such as loss of know-how, dependence etc. The risks and benefits associated with outsourcing are presented in table 2.6.1. Outsourcing benefits and table 2.6.2. Outsourcing risk.

### Outsourcing benefits

<table>
<thead>
<tr>
<th>Management focus</th>
<th>Focus on core competences</th>
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<tr>
<td></td>
<td>Reduces effort required to manage peripheral activities</td>
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<td>Focus resources on core activities</td>
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<table>
<thead>
<tr>
<th>Cost management</th>
<th>Economies of scale / productivity</th>
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<td></td>
<td>Committed cost structure, convert fixed cost to variable</td>
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<td></td>
<td>Reduce capital investments</td>
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<td></td>
<td>Cost reduction</td>
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<table>
<thead>
<tr>
<th>Access to external expertise/ investment or innovation</th>
<th>Access to specialists, management expertise, products, services</th>
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<tbody>
<tr>
<td></td>
<td>Benefit from supplier’s investments and innovation</td>
</tr>
<tr>
<td></td>
<td>Manage attrition, depth and breadth of resource requirements</td>
</tr>
<tr>
<td></td>
<td>Increased quality due to increased competition among suppliers</td>
</tr>
</tbody>
</table>
Flexibility
Adopt best practices, manage complexity & stabilise environment
Increased flexibility in environmental turbulence
Improve systems, strengthen control and enhance services
Improve scalability

Increased time to market
Implement new technology
Access to external knowledge
Access to suppliers development

Table 2.6.1. Outsourcing benefits (Vagadia 2011; Lonsdale & Cox 2000; Rundquist 2009; Quélin & Duhamel 2003)

Outsourcing Risks

Management focus
Loss of core activities
Loss of core competence
Loss of know-how
Fall in employee morale
Loss of internal coherence
Confidentiality and knowledge leaks

Cost management
Being leveraged by suppliers
Loss of intellectual property rights
Hidden costs, quality control, supplier interruptions, overhead costs etc

Flexibility
Loss of strategic flexibility
Dependence on the suppliers
Decreased in-house capacities
Suppliers lack of necessary capabilities

Table 2.6.2. Outsourcing Risks (Lonsdale & Cox 2000; Rundquist 2009; Quélin & Duhamel 2003)

According to Johnson (Appendix 1) the complexity level in controlling and managing an outsourcing process is often underestimated. Outsourcing is one of the most complex improvement strategies a corporation could undertake.
Figure 2.6.2. Risk and complexity level of change (Appendix 1)

Figure 2.6.2. illustrates the potential risk and result of complex changes within an organisation. Increased level of changes increases the complexity and also the potential risk. Outsourcing is a high complex and high-risk strategy when undertaken during the five stages of decline. Thereby managing outsourcing is of great importance for companies’ success (ibid).

When finding out about core capabilities and some issues regarding outsourcing in how it will affect the business. Magretta (2012) describes the symbiotic relationship between core capabilities and development projects. When talking about core competencies in relation to competitive advantage Magretta (2012) argues that core competencies are not the only factor at play. Instead she embraces Porter's term, fit.

Fit is how activities in a value chain relate to one another and the value and cost of one activity is affected by the way other activities are performed. That competitive success cannot be achieved by doing only one thing really well, a core competence. Good strategies depend on connections of many things and interdependent choices. An argument is made that a common misconception, that core competencies and core activities is the one important thing in strategy and outsourcing does not affect the companies as long as core activities are not outsourced. This misconception will lead companies to think less of tailoring, trade-offs and fit, thus in the long-term implications for competitive convergence could be affected. If less elements of the company's value chain is within the company less opportunities for strategic decisions remains. Thus activities that are strongly complementary with others are risky to outsource (Magretta 2012).

2.7. Network organisations and collaborations

Network is a complex, interconnected group or system that has no single reference point. It is inherently adaptable and can evolve over time and influence in two ways of its actions. First one is "through the flow and sharing of information within the network" and the second one is "through differences in the position of actors in the network, which causes power and control imbalances" (Tidd & Bessant 2013).
What kind of position a firm have within a network and if the network is tight or loose depends on the network's quantity (number), quality (intensity) and type (closeness to core capabilities) of the interactions or links. Those links or interactions within networks require significant investments in resources over time. Long-lasting innovation networks in a technological and economic environment have characteristics to solve major waves of change and through a continuous stream of innovation could help firms to sustain and grow (Tidd & Bessant 2013).

Networks are favourable when they out weight costs, for example if a company needs a technology they do not have and the costs to develop internal capabilities is larger a lot more than having joint infrastructure and where investments entail a big uncertainty. It is about defining and controlling expectations and reducing the risks since the risk gets shared and it creates possibilities to establish new markets and technologies (Mulling 1996; Tidd & Bessant 2013).

The usage of innovation networks, both internal and external, creates possibilities of getting accesses to new and complementary knowledge sets to help innovation activates (Tidd & Bessant 2013; Chesbrough 2012). Expanding their innovation resources is one of the main reasons why established companies chose to co-operate. Other reasons to use networks is to use what others have done and apply it into their own processes, reduce limitations due to company size or lack of knowledge and also obtain new knowledge skills. A shared learning is helping firms to overcome some obstacles as in seeing things in a new approach and less 'not invented here' (Tidd & Bessant 2013; Kathoefer & Leker 2010). Therefore collaboration provides a perspective of seeing the process in different ways and have more critical reflections in order to raise the quality of the process (Tidd & Bessant 2013).

Overall the reasons why firms are using networks within their innovation development are based on four major arguments (Tidd & Bessant 2013, p. 302-303):

<table>
<thead>
<tr>
<th>Collective efficiency</th>
<th>To gain competitive advantages as a smaller, middle-sized firm compared to its competitors, networking can help them to find competencies that they not have within the firm (Tidd &amp; Bessant 2013).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collective learning</td>
<td>Learning will give companies competitive advantages and is an important source. Through sharing of information, experiences that benefits all the involved, firms will become more competitive and have a higher level of knowledge (Tidd &amp; Bessant 2013; De Clercq &amp; Dimov 2008)</td>
</tr>
<tr>
<td>Collective risk-taking</td>
<td>Since the risks are spread among others it also permits a higher risk acceptance among the firms compared to those who are alone (Tidd &amp; Bessant 2013).</td>
</tr>
<tr>
<td>Intersection of different</td>
<td>Building relationships across knowledge frontiers give the participating organisations access to new experiences and stimuli (Tidd &amp; Bessant 2013).</td>
</tr>
</tbody>
</table>

Business model canvas describes the foundation of how an organisation creates, delivers and captures value (Appendix 7). The key resources and key partnership is an important part of a company's business model. Key resources describe the most important assets for a business model to work (Osterwalder & Pigneur 2009, p. 34). The key resources allow organisations to create and offer a value proposition, reach customers, maintain relationships etc. Different resources are needed dependent on business and industry. Key resources can be physical, financial, intellectual and human. If a company does not possess key resources, access could be gained through key partners (ibid).

Intellectual resource as patents, copyrights, knowledge and partnerships are increasingly important for the business model. Osterwalder & Pigneur (2009) argues that while intellectual resources are difficult to develop, when successfully developed, can give the organisation substantial value. Although human resources are needed in all business it is particularly important in certain businesses and are crucial in knowledge-intensive and creative industries (ibid, p. 35).

Key activities are what important actions an organisation must take in order to become successful. The same as for key resources, key activities is what allows an organisations to create and offer a value proposition, reach customers, maintain relationships etc. Key partnership is the building block in the business model that describes the networks of suppliers and partners that makes the business work. Companies enter into partnerships for many reasons and Osterwalder & Pigneur (2009) has in business model canvas distinguished between four different types of partnerships. Strategic alliances between non-competitors, cooperation: strategic partnership: between competitors; joint ventures to develop new business and buyer-supplier relationships to assure reliable supplies (ibid).

A part of the key resources in a technology-based firm’s core capabilities are knowledge and competencies (Leonard-Barton 1992). In business model canvas knowledge and human resources are important for the success of the business model. In business model canvas an important part of the key activities is to manage intellectual and human resources, especially for technology based firms. The key partners in Canvas are the partners who will enable you to accomplish key activities and key resources (Osterwalder & Pigneur 2009). Thus, key partner is important part of managing a company's knowledge and competence.

2.8. The need for a more dynamic competence model?

The model, figure 2.8.1. is to be seen as the authors attempt to create a more dynamic way to “map” critical competitive competencies. It explains a view based on the academic literature for how the shifts in technological knowledge and other factors influence the competencies needed to be successful within the industry. It also try to capture the need for companies to adapt to increased and changed competence requirements through building network and by nurturing dynamic internal competencies. It highlights the need to be able to change and adapt the business
to the changes in the technological environment one is competing in. The environment, technology, customer preferences and competitors is constantly changing and should be seen as highly dynamic (Sandström 2011; Becker, Knudsen & Swedberg 2012; Cojocaru & Cojocaru 2014; Kang & Montoya 2014; Foster & Kaplan 2001; Hansen & Nohria 2004), which influence the critical competence need to act in the industry.

The competence needed in order to be competitive in a specific business is visualized as important industry competence in the model, figure 2.8.1. This is the overall competence needed regardless of what internal competence the company in question possesses. The important industry competence is very dynamic. Changes occurring in the important industry competence can be both incremental changes or technological shifts (Tidd & Bessant 2013). The changes are not only influenced by technological improvements but also by other external factors (Cojocaru & Cojocaru 2014; Insch & Steensma 2006). Competitive advantage and differentiation from competitor’s correlates with what competence a company possesses and also where their technological focus is (Prahalad & Hamel 1990; Hill & Jones 2009). Thus, different companies within the same industry can possess different internal competencies within the required competence area.

Inside the important industry competence are the competencies that the company in question need to have access to. This competence consists of two parts, internal competence and network competence, figure 2.8.1. Competence accessed through collaborations is an important part to stay competitive (Hansen & Nohria 2004; Bullinger et al. 2004; Cojocaru & Cojocaru 2014).
New collaborations and discontinued collaborations as well as the internal development of competence, changes the competence accessed through the network. The internal competence and specifically the core competence are limited within a firm (Prahalad & Hamel 1990; Domberger 1998). Although the amount of manageable competence is limited, changing internal competence discarding one for another is possible and important to consider in order surviving shifts in the technological business environment.

![Dynamic Competence model](image)

The importance of adaptability and flexibility to stay competitive is apparent (Cojocaru & Cojocaru 2014; Insch & Steensma 2006; Hoecht & Trott 2006; Tidd & Bessant 2013). Changing technological requirements forces companies to be dynamic when managing their competence. This model highlight three different sources knowledge can be acquired from. One way is through insourcing processes where competence develop in the network is utilized to develop internal competence and capabilities. Second obtaining competence outside the network that is critical for competitiveness. Competence could be accessed by expanding the network area through new collaborations or directed development in the network. If competencies are found critical for the company in question new competencies could also be developed internally. The third way posed to develop the competencies is to search outside what is considered important industry competence, inside external competence possibilities. How to incorporate technology not yet coupled with the business environment and searching for competence needed in the future. Developing new competencies could make you become the company that drives changes in the important industry competence area and forces competitors to follow you. This could be the approach of first to market (Tidd & Bessant 2013; Maidique & Patch 1978; Wunker 2012), where you instead of being a follower you aim to be a leader.
3. Methodology

This chapter explains the research perspective, approach and method. The development of the research is presented as well as what actions the authors took in order to conduct the research, what choices that has been made during the research and why.

The research is based around an automotive company and how competencies are managed in relation to network collaborations and outsourcing. The relationship between this company and its network is chosen to study since they have used outsourcing strategically. Although policies on outsourcing have changed during the company’s history, outsourcing has been used continuously throughout the company's history. This is a qualitative study where information gained from interviews influence on the research result.

Empirical data will be collected through interviews with a limited number of project leaders and senior managers within the organisation. The assumption is that answers given in the interviews will be affected by the objectivism position of ontological considerations, since the organisation structure within the companies influences both internal and external factors (Bryman & Bell 2011, p. 21). The research design is influenced by the principle of deductivism. Hence, the theoretical framework is the basis for the research and arrived from previous research and theories within the research area (Bryman & Bell 2011, p. 15). Previous case studies will also influence the development of the theoretical framework. The framework will be tested by empirical material gathered from the interviews.

Qualitative research tends to emphasize social life in terms of processes. As Pettigrew (1997 p. 338) explains, process is “a sequence of individual and collective events, actions, and activities unfolding over time in context”. This includes understanding how the past history of an organisation shapes the present reality and how the “interchange between agents and contexts occurs over time and is cumulative” (Pettigrew 1997, p. 339).

3.1. Research approach

This thesis originated from analysing the effects of outsourcing on core competence in technology based firm, from a long-term perspective. Through literature review and empirical data collection the focus switched to how to manage changing competencies within organisations. The amount of competencies needed to be competitive has increased as described in sections 1.1 and 2.1 and the managerial implications is large since companies is not capable the sustain this high amount of competencies (Prahalad & Hamel 1990, Narula 2004). Thus, analysing companies manage competencies and competitive advantage through collaboration and suppliers was perceived more important.

3.1.2 Abductive research approach

This study follows abductive research approach. The abductive research approach is “a continuous movement between an empirical world and a model world”, where the “matching of theory and reality” and “direction and redirection of the study” are key processes (Dubois &
The process of abductive research is defined by evolving theoretical framework, empirical fieldwork and case analysis simultaneously. For the purpose of this study this approach was considered appropriate. The theoretical framework has evolved during the research process and theories in the research area as well as empirical findings have affected the framework continuously throughout the research process. It started by review literature and theories about outsourcing, network organisations, competencies etc. And through consulting with experts in the empirical world our understanding and the theoretical framework improved. “Theory cannot be understood without empirical observation and vice versa” (ibid, p. 555). By continuous evolving our theoretical framework, the research has been given direction and helped to identify issues, which have help redirect and adapt the framework.

The authors approached the research by familiarize themselves with the subject though previews research and increased their understanding through talking to professionals with several years of work experience in the subject. This gave the authors both an academic understanding as well as a managerial and practical understanding. The theoretical model has been developed from literature reviews, academic research on the subjects and through empirical findings. Our theoretical model has then continuously developed through the research process and the interview has significantly influenced the model.

3.1.2. Descriptive Research

Descriptive research aims to accurately describe situations, companies or persons profile and phenomenon’s (Kothari 2004). Using an abductive research approach as the purpose of this study, descriptive research was considered appropriate. When conducting descriptive research it is important to have a clear understanding of the phenomenon in question. The field of networks collaboration and core competencies are extensively studied by influential academics, which entails a clear understanding. This enabled us to form our impression of the dynamics of competencies and need for collaboration in technology-based firms. Our impression served as the foundation when formulating a descriptive model that was used to analyse the company’s approach to manage dynamic competencies. The aim of analysing the situation, based on our descriptive model, is to get a basic understanding of the problem posed to technological companies in a quickly changing technical market (Tidd & Bessant 2013) as well as an understanding for how to manage these problems.

3.1.3. Qualitative Research Design

There are two types of research strategies, qualitative and quantitative. A difference between quantitative and qualitative research is that quantitative is done through the researcher's point of view and qualitative is done through the participant’s point of view (Bryman & Bell, 2011). Also quantitative research is done through focusing on collecting and analysing a big number of data, while qualitative is focusing more on words. Our research is based on interviews with a small number of participants and the analysis is based around interpretations of their words and not numerical quantitative data. Qualitative research was considered most suitable in order to fulfil the research purpose.
3.2. Research Strategy

3.2.1. Case Study Design

This thesis was conducted using a case study design. Due to a qualitative research approach and defined descriptive research purpose, case study was considered a suitable research design (Bryman & Bell 2011). Also it is the researcher's opinion that studying a case, in order to get an understanding of how they manage a given problem, is a crucial part of understanding the problem. The limitations of using case study are that no generic model or conclusions can be drawn for the industry as a whole (ibid).

3.2.2. Qualitative Interviews

Qualitative interview tend to be less structured and more flexible. The process followed an interview guide in order to “respond to the direction in which interviewees take the interview and perhaps adjusting the emphases in the research as a result of significant issues that emerge in the course of interviews” (Bryman & Bell 2011, p. 467). The authors conducted semi-structured interviews with the aim to attain rich data and emphasis on understanding issues and events. As to understand what the interviewee sees of importance in explaining and understanding events, patterns and forms of behaviour (Bryman & Bell, 2011).

Qualitative research interviews are less structured as opposed to quantitative interviews, thus giving the interviewee the chance to answer the questions more freely. The focus of this type of research is to get insight in the interviewee’s perception, which a loosely structured interview enables (ibid).

When interviewing a pre-defined interview guide that was devised with questions on the specific topics, the answers were used as a base for discussions. Use of several assets of qualitative interviewing and deviated from the given interview guide by restructure the order of questions according to the interview situation, as suggested by Bryman & Bell (2011). The interview were prepared to deviate from the interview guide, the questions were often not strictly posed in the outlined formulation and order. There were also added multiple follow-up questions during the interview. This enabled the interviewee to reflect deeper in subjects that were found particularly of interest to the research. Since the concepts of outsourcing and core competences are complex and could be interpreted differently, it was delivered background information and further explanations when required during the interviews. Hence, the respondents could ask questions to ensure full understanding of each question that made the answers more valid to the research (Bryman & Bell, 2011).

Knowledge gain from the literature were used, and questioned what was needed to know in order to answer our research question (Bryman & Bell 2011, p. 475). The interviews were performed within a closed area with quiet surroundings, making the recordings more reliable. The recordings was transcribed afterwards into text which makes the data public to others there it can be reused in a new way that was not originally intended (Bryman & Bell 2011, p. 481). A
limitation of the transcriptions is that they are transcribed in original language, Swedish, that could limit the usage of the data.

3.3. Case Selection

3.3.1. Selection of Case Firm

The company selected for study is a good example for study in order to analyse the problem posed in this research. This because the automotive company have used outsourcing and networking as a managerial tool since it first was established. How they have managed to stay competitive and manage their competencies within this network is ideal to study. Also, the automotive industry is continuously faced with incremental innovations, technological shifts and regulations that force the companies within the industry to adapt. There are also connections to the company that enables to conduct interviews with people with significant insight and big influence within the company. This contributed to strong empirical data gathered through interviews with those people.

3.3.2. Selection of Interviewees

In order to get a broad understanding of the firm's approach to the research area within marketing, development and innovation, it was selected personnel from three different organisation functions:

1. A senior manager within marketing, sales and service department.
2. An innovation and technology manager within electric R&D department.
3. A senior manager within strategy and concept in the technology and implementation division.

The selections of interviewees at the automotive company were made dependent of their influential positions and knowledge in strategic decisions. Since middle managers and senior managers are the ones who provides a sense of direction and connects visionary ideals from the top and the “what is” mind-set of the front-line employees (Nonaka & Takeuchi, 1995 p.15; Nonaka 2007). Therefore are the chosen positions of the interviewees of great importance to the subject of this research and further explained in section 2.4.2.

3.4. Development of Interview Guide

The interview guides were developed with the aim of gaining a broader understanding of the case firms thoughts and processes behind the research area. Thus, the interview guide was constructed with general questions about the company's approach to outsourcing in different contexts, strategic, competitive, relations etc. And also general questions about the importance of competence, nurturing and gaining knowledge, past and future knowledge etc. The interview guide was semi structured with the aim of getting broad information regarding these subjects and also gets specific examples to describe their approach in different areas and times. The aim was to conduct interviews lasting at least 45 minutes to make sure adequate information was extracted
from the interview (Bryman & Bell 2011). As a result of the semi structured interview guide and the authors being unaccustomed with conducting interviews the interview time differed between interviews. The shortest interview lasted 35 minutes and the longest 75 minutes.
4. Empirical Findings

The following empirical data was gathered through qualitative interviews that were conducted at a company in the automotive industry in Sweden during the spring of 2016. The number in quotations corresponds to the interviewee number in appendix 3-5. The interviewees have decades of work experience within the automotive industry and are managers in new technology and IT development (1), senior managers in innovation and technology (2) and strategy and concept (3). The data gathered from interviews are the interviewees’ personal reflections and does not necessarily reflect the company’s policies on the subject. Therefore are the ‘automotive company’ and ‘car model X’ quotations, that are associated to the company’s real names, changed in order to minimize misunderstandings to the company as a whole.

4.1. Core competencies

What is important for competitive advantage and critical competitive factors has changed several times during the automotive company’s involvement in the car industry. With this, the core competences at the automotive company today differs from what competencies that were considered core in the past. Although this is true, some core competencies within the company have been and are still considered core within the organisation. Crash structure is a competence that has and continues to be a core competence in the automotive company’s car development. “Traditionally we have had very good competence about crash structure, it is possible we have the best people in the business” (2) and “we are in the cutting edge in all areas when it comes to safety” (3). The development of the core competencies is correlating directly to critical competitive factors and technology development. “It is about customer benefit and the unique ‘automotive company’ experience“ (2). “We are starting to take over more and more of what we considers critical for conducting business” (1). This statement refers to developing knowledge in the areas that is critical for competitive advantage. Thus, what is considered core is a result of what is needed to stay competitive.

When searching for what competence that is needed, the automotive company examines what is needed in order to be competitive and unique. This examination of important competence is done continuously with new product development. “Normally we map up what is important for the company, what do we need, what competencies. From this it is quite clear in which area it is important to develop new technology, in what area we can buy and where it is important to be unique and how. This controls our structure of competence” (3). “Today I would never talk about workshops systems and processes as I would have done 15 years ago, nowadays it is all about connected functions and services through Internet” (1). The area that is interesting and important within the car industry today is functionality and connectivity and the competence focus has shifted. “Lately it is about software functionality in the cars that has become central. And connection between the car and the cloud is what is coming next” (2).

The automotive company organisation is build up by several different functions and what is considered core is different between these functions. “Different organisations have different driving forces for different competencies, in manufacturing maybe the ambition is to minimize
complex procedures and let suppliers do more. In R&D it may be to deliver as much as possible at a fixed cost” (3). How the development of competence is also dependent on which function that is in question and what factors affect that functions success. From the interviews conducted, spanned over functions, a change in the overall approach at the automotive company has emerged. Talking about early 2000 (1) said “Our core competence is flow and process layout” this is an core competence spanning over functions, effective processes and flow through the organisation was critical for business success.

The competence that is considered core today which spanned over functions at the automotive company is system architecture. “How to assemble the system, this is our core competence, the system architecture, this we have to do by ourselves. Also, how to divide the system into different components is a core competence” (2), “we want competence about as well as managing competence in our systems” (1), “we have all the important competence we believe is needed to create the product. We conduct research on how to combine our systems with systems we buy” (3). The automotive company has shifted from focus on the process of developing car to being architects of how to integrate systems into their product. “Typically you want to be able to create several car models in the same factory. To accomplice that you need the basic architecture with fixed measurements and still have flexibility. The architecture is needed in all parts of the car, from electrical architecture to infotainment and connectivity architecture” (2), “if we are ahead with our competence we can create more efficient solutions since we can control how the systems are connected, and this is true for the whole car. The architecture is the foundation for our competence” (2).

A reason why this shift in competence focus has happened at the automotive company could be past experience and development of technology. Not having an overall architectural perspective on the development of cars entailed difficulties during the early 2000s. The restrictions and need to adapt to suppliers development was one example brought up during the interviews. “In retrospect we should have done that by ourselves” (1) referring to the development of the parameters of a system. This, together with the quick development of hardware may have been a reason why the change to architectural focus was needed at the automotive company. “The hardware has become more and more standardized, we use the same type of hardware accessible in a tablet and similar products. The true value is not in hardware but the value in software is significantly larger” (2), “we did not want to be in the hardware business any longer but instead wanted to build a system which could be used on all hardware” (1). In the infotainment area of car development at the automotive company, having system architecture as the core competence in development means specifying the interaction in detail. “I believe we can create more unique products than other, an example is ‘car model 1’ and ‘car model 2’ centre stack display and how the interaction works. We have specified in detail how the interaction shall work” (2). This way of thinking about car development has opened possibilities to create a more brand unique product for the automotive company. “In order to deliver a ‘automotive company’ experience we have specified in details how interaction should behave from every push. We think we can do this better than anyone else and we are taking steps to clear all parts of the software as well. If we did not think we could create the best ‘automotive company’ experience, we might just as well shut down” (2). Those statements could also imply that there is a strong belief and confidence in the
competence within the automotive company. “We have all the important competence we believe is need to create the product (3)”.

4.2. Acquire and manage competencies

The automotive company has for long been a company within the car market. As the market has changed so have competitors to the automotive company. All those changes and challenges that continuously is happening, while developing cars, provides data on how to see what the market could come to accept to use as an advantage for the car company. But there is more than just data that is to consider, it is just as important with experienced people. “Whether you use the documentation from past project or if you use experience is a philosophical question” (2), “we document during and after project to capture knowledge, but when new development projects are started I think it is often viewed as unique and very new and that there is little to learn from past projects” (1).

Through experience and having experienced people within the company could save time instead of always looking back on old reports. Always looking backwards could as well be an obstacle for new innovation since if you always wants to be 100 per cent sure about how to develop things, some things might seem to hard and therefore not be proceed. “We are humans and sometimes we take challenges with a little bit of "gut feeling", this is what we want to do. It can be a good thing to want something really much. Willpower will compensate to that we need more information and experience. You have to be able to push through things, you need a little entrepreneurial spirit” (3).

The automotive company have build up their competence during years of cooperation and learned how to manage, control and develop systems that is been used to create their own systems and methods. “When we are developing something new, we use project teams which enables us to work across borders” (1), “once the transition was made from analogy to digital workshop and service systems, the layout was created from a supplier and became an integrated solution which ‘the automotive company’ continued building on” (1).

But starting a new project or proceed a previous one is not made overnight, the automotive company have by acquiring knowledge in fields they do not feel certain in or have found competence gaps, filled them, adapted and learned from to minimize risks of failure by letting companies with greater experience being involved. “Since our IT-organisation was not fully formed at the time, we collaborated with an external company in Sweden to act as our IT supplier when developing our new system” (1). “Well, then we make sure that we acquire the knowledge in one way or another. it is something you do at an early stage, when it comes to technology, competence or whatever it is about. We work very conscientiously to ensure that we have the expertise in those areas” (3). “In order to develop more competence within cloud connectivity we are hiring people with specific competence and collaborate with companies within the area. We are working with Ericsson who is responsible for a big part of our cloud solution” (2). “The infrastructure of cloud connectivity is supplied by Ericsson and we create our own system solutions functioning and adapted to the cloud service” (1). “Traditionally we have had very good
competence about crash structure, it is possible we have the best people in the business and of course it is important to keep this competence fresh. But within the artificial intelligence area our competence is limited. Together with our HR function, who keeps track of our competence and what needs we have, we work towards filling gaps” (2). “When we find a knowledge gap and it is an important area. We could bring in a consultant on a low level construction wise. Where this person with the help of the environment he is placed, with knowledge in proximity, can manage the job” (3).

Being dependent to a supplier's systems that is integrated in their cars and how their development proceed, have sometimes created obstacles for the automotive company’s creativity. “We did not want to be in the hardware business any longer but instead wanted to build a system which could be used on all hardware” (1).

The automotive company wanted, by having full control of all their own systems, be more individual so they more easily could adapt the car to their customers so that they would feel and see the same thing as the people behind the car. “it is about customer benefit and the unique ‘automotive company’ experience” (2) and “it is based on the core values areas and the "brand identity" areas that we should focus on. For example, security is an area that is a combination of passive and active safety and where we have research at all levels” (3).

It can also become very expensive, the development is to slow or that the products does not fit the company’s vision, by having a few suppliers to that it is no longer advantageously to continue the cooperation. “When is gets to a point where the suppliers become huge players and they are increasing their prices, to the point where we feel like we no longer can pay them, then you as a company can start to re-think that you maybe should do those things in-house instead. Maybe there just are three big ones and so they have a kind of monopoly position” (3). “Within the infotainment area several of our competitors have a lot of software development in-house. Audi as an example has created a co-owned company” (2).

However, some of the companies that the automotive company has cooperated with are still suppliers to the automotive company since it is not possible or not advantageously within the business environment to do all by themselves, it takes to long time to create the best solution and the automotive company has therefore the focus on the whole, that the whole car is what makes the automotive company’s cars unique. “Theoretically, it will be so expensive if you constantly have to chose the absolute most optimal technology for the intended product. It is extremely difficult to develop it by yourself in all areas” (3). “In the early stages of new development when we lack knowledge it is natural to outsource. If the development becomes a more and more important part of our functionality it could result in insourcing. Or maybe the partnership has worked well and we decide to let the supplier continue and let them learn from their other customers. It is continues balancing process” (2).

The balancing process is something the automotive company have used as an advantage, that they have several of choices with suppliers to pick the best solutions from instead of doing everything by themselves, since “acquiring companies may result in the company's customers leaving since
the risk of dependency on a competitor and development within that company could slow down. Acquisition could be both bad and expensive. Instead we want to use an independent supplier. This will not obstruct another stage since possibility to withdraw from a company you have not bought up exists” (3). Also, with a big scope of areas to pick up knowledge from, the automotive company build up their competencies faster than just by doing it in one area. “There is three fundamental ways of getting competence. Cooperation, pure outsourcing and building resources in house” (2).

By having close networks is also an advantage the automotive company is using. The conditions with close suppliers as competitors focused on safety products, have build up and helped the automotive company to see early patterns and then develop their competences in those areas. “One way for the HR function to see patterns about competence is by demand from the other functions” (2). “It is a competence centre here in west Sweden specially so when SAAB was operating here and everyone was working with safety. This created good conditions and all companies grew stronger and shared” (3). It is a win-win-win situation for all, ‘the automotive company’-suppliers-competitors, “we conduct research on how to combine our systems with systems we buy” (3).

4.3. Change in competence requirements

The competencies required staying competitive in the car industry changes all the time. This because of technology advancements and new trends, both technological and social. “New trends emerge all the time” (3).

A other reason why changes in competence requirement occur is new regulations. For instance changes regarding IT at the automotive company during early 2000’s was a result of regulation regarding fair competition, a system should not be tied to for instance a Internet browser. “Regulations about fair competition forces us to have a system easily available for all operators. This and other forces dictated us to change system” (1).

The importance of creating systems that can be adapted to emerging changes and future trends has shown to be more and more important. The automotive company have taken specific steps to prepare themselves for future changes. “Knowing what will come in the future is a delicate thing. We have constructed two architectures that we believe are future proof, whatever the future brings. But it is an immense challenge to understand this. We have build new architect from the ground and almost no other car manufacturer does this” (3). The new architectures have been developed to be flexible enough to adapt to future changes, known and in some extent unknown.

When describing competence and system development a metaphor with concrete was made during the interviews. “It is like concrete, in the beginning it is soft and ductile, and after you have to splash about more on top and eventually you have to knock it down because you can not change it anymore” (1). This metaphor is referring to how the flexibility of systems is, when being developed, high and adaptation is easy. As time pasts flexibility lowers and you have to
build on what you got, making improvements and adaptations. But at a point in time the need to completely rebuild is evident.

The development of competence in the car industry has happened in stages. “Traditionally important competence in the car business has been mechanical construction, how to crease metall. In the 80’s the focus has been on simulating the mechanical construction, the emergence of computer aided design, CAD, during year 1980, and through that reducing the amount of test-cars. Lately it is about software functionality in the cars that has become central. And connection between the car and the cloud is what is coming next. The functionality in the cars in contrast to the functionality in the cloud solution. This is the next big step” (2). The cloud solutions are one of the key things in the close future in car development. “Connectivity is very relevant at this moment. Electrical cars and electrification is not only a trend but soon reality but not yet written in stone how it will turn out” (3), and in customer service, “traditionally customers have had to enter workshops in order to have their car checked for errors, now we need to have a way to perform services and troubleshooting outside of the workshop” (1). The focus of cloud solutions and connectivity is not only described in words but displayed as well. The automotive company has reduced the exposure on conventional car fairs and are exposing themselves more in consumer electronics areas. “We do not appear on as many car fairs as before but we do consumer electronics fairs. In the next consumer fair we will showcase our cloud connectivity service together with Ericsson (1)”

Today a focus at the automotive company is creating an integrated experience through the user interface. “It should be an integrated experience to drive our cars. Digital user experience, DUX, which is how we want our customers to meet our product, is increasingly more important. How to create the best possible experience, this is a focus for us right now” (2). Thus, getting acquired competence within that area, software, connectivity, artificial intelligence is today important. “Within the artificial intelligence area our competence is limited. Together with our HR function, who keeps track of our competence and what needs we have, we work towards filling gaps” (2).

In the early 2000’s a focus was on developing the IT department since the importance of IT in cars became prominent. “I recruited almost one hundred new employees to the IT-organisation which was very small in 2002 when I started there” (1). Knowing what competencies you need to develop is important for a success within this industry. “If you can not understand what problems you have, than you have a big problem” (3).

In the process of building and developing cars the amount of competence needed is substantial. So much so that it is impossible for a single company to obtain and sustain all knowledge. “It is impossible to possess all competence in every direction as well as have manufacturing capacity in a company like this. It is a theoretical impossibility and way to expensive” (3). Using external resources is therefore a must. “We have our approach to finding the balance between cooperation and developing everything by ourselves. If we were to do everything we would have to build a giant organisation locally, and that is not possible for us” (2). “We should not create everything unique like commodities. But the complete product should be unique” (3). The work commodities is referring to parts that is similar between competitors, which does not in a great
extent affect the uniqueness of the end product. An example of a commodity is Bluetooth connections. Commodities in the car industry are often products where the technology is matured and the need to conduct research is insignificant. “What we focus on is dependent on how mature the technology is. If the technology is mature the suppliers is often capable and we can lower our competence level while we need to increase it right now in software architecture” (2).

A development within the car industry noticed at the automotive company is software accessories. This business opportunity has just recently become a reality. “We see the development and are working towards selling software to car owners. You have your car and you can buy software accessories just like you today can buy a tow bar and roof rack to your car” (1). This development could mean that the car industry is moving towards applications sales similar to applications to smartphones today. “The hardware has become more and more standardized, we use the same type of hardware accessible in a tablet and similar products. The true value is not in hardware but the value in software is significantly larger” (2). And to what that differs competitors in the future could be applications, connectivity and artificial technology. Development to conduct more software development in-house at the automotive company is happening. “In the infotainment area we traditionally have specified in detail how the interaction with the driver should work but we have not done the software. But now we are moving towards by doing it ourselves” (2).

4.4. Competitive advantage

Several different factors determine competitive advantage. The main way the automotive company is competing today is through system architecture. This could give advantages in different areas, cost reduction, uniqueness, flexibility etc. "If we have an advantage software architecture we think we can create more effective solutions since we can control how the system is connected. And if you see the car as a whole, the architecture is the foundation for us. How we choose the proportions in order to give designers freedom and at the same time make sure the manufacturing can be done in a rational way” (2).

A way system architecture could achieve economical benefits is through all-embracing control of the development. “An ambition is to have a system to control and steer projects in the same direction in order to not let small projects form own solutions, the cost associated with several different solutions is too high” (1).

Flexibility of product solutions is also an important part of competitive advantage. Quick changes in customer preferences and the technical development could together be attended through the overall architecture of system integration. “Interaction between the car and the driver is critical for competition. it is a lot of brand image there, how it is supposed to be. And it is also something that is exposed for quick changes. That is why we want to do it by ourselves” (2). “In the latest products the automotive company’s priorities have been clean and modern interior design, with few controls. While our competitors has focused on functions and technique. We focus on simplicity “simplify people's life” that is what DUX is about” (2).
Also the uniqueness and the brand identity are important for competitive advantage. Thus, being dependent on suppliers when it comes to areas could be harmful for the competitiveness for the brand. Having the same systems or product solutions, as competitors could also be harmful. “We develop in-house if that part of the car is a critical component for competition” (2). “We should not create everything unique like commodities. But the complete product should be unique” (3). “We develop new technology to make the product more attractive through unique offers and to create the brand identity connected to our products” (3).

Cloud connectivity as regarded as a critical part for competition. A good cloud solution will benefit users and enhance the product in several different ways. “And when the cars are connected through the cloud troubleshooting and reprogramming can be done without customers having to enter a workshop” (1). “What should be in the car and what should be in the cloud? Because what is not in the car can be updated and changed much faster. And then we have the area of artificial intelligence and machine learning which I predict will be very big in this industry” (2).

The development of the automotive company’s competence within the software and connectivity areas is aiming towards more in-house development and specifically system architecture. All parts of the development can be done internally and external partners as suppliers are important within the industry.

Figure 4.4.1. describes the automotive company’s vision when it comes to the amount of in-house development they want to do, and how much influence they aim at having when working with partners and suppliers. The power to steer axis describes how much control a company have on their suppliers and how much they listen to them.

Two different examples in the figure are Tesla and Mercedes. “Tesla has another background than a lot of car companies, they do not have a lot of power to steer and they have not used
suppliers in this area but instead they do everything by themselves” (2). “Mercedes have not done much within this area by themselves, but they are big and strong, if Mercedes says jump, the suppliers will jump” (2). “If you are just a mass manufacturer of cars, let us say a Chinese manufacturer, and you are not too concerned with what you buy as long as it works. Than there are completely okay to be operating close to origin” (2). Operating at the end of both axis spectra is somewhat of a nirvana scenario where you possesses the competence and have in-house capabilities to develop what you need and at the same time have control over suppliers. This could let you dictate and steer project development and simultaneously have a great control over the cost structure and external partners involvement. The automotive company is working towards this direction, “we have begun to have more in-house development within this area and are moving towards this direction. That is our strategy right now” (2).

4.5. Networks and collaborations

About how the automotive company thinks about if they should cooperate or not and how they chose to, with a strategic choice in mind, is dependent on what perspectives they have. Perspectives of what the company wants to benefit from it, as interviewee person (3), at the automotive company, said about how they are thinking when to choose about outsourcing as a part of a process/project. “Outsourcing could be a financial question, can we afford to develop it, or to buy it etc., everything has financial perspective. Not from a short-term financially perspective but a financially strategic one”. It could be that the product already exists and therefore costs both time and money to do in-house, reinvent the wheel, therefore would a network benefit both companies. “It is about the balance between purchase something that exists, what a supplier already have done and in that case you do not have to pay for the development, but in the other hand it might be that you do not get exactly what you want” (2).

Through buying a product/service, the automotive company saves money by putting suppliers against each other to get the best solution/product to the best price. “From always having procurement when starting new projects we force competition between suppliers, otherwise we will not get the best price” (2).

For a successful collaboration, it needs to have a good communication environment between all parties involved. Everyone needs to have the same focus and be dynamic, this is what the automotive company always struggle to create before they starts any collaboration. “Collaboration and outsourcing needs to be more like rowing the same boat, which we often try to create” (1).

The automotive company also wants to have a system that works “as a whole” for their manufacturing and that is easy to understand, develop and integrate. “Just because our organisation's structure is build by different functions, we should not give different tools from each one to partners within the customer service area. The tools should be integrated. How we want to work internally should not necessarily be forced upon workshops and other companies we collaborate with” (1). “When collaborating and outsourcing in a R&D department it is important to be considerate. Different companies acts differently and for some it is the proximity
to the market that is important, for other it is financial or competencies. Distance is not the best thing when collaborating” (3). “We see which companies that are the most susceptible and has the most advanced technology through asking everyone for procurement” (2). “The competence must be there in order to get an effective and good collaboration” (3). “Just sending specifications to lets say India does not work, you will get something back which is not working and often with very long lead times” (1). “Collaboration needs to be dynamic in new development otherwise it will be like a passing a stick and that does not work when creativity and quick turns is needed. You do not have all the answers when you start” (1).

How to sustain a long-term collaboration is according to the automotive company dependent on trust and proximity. Without trust and that each part not is fully committed to the project/process will risk that the relationship ends. “Collaboration needs to be built on trust. If the thrust is lost, which easily can happen in the beginning of collaborations, difficult situations could occur. The early stages of collaborations are very important. In our last big procurement we choose to split it, placing or forcing the supplier to have a part of the development in Gothenburg. This made them committed to the collaboration when opening an office close to us. Some developers from them and some from us should be stationary at this office. This bridged the part of development that needed to be more dynamic. The supplier was free to develop the easier parts that were easier to specify, wherever they chose. When we want a more flexible collaboration we want to have them close to us so we can participate” (2).

If the collaboration does not work to have within the neighbourhood, the automotive company looks for choices to sustain a close and direct communication that would benefit all parties. it is about being dynamic and as stated before about making strategic financial choices, sometimes it is better to chose to have the development/manufacturing offshore and this is something the automotive company has knowledge and experience within. In how to create communication channels that works for all involved. “A example of collaboration in India ended up with us having to send people the to facilitate the process. In another example we build a creative team with personnel from the supplier within it. In this way they could communicate with development done overseas and they acted like the supplier's own gatekeepers. This work much better and that is how we have continued to work lately” (1).

From the collaborations, the automotive company have learned new knowledge and developed themselves together with their suppliers and collaboration companies, continuously in order to become more competitive. This is what have made their location in Gothenburg to a “centre” where innovation and development strongly is working between everybody. There are many long-term relationships with a lot of competencies that is hard to move to another area. “It is not by chance this new development was placed in Gothenburg. It was placed in proximity to companies how posses competence and has done this type of development before” (3).

How competitors to the automotive company chose to collaborate and how to outsource is something the automotive company firstly observes before following any patterns. “It goes trends that you will “move things to the east countries etc.” and that it will work just as well with outsourcing areas. If we put out all our commodities with gadgets in the car” (3).
A reason to why the automotive company is developing things on their own, with and without help from others’, is that they want to create the best products for their customers that they know each detail in. This will increase their competencies and this is one of the reasons to why they have developed the latest engine completely by themselves. The automotive company is acting both in a short-time as in a long-term perspective by first buying a product they do not have all the competencies within, learn from it and create one of their own that is better than the ones they can buy. “When buying products like an engine, which we have done before, you do not get the latest technology. And when it comes to engines, being the best at performance, reducing emission and fuel consumption is very important” (2). “A system called Vadis was already in place when I started working in customer service, this system became the start to our integrated solution since we had already familiarized with that system. This system came from a supplier” (1). “When a new IT system was being developed our own IT function was not fully “up and running” and we choose an external company in Sweden as an IT-supplier for our project” (1).

If the automotive company should outsourcing or not to a supplier is for them based on facts. They do not take any decisions about outsourcing without facts so it is not about what the person himself/herself thinks. It needs to be based on facts so that they will not risk losing any competencies to make a great product. “This is a very opinionated subject and you will get different answers depending on who you ask. Maybe some experience tension but in the big picture it may have been the right call. From a strategic point of view the important thing is that decisions is based on facts” (3).

Once the automotive company have learned the “big picture” in how they can create a product/service from their collaboration or that they feel that their suppliers are too expensive because of low competition. They start to research in whether they should have an in-house development since it is important to have continuously improvement to an acceptable cost for their customers. “Where there are small and quite huge players and they come to the point that they feel quite comfortable where they are and then increases the price, to the point that you do not feel that you not any longer can pay them the price they are asking for. Maybe there just are three big ones so they have a kind of monopoly position, then you as a company could start to rethink that you maybe should do those things in-house instead” (3). It can also be that the suppliers does not share the same vision and therefore not are fully committed to serve just them, the supplier wants to serve several and therefore could this slow the automotive company’s development. “In the end we kept a supplier for small components in software for convenience. But it ended up forcing us to adapts our development since their parts should accommodate other customers as well” (1). “When creating a new system for customer service the lead times using a supplier were to long. Even though they had been in charge of coding updates and troubleshooting before” (1).

There could also be that the supplier has a system that they have difficulties to change and therefore not able/willing to help the automotive company in the big perspective when they starting to develop new technology. “The car where developed rapidly at this time and our project
was a new development where we do not know exactly where we were going. The IT suppliers' strict structure complicated the collaboration” (1).

Overall, the automotive company has created long-term relationships with suppliers who are committed for helping them and solve their problems, since they are the one who is the manufacturer of the whole car and therefore their big decision maker. “In my experience it is rare with harsh environments where partners is hitting each other with contracts in the head. Cloud infrastructure is created by Ericsson and we create the system solutions” (1). “You could say that it is the car industry that is running the supplier. We have different goals, there is a symbioses but it is for sure that we are the customer that drives what they will develop and why” (3). “I see Ericsson as a IT supplier of a small part of the puzzle” (1).
5. Analysis

In the analysis figure 2.8.1. The dynamic competence model serves as a foundation for analysing the empirical data presented in chapter 4. This chapter analyses the empirical data against theories and literature on the subject in order to draw conclusions on how technological companies can secure critical competitive competence for the future, and how long term competence development is managed in a fast changing business environment.

5.1 A dynamic competence model

In order to analyse the situation in the automotive industry and the need for a more dynamic view on competencies needed, the dynamic competence model is used as the author's framework for analysis. The model consists of four competence areas;

1. The internal competence, which refers to the competence a company has.
2. Network competence, the competence that is accessible for the company through its network.
3. Important industry competence, which represent all the competence important to conduct business within the industry.
4. External competence possibilities, the competence that could become important in the future within the industry.

![Dynamic Competence Model](image-url)
The competence areas are not static, they are very dynamic. Continuously adapting competence is important to stay competitive in the long run and for surviving technological shifts. The arrows in the model represent the flow of competencies. Competence flow is occurring in three places. Where the internal competence and network competence flow is dependent on the flow between important industry competence and external competence possibilities.

Once new knowledge becomes important for business, companies needs to adapt. The internal competence flow could change in three different ways;

- Insourcing network competencies or outsourcing internal competencies.
- Acquire new important industry competencies or relinquish of existing competencies.
- Exploring new competencies outside the industry’s competence boundaries.

The last competence flow is the one occurring in the network. As for the internal competence flow companies within the network can by themselves or through collaboration acquire new important industry competencies or relinquish of existing competencies, and explore new competencies outside the industry competence boundaries.

In the analysis the model is divided in four competence areas;

- Competence areas
- Competence flow
- Network competence flow
- Internal competence flow

5.2. Competence areas

A company's core competencies are included within its internal competencies. Identifying the core competencies is important when deciding which business opportunities to pursue (Hill & Jones 2009). In order to identify the core competence, three questions can be asked (Prahalad 1993).

- Is it a significant source of competitive differentiation, does it provide a unique signature to the organisation?
- Does it transcend a single business, does it cover a range of business, both current and new?
- Is it hard for competitors to imitate?

A core competence identified from empirical data gathered from an automotive company is the system architecture.
All interviews conducted mentioned that what competencies built in the company is dependent on what is considered critical for competitive advantage, customer benefit and the unique experience. Using the system architecture competence enables them to specify interactions between systems, product parts etc., thus enables them to create more brand unique solutions. This is opposed to not having architecture competence where you as a company need to rely more on interactions solutions offered by suppliers. In this way system architecture competence is a source for competitive differentiation. It also provides a unique signature to the organisations through having a more general overview of the development rather than a detail oriented view.

Knowledge on how to combine systems is according to interviewees important in all aspects of developing a car. Being ahead of competitors in this respect enables them to create more efficient and unique solutions in all parts of the car. System architecture as a core competence also correlates with the questions posed by Prahalad & Hamel (1990).

The interviewees statements about in-house capabilities and amount of competence possible to manage in the company does not specifically limit the amount of competencies to five or six competencies as Prahalad & Hamel (1990) and Doomberger (1998) states. But limitations of in-house competence are apparent for the company. It is nearly impossible to manage all the competencies by yourself within the technological business environment.

The automotive company investigated use their network competencies in all stages in the development process. In new technological development where they lack internal competence, joint ventures are mainly used at an early stage and outsourcing is often used at later stage in the development process. They are in several aspects reliant on external factors, i.e. the network competence, which is a broad definition of outsourcing (Mol 2007). Intersection of different knowledge sets is one of the arguments why companies’ uses network in innovations development (Tidd & Bessant 2013). The network is used both to broaden accessible competence and thus filling potential gaps within important industry competence, through access to specialists as well as relieving the internal capabilities in order to focus on new technology.

The important industry competencies and external competence capabilities are intertwined and the boundaries are changing continuously (Miles & Snow 1992; Insch & Steensma 2006; Mullin 1996). Electrical hybrid cars has in recent years become an important part of the car industry and thus force companies to obtain new knowledge in that field. Lately connectivity and software development has become increasingly important for their competitive advantage, which has not been regarded in the industry before. New important competencies are entering the industry and some previous important competencies are becoming less important. Examples of this is mechanical components which has been substituted with electrical.
5.3. Competence flow

The arrows within the model shows how the competence flow between different areas is shifting continuously. A reason to why competencies need to be seen in a dynamic perspective that new technology and systems constantly are changing (Tidd & Bessant 2013). From the interviews it was told that the projects within the company first are flexible and adaptable, to that they later in the development process becomes harder to change and in the end can nothing be changed and they have to start from the beginning.

“It is like concrete, in the beginning it is soft and ductile, and after you have to splash more on top and eventually you have to knock it down because you can not change it anymore” - Gunnar Sege 2016

An example of the need for having a dynamic approach to competencies and having a competence flow in order to stay competitive, is the change in value between hardware and software described in chapter 4.1. The value of software has increased significantly and bypassed the value of hardware. Being able to adapt and utilize new knowledge areas in new development is important for the success of companies (Hoecht & Trott 2006). The companies that are successful today are the ones who can manage the change in discontinued technological changes (Sandström 2012).

The quadrants in the competence agenda, figure 2.3.2. and how new competence is gained can be shown in the competence flow. The automotive company examined is primarily acquiring new competence in the premium plus 10 quadrant, new competence, existing industry. The search for new competencies is illustrated by the arrows between internal competencies, network competencies and important industry competencies. Important industry competencies can also be acquired by the arrow connecting network competence and important industry competencies. Examples of this is the on-going development of competence regarding cloud connectivity, a technological area which will be important for car developers in the future, according to the interviewees. An example of the fill in the blanks quadrant would be incremental development of areas where competence is already obtained, safety and crash structure. The flow of competence between internal competence and network competence is an example where this kind of development could take place, intersection of different knowledge sets (Tidd & Bessant 2013). Knowledge is accessible through the network and through collaborations leveraged.

The arrows within this model helps companies to consider how they should work on their competencies in order to be first-on-the-market, fast follower, late follower or market
segmentation strategy (Maidique & Patch 1978; Wunker 2012). If the company’s approach is to be first-on-the-market, then they need to conduct research and focus on the external competencies possibilities and aim to implement new technologies and thus increasing the important industry competencies. With this strategy companies can destroy an existing market and change the whole behaviour and change how we precede products and services (Becker, Knudsen & Swedberg 2012; Cojocaru & Cojocaru 2014; Kang & Montoya 2014; Foster & Kaplan 2001; Tushman & Anderson 1986). When a company is focusing on expanding their accessible competence within important industry competencies, they are by definition, a follower. In order to be a fast follower, companies should focus on network competencies and important industry competencies since they are doing what others already have done but in an earlier stage. This minimizes research costs but there still needs to be done research in order to make fast adaption of a new technology. Late followers should similarly focus on network competencies and important industry competencies and minimize research efforts. The focus is on using existing technology and therefore are networking, in order to cut costs what they should focus on. Market segmentation is done through exploiting internal competencies by applying important industry and network competencies to reach a specific market (Maidique & Patch 1978; Wunker 2012).

From the empirical data, the automotive company can be seen as a fast follower. Since they do not have a deep focus on external competence possibilities, they cannot be considered to have a first-on-the-market strategy. Their focus as the empirical data shows is primarily on developing existing competence within the industry through collaborations. The automotive company has developed platforms. They believe this newly developed platform can be adapted easily for future changes. This is their way of being able to adapt quickly and implement new technology when it emerges. This enables them to be a fast follower.

5.4. Network competence flow

The automotive company that has been investigated is highly dependent on the networks they are integrated in. This is one of the things that makes it possible for them to compete within the industry, since the industry today is different compared to what it was past 40 years ago (Park & Yoo 2016). One big difference is that companies needs to manage several competencies in order to be competitive (Cojocaru & Cojocaru 2014; Bullinger et. al 2004; Narula 2004). The complexity of the technological industry has increased and is probably at its highest level ever (Cojocaru & Cojocaru 2014). The complexity results in that most companies cannot manage all parts of the process and thus the need for external networks has increased (Bullinger et. al 2004; Narula 2004).
The automotive company have during the years built partnerships and learned from these co-operations in order to become more competitive. If the collaboration has become too expensive or that the common focus is separated (Lonsdale & Cox 2000; Jonas Rundquist 2009; Quelin & Duhamel 2003), they develop the competencies themselves when they extracted know-how from the collaboration. Simultaneously tacit and explicit knowledge are gained from involvement into projects (Nonaka 2007). An example is when they decide to develop the engine all by themselves lately. They gradually increase their competencies to become more competitive in a long-term perspective regarding the system integration areas that constitutes ‘the whole concept’ of the car. They acquire new tacit knowledge on how to develop new technology within their company, in order to integrate the new technology into new markets. In order to be a part of the development of what they believe will become future technology, they collaborate with companies who possess the knowledge. This kind of network is favourable since it outweighs costs, the risks gets shared and it creates possibilities to enter new markets as technologies mature (Mulling 1996; Tidd & Bessant 2013).

The automotive company in this research is using an open innovation approach to their development. They try to have several options on how to approach new opportunities and problems (Chesbrough 2012). They are using their innovation networks to find the best solution and at a reasonable cost (Bullinger, Auernhammer & Gomeringer 2004). This is done by displaying their problem among working teams and suppliers, in this way help can be obtained from a knowledgeable source. Where it is going to be developed depends on their strategic financial perspective and how trustful and competent the suppliers are. This allows the main focus for the automotive company to remain system integration. They are not interested in developing parts that their suppliers possible can do better by just focus on that segment, or that they gives a good enough quality for a cheaper price. They are more interested in how the whole car is working with all the systems integrated. The price of developing a new product is an important factor for the automotive company when choosing which supplier they are going to work with. A factor the automotive company may not be aware of is that the inquiry for lowers cost also entails development and innovativeness among the group of suppliers they are collaborating with.

Nonaka (2007) describes how focus on competencies development and use of redundant organisations enables creation of new products and/or services. This could be visualized by observing the dynamic competence model and how the automotive company is working today. By displaying problems in their networks and letting the companies within the networks compete with each other. Through this process the automotive company can find the best solutions from the competencies in the network. They also benefit from what the network companies have learned from their development with other customers. Simultaneous, the automotive company guides the network companies and focuses their development. The automotive company gets the best ideas and inputs from several partners. By competition within the network the highest share of knowledge among the involved is created. They will get knowledge from their networks, the important industry competencies and external competence possibilities. This will also put
pressure on the networking companies to develop new competencies in order to be more competitive even if they do not get the order (Nonaka 2007; Fægri, Dybå & Dingsøyr 2010).

The figure 5.4.2. illustrates how the automotive company becomes a knowledge creating company. The grey circles are the networking suppliers who are competing against each other in order to serve the organisation. The organisation is simultaneously observing the process and once the organisation has a ‘good enough’ or the best solution, they then decide how to implement it within their system. By acquiring new knowledge through this type of collaboration, the automotive company will save costs through the transfer of best practices.

The advices from the involved members in the models allows them to make better decision. There is also a cross-fertilization of ideas that promotes innovation and the revenue increase through the sharing of expertise and products among subsidiaries (Hansen & Nohria 2004).

![Figure 5.4.2. Knowledge creating networks](image)

The automotive company in this research has a great awareness of their suppliers capabilities. With this awareness the risks and problems associated with outsourcing are reduced (Merrifield 2006). The model 5.3.1. “Competence flow” is also a good illustration on how a collaboration of competencies between the automotive company and their networking companies who differentiate themselves, a win-win situation for all involved in order to become more competitive. It helps everyone to keep the same dynamic focus.

The automotive company is collecting and compiling the knowledge gained from previews projects in a book. The aim of compiling this book is to enable the flow of knowledge between individuals and projects, but it seems that the book is not always used in this regard. A reason might be that they often have experienced people around them to help. A person who has previously been responsible for a project is often involved in the starts of the next project and thus pass their experiences to the rest of the group. This helps the ‘know-how’ inside and outside the company to be passed on and is done by observation, communication, commitment to learn and that they have written down their new knowledge in order for others to learn outside the section (Nonaka 2007). By having a common vision and a goal of what they believe is the right thing for the company even if it is not always corresponding with the theories. Instead they listen to their groups ‘gut feeling’, and this has created a commitment to what they are doing. During the interviews it was described that their company is having the best people to create the best company feeling even though a common vision/slogan between sections could not be found.
In order to do this, the company valued to have close connections and to be close to their facilities as collaboration partners, otherwise it would be complicated to further pass on their tacit knowledge (Nonaka 2007). This is also important in order to expand the trust and have long lasting innovation networks. Which will help them to solve major waves of changes on the market (Tidd & Bessant 2013). The fact that the automotive company is using both internal and external innovation networks also helps them to create possibilities to get into new eras of technology (Tidd & Bessant 2013; Chesbrough 2012).

5.5. Internal competence flow

There seems to be a universal way for the company to acquire new skills and learn new knowledge and opinions on what way is correct is similar across different functions. It is internal development, joint ventures or alliances and outsourcing. To the company there is only three ways of obtaining new knowledge to their products, either they develop it by themselves through R&D, they collaborate with a partner or they purchase existing technology and implement it in their products.

According to Robert & Berry (1985) joint ventures is best suited when development investments is too large for the company. But this is not the reason why joint ventures are used by this automotive company. Joint ventures seems to be a strategic way for them to get involved in new technology and development when the technology is still at an early stage of development. The implications on future products are still unknown and knowledge about the technology is not sufficient inside the company. Thus collaboration through joint ventures is needed with a company that possesses the needed competence. Sharing resources and investments as well as different contributions may also create a symbiosis between companies (Kotler et al. 2013; Roberts & Berry 1985; Merrifield 2006).

Internal development is also used and the company builds technical knowledge through R&D and through hiring new personnel with certain technical expertise. The reason why one way is chosen over the other could correlate to how familiar they are in the technical area concerned in order to avoid errors and long development times (Robert & Berry 1985). The development of their core competencies is also correlating to what is considered critical for competition and what enables them to create a unique product and technical development. To retain a company’s competitive core and future ability to compete they need for reliably identify core competencies and specialized skills (Hoecht & Trott 2006). Companies compete through acquire and develop core capabilities and key success factors (Magretta 2012). The changing environment in which the
automotive industry is competing within requires them to continuously search for and evaluate critical success factors.

Thus, by mapping what is important for the company and what they need to know, they understand where it is important to develop internal capabilities. This controls their competence structure. The approach to map important competencies is similar to asking the questions “what are we trying to learn? And what do we need to know?” which Nonaka (2007) uses in order to visualize a company’s future. The awareness of critical competence and the development of them internally could be a way to reduce risk associated with loss of core competence, activities and know-how in critical areas (Lonsdale & Cox 2000; Rundquist 2009; Quélin & Duhamel 2003).

When new technologies are being explored through joint ventures, the approach to learning could switch. Once a new technology becomes a critical competitive factor, the company often invests in building competence in-house. Areas that are critical for conducting business is often developed in-house. This is why the development of their competencies correlates with critical competitive factors and technological development. When entering into a new technological area, an example is when the automotive company was entering into the cloud connectivity field. They had no prior experience in this technical area and established therefore a joint venture with a company with that technical expertise. Through this collaboration new technology could be implemented into their products more quickly. Connectivity is now viewed as an important part off their competitive advantage and development of the connectivity and cloud solutions has started being developed more and more in-house. This process is similar in other areas covered in empirical data as well. It is also stated that if collaborations is working effectively, partnership within this technical area could also be an option.

The limitations of a company’s competencies restricts a company from acquire new competencies continuously as the environment changes (Prahalad & Hamel 1990). The company investigated, diminishes this by outsourcing. It was stated that once a technology reaches a mature state, outsourcing is used and thus changing the competence areas within the company and using the network to fill the gap. Few corporations is surviving technological shifts because many does not understand the limits of their present technology (Foster 1985). By continuously apply outsourcing once the technology is mature and suppliers are capable to develop products, helps companies reduce this risk. Having a superior method to adapt and learn new technologies gives companies a competitive edge (Christensen 2006; Foster 198; Hansen & Nohria 2004). Outsourcing is a shift within a company’s boundaries (Lonsdale & Cox 1998) and outsourcing is used as a way of changing the boundaries to enable new knowledge to enter into the core knowledge area. Using outsourcing in areas where technology is mature also increases the flexibility to change technology and adopt best practices (Lonsdale & Cox 2000; Jonas Rundquist 2009; Quélin & Duhamel 2003).

An interpretation of this approach could be that when entering into a new technical area, joint venture is used as a way of attaining the knowledge of other partners and getting access to technology easier than developing them inhouse themselves. At a point in time a decision has to
be made regarding the technological importance for the future competitiveness of these areas, for the company. If it is found to be critical, it is moved to internal development, insourcing, in order to give the company greater control of development, build knowledge and uniqueness.

![Technology flow model](image)

Figure 5.5.2. “Technology flow model”, describes the general interpretation of when a new technology is entering the area important to industry competencies from the external competence possibilities, see Figure 2.7.1. “Dynamic competence model”. In order to acquire the competencies and implement the technology, a joint venture is established. The technological development is insourced, moving from network competence to internal competence. Once the technology is mature and the other company possesses competence to develop further products, the technological area is outsourced thus moving the competence to the network. In the case of the technology becoming obsolete, the outsourcing contract could be finalized and the competence is removed from the network competence. For a company to excel they always need to evolve, innovate and change (Foster & Kaplan 2001). The approach explained in Figure 5.5.2. “Technology flow”, is a way to evolve and change the company and follow technological developments and adapt to its critical success factors.

There are barriers that could affect the development and acquisition of new competencies. A problem that could be evident at the automotive company investigated is an unwillingness to seek input and learn from others (Hansen & Nohria 2004; Tidd & Bessant 2013; Kathoefer & Leker 2010). An attitude and almost arrogance about their capability “we know what we need to know” and that they can create the best and unique products exists. Also the lack of an universal vision is apparent which is important for a knowledge creating company (Nonaka 2007). Even if there seems to be an underlying vision of what is important, none of the managers who were interviewed had a united statement of what they are trying to accomplish.
6. Conclusion

This chapter concludes this research by answering the research questions. Managerial and theoretical implications are also discussed with the aim of contributing to this field of research as well as practical contributions. Future research needed on this subject is also discussed.

6.1. Research questions

The purpose of this study was to get a holistic view on how companies manage and survive technological shifts and adapt core competencies according to the market development needs. In order to fulfil our purpose two questions were posed.

• How do technological companies secure critical competitive competence for the future?
• How are long-term competence development managed in a fast changing business environment?

Through prior theories in this field and the empirical data collected two models has emerged describing how the studied automotive company manages the problems that has been researched.

Figure 5.4.2. “Knowledge creating networks” model, describes how theories about knowledge creating companies can be applied on an organisation's network. By creating new competencies in the network, the individual company secures important competence for the future. Since companies today does not have the resources to maintain all the competencies that is required in order to stay competitive, companies need to use their networks more explicit. The individual organisation is using redundancy in its network and according to the theories; this creates a chaos that generates new knowledge. The chaos is born from the leverage and competition between organisations that all are focused on creating important competitive knowledge. The network therefor continuously enforces technological improvements.

The studied automotive company proved to manage the problem of a fast changing environment by the use of their network. New technology was implemented through collaborations, typically joint ventures, which enabled them to get a quick access to new technology and to integrate into new products, but also improved competence within certain technical areas. When and if a technical areas become a critical factor for conducting business, internal development and internal know how followed later for the studied company. Once the technology reaches a mature stage and the company feels comfortable that suppliers can deliver the technology with enough quality, outsourcing is used. This enables them to adapt and learn new technologies in a convenient way. This is illustrated in figure 5.5.2. “Technology flow”.

6.2. Managerial and theoretical implications

Having an organisation prepared for technological shifts is important to survive in a fast changing business environment. At a managerial level to understand how and why decisions regarding network, collaboration and outsourcing are made in order to give the company access to critical competitive competence will in the future become more critical. When viewing the dynamic competence model it is important not only to consider the network competence from present...
collaborations but also future implications. Possible suppliers and collaboration companies are equally important to consider, as their development also affect what competencies are accessible. Dynamic competence is import to stay competitive over time, realizing this at a managerial level and enable the company to adapt to technological changes, is critical. The process described in figure 5.5.2. Technological flow, is an example off how the studied autonomy company is adapting to the need to acquire new knowledge.

The literature study shows that there is a need to connect a company's competitiveness also with its surrounding network. The environment is changing rapidly and the classic theories in this research field, about core competencies and outsourcing needs to be more connected to the implications this entails. The theoretical contributions of this paper include describing how a technical company is developing a network with suppliers and partners in order to survive changes in the market and technological shifts. It describes how companies quickly can adapt to new technology and change its competence accordingly, it also describes the problems regarding a fast changing environment with shorter lifecycles.

The need for a more dynamic competence model is thus highlighted in this paper. We believe it is increasingly important to view the competencies and the flow of competencies in a more holistic way. The competence model developed in this paper describes the competence and flow as intertwined and ever changing in the industry, we believe it is important to view competencies in this matter. The competence developed in a company is dependent on what other companies are doing in the network and business environment. An example is an increased willingness to perform needed innovation among suppliers where companies openly display problems, compare solutions and cost estimates, and thus increasing the competition between the suppliers.

6.3. Limitations and suggestions for future research

This research was an attempt to analyse how companies becomes more aware and responsive for changes within the technological field. The study also attempts to analyse how knowledge building strategies could change in the 21th century. It would have been preferred to collect more data and investigate more companies about how they attempt to survive technological shifts. It would also have been preferred to perform a cross case analysis with several perspectives and experiences. More data would have improved the models and it is needed to be able to generalise the result of this study. More research about barriers as problems that could occur if collaboration for example ends suddenly is needed. This would improve the quality of the understanding on how companies can prepare for the future.
7. References


Richard has a passion for business development and technological product development. He is experienced in how to support projects with a holistic view thinking and how to create networks that will benefit the company.

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