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The Effects of Mergers and Acquisitions on Research and Development in Technology Firms

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Abstract

The frequency and economic value of cross-border mergers and acquisitions (M&A) has grown significantly during the last decades. In the same time, research and development (R&D) capability has been increasingly important for firms' success. Current research on M&As is vast, and shows a surprisingly high failure rate, which is often explained by post-merger integration (PMI) problems. However, the research on R&D post M&A is understudied in comparison to other aspects of M&As. The goal with this study was therefore to widen the M&A research and deepen the understanding of PMI problems in the case of R&D, as well as eliciting how synergies from the M&A can be utilized for R&D. The research was based on a qualitative and explanatory case study. The empirical data for the research was gathered by performing three semi-structured interviews with persons in managerial positions in large technology-oriented firms that had been subject to M&As. In addition to the interviews, a literature review on existing theories was performed. The data from the interviews and the literature review was analysed by categorisation according to the guidelines of grounded theory. The results showed that the largest PMI problem for R&D was to harmonize different managerial strategies and working procedures of the merging parts. Several synergies for R&D were identified, the most notable one was that by combining different areas of knowledge, products in new business areas could be developed more efficiently by the new entity than if the merging parts were to do so on their own. It was learned that for an M&A to bring such R&D synergies, it is important to have an adequate mix of complementary- and substitutive technological relatedness between the merging parts. It is also important to have a clear integration plan that shows where different knowledge in the new entity exists and that focuses on R&D employee retention. Finally, it was also shown that following cross-border M&As, the R&D organization will be geographically dispersed which necessitates efficient managerial procedures to facilitate cooperation between R&D employees in different locations.

Keywords: R&D, M&A, product development, PD, synergies

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List of Abbreviations

FDI: Foreign Direct Investment

FMC: Ford Motor Company

GPD: Global Product Development

M&A(s): Mergers and Acquisitions

MNC: Multinational Company

OECD: Organisation for Economic Co-operation and Development

PMI: Post-Merger Integration

R&D: Research and Development

VCC: Volvo Car Corporation

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1 Introduction

This chapter serves as an introduction of the topic for the reader. It will give a background to the problem, present the research questions as well as motivate why the subject is interesting and important to study.

1.1 Background

Mergers and Acquisitions (M&A), is a commonly used term in the field of International Business. A merger, two firms coming together to form a single entity, has a different meaning than an acquisition, an asset bought or obtained, but is used as one abbreviation. The companies who form a merger are seldom completely equal to each other, and it is therefore argued that a merger also can be held as an acquisition (Humpal, 1971).

With the world becoming more globalized, more cross-border M&A follows. Cross-border M&A are a common way to expand, not only because of globalization but also due to technological development (Coeurdacier et al., 2009). However, M&A are complex and to make the deal into a success is not a simple task. R&D and economic growth both play a vital role for a firm's development (Aghion and Howitt, 1998). While R&D has an important role for cross-border M&A, the role international companies play for R&D is also increasing. During the last couple of decades, government spending in R&D as shares of total spending has decreased in the OECD countries (Dunning and Lundan, 2008). The international firms have taken a larger share in the total amount of R&D spending and non-state share of total funding is steadily increasing. Historically, these MNC have kept most of their R&D in their home country, but nowadays, R&D funding from a non-national source has risen and the MNC share of the foreign sourced R&D is about 85 % (Dunning and Lundan, 2008).

However, even though international firms' importance for R&D has increased, there is a limited amount of research on what impact the increased cross-border M&A have on R&D (Bertrand and Zuniga, 2006).

1.2 Problematization

Cross-border M&As, i.e. M&As involving at least one international firm (defined as a firm with business activities in two or more markets), have increased significantly during the past decades. Data from the European Central Bank shows a nine-fold increase in total cross-border M&A value between 1985 and 2006, although facing a setback of about 50 % between 2007 and 2011 due to the financial crisis (UNCTAD, 2012). In the same study by the European Central Bank two main motives for M&A were identified; efficiency- and strategic motives. Efficiency motives are gains from positive synergies from e.g. economies of scale or scope. Strategic motives are gains from strengthened market positions following the M&As (Coeurdacier et al., 2009). Paradoxically, the increasing M&A activity is followed by a lot of research that shows a high failure rate (Weber and Tarba, 2012). It has for instance been shown in a study of 160 mergers published in the McKinsey quarterly report, 2004 issue 2, that 70 % of the mergers failed to achieve expected synergies (Christofferson et al., 2004). One of the keys to a successful M&A lies in keeping focus on R&D (Hitt et al., 2001; Samad, 2009). In today's increasingly competitive business environment, product development capability is a requirement for a firm's success in most markets (Wheelwright and Clark, 1992). Because of the increasing M&A activity, it is of interest to evaluate how M&As affect the R&D function of firms. Some studies have been performed on R&D performance post M&A but the results have been rather inconclusive and contradictive. Some has found a positive correlation between R&D expenditures and M&As (Miyazaki, 2009; Bertrand, 2009). Although a propensity for R&D intensive companies to have a lower than average tendency to acquire other firms were found by Blonigen and Taylor (2000) when doing a study of 217 high-tech companies in the United States indicating that companies either focus on development on their own or through M&As. A study by Cassiman et al. (2005) rejected economies of scale in R&D post M&A, but found possibilities for economies of scope. Valentini (2012) found that patent quantity tends to increase but that the impact of those patents decreased after an M&A. A study of firms in OECD countries finds little correlation between R&D spending and M&A at all (Bertrand and Zuniga, 2006). All in all, it seems far from certain to reap any benefits on R&D performance from M&As.

Some research has been made on possible explanations for difficulties in leveraging R&D performance after an M&A and many mean that post-merger integration (PMI) problems

are the primary issues (Kummer, 2009; Hill, 2010; Gates and Very, 2003). When reviewing existing literature on the subject, it can be noticed that although several studies have been made on quantitative data, qualitative studies are scarce. The ones that exist usually describe their results in general and broad terms, for example blaming PMI problems as mentioned above. Such broad explanations are not very helpful for R&D managers facing the challenge of an M&A. The intent of this study is to provide an increased depth of knowledge in the subject in order to answer questions like how, what and why to provide usable results for future managers. To do so, qualitative data from large cross-border M&As in the technology and industrial sectors will be collected in order to answer the following questions:

1. How can positive synergies for R&D be utilized following an M&A?
2. What are the main problems for R&D post M&A?

1.3 Purpose

The purpose of this case study is to analyze R&D departments of different firms following an M&A in order to elicit qualitative information on what the difficulties following an M&A are and how can they be avoided. The study will also focus on finding positive synergies that can be used in R&D post M&A. Such synergies will be analyzed according to their degree of utilization and possible ways to increase gains from using them. The report will serve as food for thought for R&D managers on important aspects to consider for taking advantage of an M&A.

1.4 Delimitations

This report will not examine whether or not the M&As in the case study have been successful or not, since there are numerous ways to perform such evaluation. Product Development (PD) and Research and Development (R&D) will be treated as equalities and the phrases will be used interchangeably. Only large firms in technology oriented sectors will be evaluated in the case study since they are considered to have R&D organizations large enough for the results to have some transferability. This report will be purely qualitative; some numerical data from the companies in the case studies will be presented although no quantitative analysis will be performed.

2 Method

This chapter describes and motivates the methodology of the methods used in order for the reader to understand the approach taken to the study. The chapter also contains a discussion of the credibility, transferability, dependability, confirmability and authenticity of the results.

2.1 Research Approach

There are two main categories of methods when conducting social sciences; quantitative and qualitative studies. Quantitative studies are based on an extensive collection of data that can be statistically analyzed. Qualitative studies search for reasons for certain behaviors in order to get an in-depth understanding. This is done by putting oneself into the perspective of the investigated object/objects to be able to understand the problem from an insider perspective (Holme et al., 1997). The research questions in this report are of an explaining kind that aims to improve and obtain in-depth knowledge in the field of R&D post M&A. For such deepening and complex research question the input from persons active in the field is important and it is therefore particularly suited for a qualitative approach in which in-depth knowledge can truly be elicited.

2.2 The Case Study

According to Yin (2009) case studies are well-suited for answering research questions that are of a “how” and “why” nature, although also applicable for answering “what” according to Ghauri (2004). There are numerous kinds of case studies, according to Merriam and Nilsson (1994), the two main categories are the inductive and the deductive. Deductive case studies are generally used to test the validity of a hypothesis or research question derived from theoretical studies. Inductive case studies are instead based on a presumption-free collection of data that is later used in order to build new theories or conclusions, as stated in a lecture by Dr. Lars Norén on 27 March 2013. Additionally, a case study can either be exploratory, descriptive or explanatory. These three methods overlap even if they differ in many ways. As Yin (2009:8) puts it: “The goal is to avoid gross misfits—that is, when you are planning to use one type of method but another is really more advantageous”. An exploratory case study is useful when the researchers control different input variables to the system of interest, and thus analyze output responses. A descriptive case study is used for obtaining information and describe in detail rather than finding input-output connections

(Merriam and Nilsson, 1994). The explanatory case study is used to investigate and explain, rather than explore characteristics of a phenomenon (Yin, 2009).

The purpose of this study is to answer questions that are of the kind “what”, “how” and “why”, which according to Yin (2009) and Ghauri (2004) makes a case study a preferable tool to use. An explanatory case study approach will be used since the research questions are well-suited to be of an explaining character. In addition, since the study is based on past events it would not be possible to control any inputs in the studies, thus making an experimental approach impossible. The purpose of the report is not to test any hypothesis, but rather to try to describe and explain effects on R&D post M&A. Therefore, an inductive instead of a deductive approach to the case study was taken. This implied that the project started without a clear formulation of the problem, it was developed during the course of the project when sufficient knowledge of the subject had been developed. The method used for the case study followed the procedure presented by Dr. Lars Norén on his lecture 27 March 2013. A broad initial research question was decided: What happens to R&D post M&A, why and for what reason? Thereafter empirical- and theoretical data was collected through concurrently performing an extensive literature review combined with three case studies.

2.3 Data collection

Data is usually divided in two different categories: Primary and secondary data. Primary data is collected for the first time by the researcher with the sole purpose of being used in the research project. Typical examples of primary data collection methods are observations, interviews or surveys (Booth et al., 2004). Contrary to primary data, secondary data has previously been processed by other researchers for different purposes than the current research project. Secondary data collection methods are for example literature reviews of books, articles and other publications (Holme et al., 1997). The data in this report is collected by both primary and secondary research in order to be able to compare empirical findings of primary research with existing knowledge in the form of a theoretical framework built on secondary research.

Secondary data for this report has been collected through an extensive literature review in order to create a strong theoretical framework, presented in chapter three. The majority of the data was collected from books or articles published in scientific journals, some data was also collected from annual reports provided by the companies that was studied. The data in the literature review was found in databases through the search engine Summon provided by the library at the University of Gothenburg (www.ub.gu.se) and the library at Chalmers University of Technology (www.lib.chalmers.se).

In this report, three interviews will be used as the main source of primary data because of their suitability for gathering in-depth knowledge. Surveys were perceived as unfeasible since the answers needed in the study were of a far too complex nature to be able to catch with surveys. Observations could have been a usable approach to see how the R&D organization and the involved people acted before and after the M&A. Because of the time constraints of the study and the usually long process of an M&A, past events needed to be studied and thus no observations could be performed.

2.3.1 Interview method

There are different ways to structure an interview. A method of conducting an interview is the structured interview where no follow-up questions are being asked. When using this method, the interviewees are guided throughout the interview in a standardized and pre-decided manner. It is usable for making cross-analyses between the different answers and when a large amount of interviews are held. An alternative interview method is the semi-structured interview, which is well used for comparison between different interviews for qualitative research. When using semi-structured interviews, the same questions are being asked to all interviewees but there is space for more detailed questions and for the interviewee to speak freely (Mason, 1996; Bryman and Bell, 2011). This gives a good possibility to get a more personal perspective on the matter and also be a source of additional information that was not thought of ahead of the interview, as well as allowing new questions to be asked during the interview. The unstructured interview method is often used when there is little knowledge regarding the subject from the one conducting the interview. The unstructured method means that after the initial question, the interview has a character close to a normal conversation (Bryman and Bell, 2011). An advantage with the unstructured interview method is that the interviewee will talk what he / she thinks is most

important and relevant. However, a disadvantage is that analyzing a set of interviews might be very difficult if what is important and relevant is interpreted differently among the interviewees.

In this report, semi-structured interviews have been used because of the fairly small number of interviews and the fact that the inductive approach taken requires openness to new information that can be obtained from the interviews. Since the research questions require an in-depth understanding in order to be answered it was also considered important to be able to use follow up questions to really probe the problem. The unstructured interview method was also taken into consideration, but as it complicates cross-evaluation, it was not used in this report.

2.3.2 Selection/sampling

There are several ways for sampling cases in a case study. The probability sampling method is well used in the quantitative research method. It requires that the firms to interview or include in questionnaires should be picked at random. In addition, a large number of samples should be collected in order to obtain a normal distribution curve (Bryman and Bell, 2011). Within the qualitative research method, the two most commonly used ways of sampling are purposive sampling and theoretical sampling. The purposive sampling is not restricted by the need of randomness and large samples, but this also means that drawing a conclusion for the whole population will not be possible. The researcher has to choose samples not by random or convenience, but by what fits into the criteria that has been set up in order to investigate the research question (Bryman and Bell, 2011). The theoretical sampling is another way of thinking when conducting a research. It has been developed in grounded theory and described by Glaser and Strauss (1967:45) as: "The process of data collection for generating theory whereby the analyst jointly collects, codes, and analyses his data and decides what data to collect next to find and where to find them, in order to develop his theory as it emerges. The process of data collection is controlled by the emerging theory whether substantive or formal". In grounded theory, the researcher should continue to collect data until theoretical saturation is reached. Theoretical saturation means that the categories are well developed with a variety of data, and the categories have a clear relationship (Bryman and Bell, 2011).

Due to time restraints of the study and a large abstinence of firms to accept being interviewed, the possibility sampling method was deemed insufficient. Both purposive sampling and the theoretical sampling were possible methods to use and they are rather similar, with the largest difference being that theoretical sampling is an iterative approach. Since data analysis was performed by categorizing empirical findings as in the grounded theory described by Glaser and Strauss (1967), it was decided to follow the theoretical sampling approach recommended by the same authors. Due to the international perspective of the study the interviewed companies in this report all had to fit into the criteria of being a technology based multinational company that had been involved in a cross-border merger or acquisition deal during the last 15 years. A time limit was used since it was perceived hard to find personnel with a clear remembrance of the M&A process if it took place too long ago. The first interview was chosen rather arbitrarily within the limitations described above. From the first interview it was concluded that in order to improve the study a diversification to different industries was necessary which led to the two subsequent interviews.

2.3.3 The case studies

The first case study was the Swedish company SKF's acquisitions of several foreign companies in the lubrication systems industry between 2004 and 2010. The fact that SKF has been involved in several M&As in this industry makes it particularly suitable for this study. By comparison between the different M&As the interview can contribute to answering the qualitative research questions in this study. Additionally, since SKF's operations in the lubrication systems industry were rather small prior to the first acquisition, it can be seen as a complementary technology acquisition. The second acquisition was slightly more of a substitutive technology acquisition, although as mentioned by SKF the technology overlap was rather small. To our sincere appreciation, Mr. Henrik Lange from SKF accepted our request for an interview. Mr. Lange currently holds the position of chief financial officer and executive vice president of SKF. He has previously held several managerial positions at SKF including President of Industrial markets for Strategic Industries, President of the Industrial Division and CEO of SKF's Austrian and Polish subsidiaries.

The second case study was the American firm Ford Motor Company (FMC)'s acquisition of the Swedish automobile producer Volvo Car Corporation (VCC). The reason for selecting the VCC-FMC case as the second interview was a wish to widen the research by also looking at

the very competitive and scale-dependent globalized automobile market. Also, as the deals done by SKF were described as successful, a look at an acquisition that did not end in a success was perceived useful for cross-case analysis. The deal also differs from the SKF case as since the two firms operated in the same business and therefore had more of a substitutive character. We are very thankful that Mr. Peter Palmqvist accepted our interview request. Mr. Palmqvist has an engineering degree and currently holds the position of chief operating officer at Getinge. He worked for VCC from 1988 to 2009. Starting off as a consultant, he got promoted and became concept leader for the interior and climate department at VCC soon after the FMC deal.

The third case study was performed on a company that requested anonymity for both the company and the interviewees. The company operated in an R&D intensive industry and has been subject of an acquisition in recent years. The company was chosen because it operated in a different industry than the previous ones. It provides increased width of the study not only by being active in another industry but also since the M&A occurred more recently and the integration phase can be seen as ongoing. The interview was performed at one event with five participating R&D managers and thus almost had the character of a focus group interview, which allowed for interesting discussions. We are very thankful for these persons' participation in the interview.

2.4 Data analysis

Within qualitative research, analytic induction and grounded theory are the two general strategies used for data analysis (Bryman and Bell, 2011). Analytic induction is a framework based on the research question put into a hypothesis which is then tested against the findings of the research. If the findings in the research do not concur with the hypothesis, a new hypothesis has to be formulated and tested until a hypothesis cannot be rejected by the cases and the research question answered. This method has the possibility of becoming time-consuming if the initial hypothesis should be rejected several times. It also lacks guidelines of how many cases that has to be investigated before a hypothesis is proven (Bryman and Bell, 2011).

Grounded theory is not based on setting up a hypothesis and then test if it cannot be rejected by findings from the cases, but is rather a theory where an explanation or theory to

the initial research question develops along the way of the study. As Strauss and Corbin (1998:12) puts it: “In this method, data collection, analysis, and eventual theory stand in close relationship to one another”. The main difference from inductive analysis is that the theory is not to be proven, but developed or discovered through the research. In grounded theory, coding together with constant comparison are the central processes for analyzing data. Coding is the part where data is divided into components that are labeled and organized. Coding of data begins as soon as data has been collected. Constant comparison between data makes it possible to find patterns and put these patterns into concepts. As concepts are being built, they are used to construct categories. A category is something that represents a phenomenon relevant to the research. With coding of new data and comparison with the already obtained data, concepts and categories might have to be redefined and as categories develops a theory from these categories starts to emerge (Bryman and Bell, 2011). Since perceptions of key component and patterns from the research might be subjective, it’s important to keep an open mind and try to avoid adding personal values when using the principles from grounded theory (Crowther and Lancaster, 2012). The following two sub-chapters will provide a description of how analysis by categorization was used in this research project.

2.4.1 How data were coded

Immediately after the interviews, the empirical findings (presented in chapter four) were put into basic concepts, called tier 1 categories. The tier 1 categories consisted of concepts relevant for the research project that the interviewee put a lot of attention to or mentioned several times during the interview. By comparison of the field notes from both interviewers and by discussing the interview shortly after finishing it, such concepts could quite clearly be identified. This procedure was followed for all interviews and the resulting tier 1 categories are presented in the leftmost column in Appendix 1. For a more coherent presentation of the interviews, see chapter four.

2.4.2 How data were analyzed

After the initial process of creating tier 1 categories according to the within-case analysis described above, the process of transforming the categories from tier 1 to tier 2 was started. Tier 2 categories were formed by a cross-case comparison in which the relations between the tier 1 categories from the different interviews were compared and clustered. For

example, it was learned in case 1 that the complementary technologies in the merging parts had several benefits for R&D, although it was mentioned that synergies for R&D were actually larger for SKF's subsequent acquisitions, which had slightly more of a substitutive character. Case 2 saw benefits of both complementary and substitutive technologies from the M&A. Thus, the question of whether complementary- vs. substitutive technologies M&As gave the most synergies was not obvious, although much attention been given to it in both interviews wherefore it interesting to study further. Thus, a tier 2 category called complementary- vs. substitutive technologies was formed following the cross-case analysis.

Following the categorization of the empirical findings, the tier 2 categories were subjected to a comparison to the literature as can also be seen in Appendix 1. From this analysis, the tier 2 categories were transformed to tier 3 categories, which are more thoroughly explained in chapter five. Continuing with the example above, by putting the findings from the literature on top of the empirical findings, it was found that in a study by Cassiman et al. (2005), complementary technologies use to give the most R&D synergies. However, a mix of complementary and substitutive technology relatedness between the merging parts seems to be the best. In this case, the final analysis showed that it was not a matter of complementarity *or* substitutivity, instead there should be a mix of the two in an adequate dose. The category was therefore renamed to its final form by calling it: "The right mix of technology relatedness".

The same procedure was used for the remaining categories; an overview of this can be seen in Appendix 1 and is described in more detail in chapter five. The result of this categorization process is presented in Table 1 below. It shall be noted that some categories were not compared to the literature since the literature review did not cover these topics. However, they are still interesting to consider on a purely empirical basis and has therefore been included as tier 3 categories. Additionally, some tier 1 categories that did not have resemblance in the other cases were removed.

Table 1 - The categories developed during the case studies and literature review

Category	Explanation	Sources of data
The right mix of technology relatedness	There seems to be most synergies from M&As of companies with an adequate mix of complementary and substitutive technological relatedness	(Cassiman et al., 2005) Case 1, Case 2
Synergies, economies of scale and scope	Synergies can come in many forms for R&D following an M&A. A mix of all of them seems most common	(Cassiman et al., 2005) (Pike and Neale, 2009) (Ulrich and Eppinger, 2011) Case 1, Case 2, Case 3
Geographically dispersed R&D	It seems rare to move existing R&D centers. Cross-border M&As therefore leads to a geographically spread R&D which has both positive and negative implications	(Eppinger and Chitkara, 2006) Case 1, Case 2, Case 3
Where in the PD process can synergies be achieved?	Different views of where the most synergies in the PD process following an M&A can be found were given by the case studies. It was theorized that it might relate to differences in technology relatedness between the M&As	Case 1, Case 2, Case 3
Harmonizing different working procedures	The most prominent post-merger integration problem in the case studies was converging the technological and managerial working procedures.	(Hitt et al., 2001) Case 2, Case 3
Employee retention	Although not a problem in the studied cases. Since many synergies for R&D post M&A originates in the combination of different knowledge, losing key employees post M&A decreases the chance of achieving such synergies	(Walsh and Ellwood, 1991) (Ranft and Lord, 2000) Case 1, Case 2, Case 3
Unused synergies	Case 3 showed a PMI problem in which possible synergies were not used due to a failure of the acquiring firm to show where existing knowledge in the new entity was located.	Case 3

2.5 Credibility, Dependability, Confirmability and Transferability.

As the structure of a qualitative report differs from a quantitative, Bryman and Bell (2011) presents an alternative way of evaluating validity and reliability by Guba and Lincoln (1989), better suited for the qualitative approach: trustworthiness and authenticity. Trustworthiness is divided into credibility, transferability, dependability, and confirmability as described below.

Credibility is the counterpart to validity and the evaluating part referring to if the findings in the gathered data are credible or not (Guba and Lincoln, 1989). Three interviews have been

done in this report; Swedish was spoken in all of them. In order to keep translation mistakes and / or misunderstandings to a minimum, each of the authors took notes separately and also let the interviewees review and correct eventual mistakes in the empirical findings in chapter four of this report. Moreover, secondary data was compared to the findings in the interview in order to assess the validity of the findings.

Transferability is a criterion for into what extent the findings can be transferred and used in a different environment. A qualitative method with a small amount of interviews results in that conclusions drawn from the samples obtained are insufficient to stand as a conclusion for the whole population. To add transferability, the researcher must add an as complete data base as possible, known as thick description (Guba and Lincoln, 1989). Although three case studies might be insufficient to build a commonly transferable theory on their own, similar findings in other studies might help to form a wider perspective of the population and help confirm or reject other studies done in the same area of research. The findings should be used for future comparison and as a means to deepen the current research in the field. Transferability is also limited by the fact that only technology-oriented firms have been studied in this report.

Dependability is the qualitative counterpart to reliability. The idea is that all data obtained in the research process should be kept and then audited by peer/peers. This is done to keep the research trustworthy through all stages (Guba and Lincoln, 1989). A supervisor has overlooked the report and the authors have defended the report in an opposition performed by a group of two students in the same class. Secondary data is readily available in databases. Field notes from the interviews were stored, although taping and line-by-line transcribing were not performed because, as described by (Bryant and Charmaz, 2007:276), they are tedious to perform and can compared to field notes increase the risk of losing focus on what is really happening.

Confirmability is the criteria of objectivity. As it is not possible for a human being to stay completely objective, subjectivity will affect how data is looked upon and analyzed (Guba and Lincoln, 1989). Confirmability applies to the findings of the authors of this report, not the interviewees in the case studies, since the purpose of the interviews was to capture precisely personal opinions and experiences. To reach an as high level of objectivity as

possible towards the collection of data from the interviews, leading questions were avoided and the interviewees were encouraged to speak their mind freely. Since an inductive approach with grounded theory as analyzing tool was used in this report, the author should start the research assumption free and try to avoid adding personal values. As with objectivity, this is not possible to completely achieve but being aware of this main problem with the inductive approach helps to avoid this to an as large extent as possible

Authenticity deals with the general fairness and the political impact the research might have. Fairness is reached by representing viewpoints from different hierarchical levels (Bryman and Bell, 2011). The interviews performed in this study were held with persons that today have high-ranking managerial positions in large firms. However, some of them held positions in lower hierarchical levels during the time of the M&A. This allowed them to see the M&A from different hierarchical perspectives, which gives fairness to the findings of the report. To improve fairness, persons from different hierarchical levels in the same firm could be interviewed. Due to time restraints, it was decided not to do so and instead focus on collecting data from a broader set of firms in order to allow cross-case comparison.

3 Theoretical Framework

This chapter presents the theoretical data that has been collected in the literature review performed during the study. Initially, present research about the effects on R&D following M&As is presented. Thereafter more in depth data from the separate fields of M&As and R&D is presented in different sub-chapters.

Although the amount of research performed on M&As is vast, the focus of such studies does rarely seem to be on R&D aspects. In a study by Zollo and Meier (2008) one can see that in comparison to other aspects such as financial- and accounting performance, innovation performance is indeed understudied. The existing studies in the field are rather inconclusive and contradicting. Most try to measure the R&D performance before and after an M&A. R&D performance is measured in different ways in the studies which makes it hard to get a coherent view of the effects on R&D post M&A. Even though the existing literature is inconclusive and sometimes even confusing it is relevant to refer to in this report in order to give an overview of the subject and to use as comparison to the findings in the performed interviews.

In a study on foreign acquisitions of innovative French manufacturing companies Bertrand (2009) found a positive and significant effect on R&D spending post M&A and that efficiency gains may outweigh the various costs of e.g. post-merger integration. Bertrand's results were reproduced in a similar study by (Miyazaki, 2009). He found that there existed a positive correlation between R&D spending and M&As in Japanese high-tech firms which suggested that the firms did expect to obtain synergies from the M&As. With Miyazaki and Bertrand's results in mind it is somewhat surprising to see a significant negative correlation between R&D spending and a firm's propensity to invest in M&As. A large study of American firms between 1985-1993 by Blonigen and Taylor (2000) showed just that and further suggested that technology firms can grow in two modes; by internal R&D *or* by acquisitions. In another report by Bertrand and Zuniga (2006) it was investigated how cross-border M&As affected R&D investments in OECD countries. The study showed a weak influence of M&A on R&D investment and is thus contradicting to Bertrand's later study performed in 2009 as mentioned above.

In a study of firms' technological performance, Valentini (2012) studied patenting behavior of firms in the American medical devices and photographic equipment industry before and after M&As. The results showed that patent quantity increased after the M&A, but the quality measured by the patents' impact, generality and originality decreased. The findings suggest that a pressure for immediate results following the M&A could be the reason for the decreased quality of the patents.

In a widely cited article by Cassiman et al. (2005) they present several possible consequences on R&D post M&A of which some are: *Economies of scale* can theoretically be achieved by spreading the costs over more output and by eliminating common inputs for production, although according to Cassiman et al. (2005) it was not applicable for R&D. *Economies of scope* is the result of the new entity's lower cost of development of two products compared to if the two firms developed one product each. *Synergies* from the fusion of different knowledge and technology make projects feasible that were not feasible for the separate companies and thus increase the incentive to invest in R&D. By the knowledge transfer and its effect on the R&D organization, the new entity can attain a critical mass in a broader product portfolio that results in improved R&D. *Technology market power*, by securing technology the new entity can create barriers to entry for other firms and thus gain a competitive advantage. The effects on R&D from M&As differ whether the merging firms' technologies are complementary or substitutive and if the firms are rivals or not. Other interesting findings were that complementary technology firms achieve stronger synergies from M&A compared to substitutive technology firms, and non-rival firms are better suited for M&As than rival firms (Cassiman et al., 2005).

After an M&A it is common for the companies to face increased employee turnover. Walsh and Ellwood (1991) showed that after the two first years following an M&A, 39 % of the top managers had left the company, compared to 15 % in companies not involved in an M&A. Increased employee retention is not limited to top management, Ranft and Lord (2000) argues that retention of other key personnel such as R&D employees can be more directly related to post M&A performance. In a study of M&As in high-tech firms, Ranft and Lord (2000) stressed the importance of retaining key personnel in order to transfer tacit knowledge between the merging firms, which is of vital importance for whether the M&A turns out successfully or not.

3.1 M&A in a historical perspective

Mergers and Acquisitions have historically come in wave-shaped patterns, which mean that each period starts with a few M&As that rapidly increases until it peaks to then hastily cease. The reason to this phenomenon still puzzles scholars and even though the amount of research on the topic is considered to be vast, no broadly accepted theory explaining why M&A appears in waves currently exists (Ribeiro, 2010).

A total of seven M&A waves have been defined. The first five waves of M&As has been described by Weston and Weaver (2001), and the more recent sixth and indications of a current seventh wave by McCarthy and Dolfsma (2012). The first wave occurred around the 19th century. In U.S this wave was dominated by horizontal, i.e. inter-industry, M&As. The second wave occurred after WWI and lasted until the outbreak of the financial crisis in 1929. Innovations such as the automobile and radio made vertical M&As more common as companies wanted to control the distribution channels when national broadcasting became possible. The third wave happened in the 1960s and became a wave of diversification. The fourth wave in the 1980s was characterized by hostile takeovers. The fifth wave started in the mid-1990s and ended somewhere around the year of 2001. It was by far the largest wave so far and consisted of around 87,000 deals compared to the fourth wave with around 10,000. The sixth wave came in-between two large recessions, from 2003 until 2008. An indication of a more globalized world might be that this was first wave not lead by the U.S market, but by European one. The most recent wave started in 2010 but some data indicated that it ended quickly, already in 2011 or 2012. However, with countries like China, India, Brazil and Russia on an aggressive economic growth, it seems like a seventh wave is either still on-going or soon to come (McCarthy and Dolfsma, 2012).

3.2 Why companies choose M&A

According to Ross et al. (2005), there are three types of M&As: Horizontal M&A, which is a deal between two firms within the same industry. Vertical M&A, defined as a deal between two firms which are operating at different levels in the production line, and conglomerate M&A, where two firms operating in different industries and/or at different levels in the production line.

Economies of scale, company size, and market power are all repeated motives for entering an M&A (Damodaran, 2002; Pike and Neale, 2009; Kang and Sakai, 2001; Coeurdacier et al., 2009; Goldberg, 1983). The advantage of economies of scale is that costs per unit can be reduced with a larger unit output. Size could be “Critical mass”, i.e. size needed be able to survive in a market, e.g. a certain percentage of the market share is necessary to be able to compete in a long term view. Size could also be the possibility of getting listed on the stock market. Market power could be used for forcing competitors to exit the market and to create an oligopoly or monopoly.

Other discussed motives are economies of scope (Kang and Sakai, 2001; Coeurdacier et al., 2009), financial benefits (Damodaran, 2002), entrance to new market, cost of new product development (Hitt et al., 2001), and improved growth (Pike and Neale, 2009). Economies of scope are similar to economies of scale but refer to a company lowering their average production costs for two or more products. Financial motives could be e.g. to reduce taxation by restructuring a firm to be able to exploit differences in tax laws between countries, or increased debt possibilities because of the increased revenue for the new firm. Entrance to new market is a strategy where green field investment is seen as too risky and M&A seems as the best alternative. In some countries, such as China, M&A might be the only option to gain access to a market. To develop a new product could be both expensive and time-consuming. Thus, a company with a large budget and possibly a longer time perspective might improve the odds to a successful product development. The motive of improved growth includes companies in stagnated markets or markets expected to stagnate and look to grow further through M&A.

It should be noted that some of the motives are quite similar to each other, e.g. obtain stock market listing and to reach critical mass might in some cases be the same thing, and depends on the authors' different definition.

A Statistics research by Tiemann (2008) analyzing the stock price one and two years after M&A deals in 510 cases found that the motive for the deal had an impact on the stock value. Firms with the motive to increase their financial strength had an average increase of their stock price by 6.7% increase after one year and by 16.8% after two years after the deal. Firms motivated by increasing their distribution channels saw an average increase 5.7% the

first year and 17.8% after two years. The motivation that scored the lowest was firms with the simple motive of increase earnings with an average of 5.4% and 16.5% respectively. The study also found that smaller companies involved in few deals were more successful, in terms of stock price, than larger firms.

3.3 OLI

Many reasons and rationale for why companies enter M&A have been presented but any final conclusion seems to be hard to state (Steger and Kummer, 2007). The OLI-framework can be used to explain what is necessary for a firm to be able to expand and why they sometimes choose to do so through M&A (Samad, 2009). The model has been modified over the years and Dunning and Lundan (2008) elaborated the OLI paradigm to better capture the international perspective

The OLI-framework consists of the O, ownership-specific advantages. These advantages are put into three different categories. O_a, which is the property rights e.g. production innovation or production management. Complementary assets, O_t, such as economies of scale or market control. O_i, institutional assets, that is assets such as corporate culture and leadership. Localization-specific advantages, L. If a company is localized in two countries they may use differences in tax system or labor cost. Localization advantages also include access to markets and region specific resources. Internalization advantages I. When keeping production inside your own firm you can keep control of the production line. Thus avoid being a victim of e.g. suppliers breaking a contract or run bankrupt. To internalize is useful when a firm wants to secure its owner-specific advantage, e.g. a patented product, and not take the risk of letting an outside firm take part in the production. If a company finds that they can find all of these advantages abroad, then Foreign Direct Investment, FDI, is recommended. However, if a company finds themselves with only one or two advantages, the ownership advantage is always required, then licensing or simply exporting is to be preferred as this approach is less costly and thus less risky (Dunning and Lundan, 2008).

3.4 Successful M&A

As discussed in the problematization, numerous authors find high failure rates in the case of M&As. Since that is the case, what then characterize a successful M&A? To be able to find

and utilize synergy effects, that the merger/acquired firm is complementary in either resources or assets, that the acquisition is of friendly nature, and that the acquiring firm sustains and focus on R&D are four key elements for a successful M&A (Hitt et al., 2001; Samad, 2009). Additionally, Hitt et al. (2001) describes four key components to create synergy: strategic fit, organizational fit, managerial actions, and value creation. Strategic fit is when the post M&A-company is able to match organizational capabilities such as e.g. combined R&D or marketing. Organizational fit refers to the ability to manage to merge the cultures, system and structure to facilitate learning from each other's experiences and communication. Managerial actions are required to complement strategic and organizational fit. Value creation is when investment in exploiting in synergies is exceeded by the gains from those synergies.

3.5 The importance of product development for business success

In today's increasingly competitive business environment, product development capability is a requirement for a firm's success. The driving forces behind the growing importance of PD are identified by Wheelwright and Clark (1992) as: *Intense international competition*; The globalized business environment has increased the number of competitors and the diversity of firms due to different national cultures etc., which has resulted in a less forgiving business environment. *Fragmented, demanding markets*; Customer tastes have become increasingly sophisticated and diverse. High demand on performance and reliability is accompanied by the importance of user friendliness and intuitive products. *Diverse and rapidly changing technologies*; the growing breadth and depth of technical knowledge create new and diverse opportunities to meet customer requirement, but also has the potential to make existing products obsolete at an instant.

Sorli and Stokic (2009) present similar conclusions regarding the driving forces of PD but with an added point: Legal regulations in the form of e.g. safety- and environmental legislation are becoming more and more numerous. Ulrich and Eppinger (2011) argues that the ability to identify customer needs and then quickly design, produce and market products that meet those requirements at a low cost is what defines most firms' success. The importance of PD is present in most markets, not only in technically dynamic industries but

also in mature market with long product lifecycles, for example the textile industry (Wheelwright and Clark, 1992).

3.6 The characteristic product development process

Product development is an interdisciplinary activity where in particular three business functions collaborate; marketing, design / engineering and manufacturing. The generic PD process can be divided in 6 steps presented by Ulrich and Eppinger (2011): 1, a planning phase in which opportunities are identified and development goals, constraints and assumptions are set. 2, a concept development phase, often called the “front end process”. In this phase customer needs are identified and several product concepts are generated and funneled down to the most promising one. 3, a System level design phase where the architecture of the product is developed, and an initial production process is defined. 4, a detailed design phase in which all parts of the product are developed and ready for manufacturing. 5, testing and refinement of the design is performed before the start of production in order to ensure that the goals of the product are fulfilled and shortcomings are improved. 6, the last step of the PD process is the production ramp up where the production system is finalized and the workforce trained to produce the product as efficiently as possible. Similar descriptions are given by both Wheelwright and Clark (1992) and Sorli and Stokic (2009).

3.7 What is successful Product Development?

According to Wheelwright and Clark (1992) there are three competitive imperatives for successful product development: A fast and responsive development process is needed in order to handle intense competition, changing customer tastes and technological change. High development productivity enabled diverse products to be developed for the increasingly diverse customer tastes. Products with distinction and integrity are required to be competitive on a crowded market and attract customer attention.

The profitability of the developed products is what defines PD success according to (Ulrich and Eppinger, 2011). To assess profitability, they use five different dimensions: Product quality, manufacturing cost, development time, development cost and development capability / company learning.

3.8 Organizing Product Development

Several theories on how to organize PD in an organization have been developed over time. Organization by Cross-functional teams has long been considered a best practice for many applications, although the theory has recently been challenged by the new trend of Global Product Development (GPD).

By 2000, a widely accepted best practice for organizing PD was the use of co-located cross-functional teams (Eppinger and Chitkara, 2006). Wheelwright and Clark (1992) propose that in dynamic markets where a short time to market is a critical success factor for PD, cross-functional integration is of vital importance. By Cross-functional integration, Wheelwright and Clark mean a solid cooperation between the engineering-, marketing- and manufacturing department of a firm. True cross-functional integration rests not on company structures and working procedures but on inter-personal and inter-group relations based on a dependency of one another and on good communication. The need for cross-functional integration in PD is also mentioned by Hill (2010) where he stresses that cross-functional integration is a way for companies to reduce the rather high failure rate of PD. By co-location of cross-functional teams several different development activities can be performed simultaneously in an efficient way. By using such concurrent approach to PD; better designs, shorter lead times and lower manufacturing costs could be achieved (Eppinger and Chitkara, 2006).

A recent new trend in Product development is the use of Global Product Development (GPD). GPD is a stark contrast to co-located teams since it instead uses a highly distributed, networked and digital development process (Eppinger and Chitkara, 2006). Using foreign PD is not new in itself, in a study from 1997, it was shown that American and Japanese companies used FDI to develop a decentralized PD organizations in order to meet local customer needs (Greaney, 1997). However, GPD is not only about meeting local customer needs, Eppinger and Chitkara (2006) has found four primary reasons for building GPD capabilities: *Lower cost*: There is today a large pool of talented engineers in countries with significantly lower wages than in for example the US. Countries like India, China and Vietnam are some examples. *Improved Process*: Much of the world's production is nowadays located in low wage countries. By locating parts of the development process at the manufacturing

site, some of the same benefits of using co-located cross-functional teams can be achieved. *Global growth*: Better response to local customer tastes. *Technology access*: By using a globally dispersed development network, local specialty knowledge can be captured.

Eppinger and Chitkara (2006) identify three basic approaches for GPD: *Process outsourcing* is the outsourcing of certain parts or processes of the development cycle, for example tooling design or translation of technical documents. *Component outsourcing*: For products that can be modularized or decomposed into subsystems it is possible to outsource the complete development of some modules or parts. *Captive design center*: Contrary to just outsourcing PD activities, a wholly owned foreign development center can be used, which of course is more complex alternative. *The captive design center* approach is the most similar one to what happens after an international M&A, where the new organization own development centers in different countries.

Implementing GPD is accompanied with a learning curve and several years of commitment for the GPD process to run smoothly. Eppinger and Chitkara (2006) provide a list of key success factors for implementing GPD of which the most relevant for this study are: *Management priority*: The executive team must show a strong commitment to the success of GPD and be ready to endure “worse-before-better” performance of the PD organization. *Product and process modularity*: It must be possible to segregate the work in a clear way. *Data quality*: There must be no confusion on what data is the most recent and valid one and the data must be available for globally dispersed teams. *Governance and Project Management*: Management of the PD is a larger challenge when the team is not co-located which makes clear goals and planning etc. even more important than for conventional PD. *Collaborative culture*: Trust is equally important for GPD as for conventional PD. Trust is developed over time and requires a consistent set of processes and standards. Bi-directional travel has proven to be an important tool to build trust.

3.9 Theoretical conclusions

The underlying motive/motives for M&A have an impact on how well it turns out (Tiemann, 2008). Common motives are Economies of scale, company size and market power (Damodaran, 2002; Pike and Neale, 2009; Kang and Sakai, 2001; Coeurdacier et al., 2009; Goldberg, 1983). Also, cost of product development (Hitt et al., 2001), economies of scope

(Kang and Sakai, 2001, Coeurdacier et al., 2009), and improved growth (Pike and Neale, 2009). The OLI-framework explains what attributes are needed to expand at all: Ownership-, Location- and Internalization specific advantages. If a company has Ownership-specific advantages combined with Location and/or Internalization advantages, then FDI is recommended (Dunning and Lundan, 2008). In this study, location advantages were found to be of importance for R&D in cross-border M&As.

Because of the high failure rate of M&As, it is important to know the characteristics found in a successful M&A in order to lessen the risk of M&A failure. To be able to find and utilize synergy effect is one of four key components. To create synergy effects is split into strategic fit, organizational fit, managerial actions and value creation. The second component is that the two firms are complementary in either resources or assets. That the merger/acquisition is of a non-hostile nature is the third key component. The last key component that characterizes a successful M&A is that the acquiring firm focuses on, and sustains R&D (Hitt et al., 2001; Samad, 2009).

Product development is a process with long lead times and a vast amount of activities that needs to be coordinated. As shown by Ulrich and Eppinger (2011) the beginning of the process is characterized by creativity and is thereafter becoming increasingly rigid. To manage this complex activity, several theories have been developed. Cross-functional teams, described by Wheelwright and Clark (1992) were long consider best practice, although the theory has recently been challenged by that of global product development (GPD), described by Eppinger and Chitkara (2006). The major difference between the two is that GPD uses a geographically dispersed set of R&D engineers, whereas cross-functional are co-located. By cross-border M&As, the result is often a geographically scattered R&D organization, which resembles that of GPD. The benefits of GPD are described by Eppinger and Chitkara (2006) as access to local labor and knowledge clusters, possibilities to locate R&D close to production facilities and better response to local tastes. The drawback is impaired cooperation between the engineers due to the long distances, which necessitates the use of IT-tools and thereby losing some possibilities of establishing personal relations between the engineers, which is described as important by both Wheelwright and Clark (1992) and Eppinger and Chitkara (2006).

4 Empirical data

This chapter presents the companies and the M&As in the case studies. The empirical findings are presented in a summary of the field notes taken from each interview. One participating company asked for full anonymity and will therefore not be presented.

4.1 Description of case 1: SKF-Willy Vogel and SKF-Lincoln

The first case study was performed on the Swedish MNC SKF, founded in 1907. The company now operates in more than 130 countries and has almost 47 000 employees. SKF was initially a producer of bearings but has since then expanded the product portfolio significantly and now divides its technologies in five platforms: Bearings and units, seals, mechatronics, services and lubrication systems (SKF, 2013). In 2012, SKF spent SEK 1607m on R&D expenses, about 2.5 % of the net sales of SEK 64,575m (SKF, 2012). SKF has been involved in numerous acquisitions. In this report the studied acquisitions will be limited to a number of acquisitions of firms in the lubrication industry. With the purchase of Willy Vogel, hereinafter called Vogel, in 2004, SKF added a new product platform to its portfolio. Vogel was a German company with an annual turnover of around 1 billion SEK and 940 employees. The company was headquartered in Germany with production in France, USA, Germany and Japan. Prior to the purchase, SKF sold lubrication system products for about SEK 200m annually. For SKF the purchase of Vogel was motivated by acquiring increased knowledge in automated lubrication systems, becoming a global supplier in lubrication and by increasing customer value in SKF's products. Vogel saw possibilities to reach new customers and segments by SKF's global presence (SKF, 2004). Since the purchase of Vogel, SKF has acquired a number of other firms in the lubrication industry, the most recent one being the American firm Lincoln in 2010. Lincoln had 2000 employees and expected annual net sales of USD 400m. Lincoln is headquartered in USA and has sales and production in North America, Europe and Asia, production was based in Asia and North America. SKF's motives for the acquisition were improvement of the lubrication system platform by complementing the current product portfolio with only minor overlap, increased presence in North America and Asia, increased business in America's automotive industry and increased production by Lincoln's strong position in USA and Asia (SKF, 2010).

4.2 Empirical findings from case 1

The first acquisition of Willy Vogel was a way for SKF to expand its business areas by expanding around the core business. Although SKF had some research on lubrication prior to the acquisition, it was perceived as providing SKF with complementary technology rather than substitutive. The following acquisitions including Lincoln further strengthened SKF's new business area. Although both Lincoln and Vogel were companies in the lubrication systems business, their technological overlap was rather small. Vogel mainly produced lubrication system products based on oil, whereas Lincoln primarily sold grease-based products. Therefore, the acquisition of Lincoln could still be seen as mostly bringing complementary technology to SKF.

The interviewee described the integration following both acquisitions as very successful and mentioned some points that he believed important for the smooth integration. SKF were very clear about what the acquisition would lead to for the acquired firms already in the acquisition process. A well-considered plan for organizing the new entity was considered important and SKF also made sure to include persons from the acquired firms in the management team of the new entity. These actions created a positive attitude towards the acquisition. It was also considered of vital importance of SKF to listen to requests and proposals of the acquired firms and not do too large changes immediately following the acquisitions, which was metaphorically described as not to act as "an elephant in a porcelain shop". Along with SKF's rather slow and careful approach to the integration, the well-defined goals and positive attitudes created a clear integration-path that could be followed without inducing any shocks to the new organization.

After the acquisition of Lincoln, some technological overlap existed that led to double work. For successfully merging the companies it was perceived important to harmonize the product offers in order to create one SKF product line. To do so, an auditing of the components that were produced by both companies was performed in order to choose which ones that should be kept. This harmonization process is still ongoing, SKF has made good progress and eventually no double work will be performed. Distinctive leadership, new organization structures and a clear plan were perceived important to succeed with this harmonization process. The only mentioned problem to integrating the companies was that

the ownership structure changed for the acquired firms. Before the acquisitions, neither Lincoln nor Vogel were publicly listed companies. It took some time for managers of the acquired firms to get used to being part of the publicly listed company SKF.

When asked about synergies for R&D from the M&As the interviewee described that for an old and rather stable company like SKF it could be beneficial to widen the scope of knowledge in order to get a more coherent view of the industry. By acquiring complementary technology in the lubrication systems industry, SKF acquired new knowledge and R&D employees with new solutions and ideas. The widened scope of knowledge increased the R&D creativity. This had positive impacts on the initial parts of the R&D process where idea generation is the central activity, thus increasing the innovativeness of the company. Another synergy that was described was that the new entity reached a critical mass, which enabled R&D projects that would have been infeasible for the firms to perform on their own. The increased scope of knowledge combined with the critical mass enabled new products to be developed. For example; by combining SKF's knowledge of mechatronics and automation and the acquired firms' knowledge of lubrication system products, new automated lubrication systems could be developed and sold successfully. It would have been significantly more expensive for either part to develop such systems by themselves. Scale economies for R&D could not be commented on since that had not been a goal with the M&As.

Prior to the acquisitions, SKF had its R&D for lubrication based in the Netherlands, Vogel in Germany and Lincoln in USA. None of these R&D centers were moved following the M&As. However, smaller R&D centers in China and India were consolidated to larger R&D centers with inputs from all of the merging parts. Thus, following the acquisitions; SKF's R&D in lubrication was geographically dispersed on a global level. Cooperation between the different R&D centers is enabled by the use of IT tools, which works well. It was described that most products were of a modular character, which allowed the R&D centers to focus their research on different modules of the product. Such modular product design was used by SKF prior to the acquisitions, but the benefits could perhaps be more evident when the R&D became more geographically dispersed. Benefits of having R&D in different areas of the world consisted of the ability to capture local tastes / requirements and to get access to

knowledge clusters, both were important to SKF. The growing supply of skilled engineers in India was mentioned as one example.

The reason for not moving the R&D centers in Europe and USA was that the risk for losing key employees was perceived smaller by keeping them where they were. It was stressed that employee retention was of vital importance. Since the acquired knowledge exists in the form of skilled employees, that knowledge would be lost if they left the company. No problems with key people leaving the company following the studied M&As had been experienced, which could be explained by the fact that SKF made sure not to proceed too fast and bluntly with the integration of the acquired firms in order for the staff to accept the new ownership. The interviewee did however have some experience of past M&As where key employees had left the new entity shortly after the M&As. He perceived the problem to be larger for acquisitions of really small and entrepreneurial firms because they could not adapt to the increased bureaucracy in the much larger new entity.

4.3 Description of case 2: FMC-VCC

The second case study was performed on Ford Motor Company's (FMC)'s acquisition of Volvo Car Corporation (VCC) in 1999. The Swedish company Volvo started off as a subsidiary to SKF with production of automobiles in 1927. Production of trucks started one year later and Volvo was subsequently divested from SKF. Nowadays Volvo Group is one of the global giants in trucks, Volvo Group signed a deal with the Chinese firm Dongfeng in January 2013, which will make them the largest heavy truck manufacturer in the world. Volvo Group also produces e.g. buses and construction equipment (Volvo, 2013). FMC is an American MNC and one of the world's largest car manufacturers with a total of 166 000 employees as of 2013. Ford was founded in 1903 by Henry Ford and in addition to cars, also produces a variety of vehicles, for example trucks (Ford, 2013). In 1999, Volvo Group sold off their share in VCC for SEK 50 billion to FMC. At the time, VCC had an above average profit per year (Volvo, 1999). The deal took place in the fifth so-called M&A wave. During an on-going consolidation phase in the automobile industry, FMC sought to increase their brand portfolio. FMC added VCC into their premium automotive group and planned to use VCC's technological strengths such as security. VCC, on the other hand, thought that economies of scale were required in order to develop new cars and saw possibilities for that by merging

with FMC (Lundbäck, 2002). In 2010, after several years of losses for VCC and at the same time, the whole industry being hit hard by the recession, FMC sold VCC to the Chinese company Geely for about SEK 13 billion (USD 1.8 billion), a loss of about SEK 37 billion compared to the amount FMC paid to acquire VCC eleven years earlier (Economist, 2010). The sale of VCC occurred as FMC chose to reconstruct the firm to focus on their main brand; Ford.

4.4 Empirical findings from case 2

In the very cost-competitive automotive industry, FMC's acquisition of VCC led to scale economies for R&D by spreading the very large platform development costs on a larger number of car models. Prior to being acquired by FMC, VCC used one platform for four car models, after the M&A, this number was increased to 16. However, such strategy also increased the complexity of the platform development. Both because of technological challenges of making the platform so versatile that it could be used on 16 models, and also due to the fact that the R&D now had to be done by international cooperation between FMC's subsidiaries. Platform development for so many car models requires very large upfront R&D costs, but has the possibility to lead to even larger cost savings during production. However, the time from R&D to production can be rather long and perseverance is therefore required until the investments start to pay off.

Although VCC and FMC operated in the same industry, the acquisition did not only give FMC substitutive technology. Complementary technology in certain areas of expertise was also transferred between the different subsidiaries in the new entity. VCC for example was used as a center of excellence for safety. Following the M&A, FMC used VCC's expertise in safety by conducting crash tests for several of their brands in VCC's test facility in Gothenburg. FMC on the other hand was skilled in for example chassis and engineer to cost. By using knowledge from different centers of excellence, economies of scope could be achieved for the new entity. Since different subsidiaries of FMC specialized in different areas of R&D, the relative R&D efficiencies differed in different technology-areas and subsidiaries. For example, the relative R&D efficiency in safety was better in VCC than in any other subsidiary of FMC, therefore it was most worthwhile to allocate FMC's investments on safety-R&D to VCC. Since FMC could allocate its R&D investments to the different subsidiaries according to

their R&D strengths, and then combine the R&D outputs to the entire entity, FMC could increase the overall R&D efficiency. The interviewee saw synergies for R&D following the acquisition in a large part of the R&D process. The increased scope of knowledge improved creativity that could be used in the early R&D-stages and as previously described, different areas of R&D strengths in the new entity could be used for both system level- and detailed design throughout the R&D process.

The R&D centers were not moved following the acquisition although R&D knowledge was more clearly organized by geographically dispersed centers of excellence. In addition to the synergies mentioned above, such centers had benefits of being able to use local knowledge clusters, for example did Autoliv, Saab and VCC who were all skilled in car safety exist in a rather close proximity in Sweden. Another benefit of the centers of excellence was that they attracted top engineers to work there. In order to facilitate cooperation between the geographically dispersed knowledge centers a clear understanding of different technical interfaces was important. Telephone- and video meetings were very common, although the importance of engineers that worked together to at least having met face to face once was stressed as important in order to build trust and improve future cooperation. IT tools for R&D cooperation between the engineers were used; some initial problems with transferring technical files between the different subsidiaries in the new entity were experienced due to the use of different software.

Project management practices also differed slightly between the firms. Both FMC and VCC used tollgate systems for their R&D, although the contents of the different gates differed somewhat. It was considered important to harmonize such working procedures in order for the different subsidiaries to “speak the same language” by for example agreeing on requirements for approval, engineering designations etc. A harmonization phase of 2-3 years was required until problems following such differences were reduced to a minimum. It was perceived that FMC did use a sensible approach for integration and did take VCC’s opinions into account. The integration process was allowed to take time and FMC considered personal contacts between the subsidiaries as important. The interviewee experienced no increased employee turnover. When asked about the amount of double work, i.e. development of the same parts by different subsidiaries of FMC, the interviewee mentioned that some double work was inevitable. In certain areas it was required in order to keep the

distinguishing characteristics between the different brands. However, for components not visible to the customer the goal was to use the same parts for all subsidiaries in FMC to an as large extent as possible as long as it did not negotiate the core attributes in the brand. In some cases, that goal was not reached. The interviewee could not give a definite answer to what caused this, although he speculated on a failure to agree on technology choices and a lack of personal relations, to be some of the reasons.

When speculating about why FMC eventually decided to divest its investment in VCC, the interviewee mentioned that the acquisition had not been economically feasible to FMC and that they needed to focus upon recovering the performance of the Ford brand. It was discussed why other firms, most notable Volkswagen, had been more successful in their acquisitions. A hesitant answer to why Volkswagen had been more successful was that they had started their acquisitions much earlier, that their acquisitions had a better strategic fit and that they had more patience to wait for the cost savings discussed above. FMC acquired VCC rather late in a consolidation phase in the automotive industry, and might perhaps have focused slightly too much on quick wins.

4.5 Description of case 3

The final participating company in the case studies of this report requested to be anonymous and will therefore not be presented. The company operates in a different sector than VCC and SKF although still being technology oriented with a substantial amount of R&D. A foreign firm acquired the company not so many years ago and the integration phase of the M&A is still ongoing by the time of writing.

4.6 Empirical findings from case 3

The technology relatedness in case 3 was a mix of both complementary- and substitutive technologies, although complementarity dominated. The motivation for the deal was mostly based on widening the technology portfolio of the acquirer. Since the acquisition occurred quite recently, no economies of scope have yet been achieved from the widened knowledge. However, all participants in the interview expected such potentials to be utilized in the future. The increased size of the new entity was not expected to lead to any economies of scale. However, the acquisition increased R&D funding possibilities due to the larger size of

the new entity. The increased funding possibilities were not immediately available however; several interviewees described an increased need to thoroughly motivate investments in R&D to the acquiring company's corporate division. Such requirements were perceived as slightly demotivating for R&D employees, although it was also experienced as a rather effective cost reduction method.

The locations of the R&D centers were not changed following the acquisition, which resulted in a geographically dispersed research. The interviewees anticipated that the acquiring firm chose to keep the R&D centers where they were because of a fear of losing employees if they would have been moved. However, the geographically dispersed R&D did not facilitate good cooperation between the different centers. The integration process lacked any possibilities for R&D employees in the merging firms to meet each other and establish personal contacts. Further, it was not clear to the R&D employees where in the new entity that different knowledge could be found. Because of that, synergies from combining a wider scope of knowledge were effectively prevented. The most notable cooperation between the different parts of the new entity was that the top ranking R&D managers for each subsidiary had monthly meetings, which were perceived as very fruitful. Although the interviewees did not experience it enough to just integrate the highest hierarchical levels of the R&D organization. Integration of lower level managers or researchers was perceived as equally important to facilitate efficient cooperation between the different subsidiaries of the new entity.

The interviewees described that the acquirer used a sensible and sensitive approach to the integration, the acquirer listened to the opinions of the acquired company and did not force any changes immediately following the M&A. No significant increase in employee turnover was noticed; no clear cases in which a person left purely because of the acquisition was mentioned. Some R&D employees found it emotionally hard to accept that R&D projects that they were involved in were scrapped due to different priorities of the new owner, though such experiences were described as inevitable.

Differences in project management procedures were perceived as the biggest problem for integrating into the new entity. Having to adjust working procedures at the same time as showing economic feasibility of the R&D to the new owner required much effort from the

R&D employees. The new owner's project management procedures were perceived as a downgrade to the current ones by many employees, which further reduced motivation for change. Also, the different subsidiaries in the new entity are rather different which makes it hard to use the same management procedures in the entire entity, which is the goal of the new owner. The reasonability of that goal was questioned by the interviewees.

5 Data analysis and discussion

In this chapter the empirical findings from the interview and the literature review are analyzed and discussed according to the research questions. The chapter is divided in the categories found by coding of the findings in both the interviews and the literature review. Hereinafter; the case study on SKF will be referred to as “case 1”, the FMC-VCC case as “case 2” and the anonymous case will be “case 3”.

5.1 The right mix of technology relatedness

All case studies had some parts of both complementary and substitutive technology relatedness. Case 2 can predominantly be seen as a case of substitutive technology. However, during the interview it was found that the areas of expertise in the merging firms differed which lead to “complementary expert knowledge”. Thus, even though the merging entities are technologically substitutive, some amounts of complementary technology will also be acquired. The merging of complementary technologies in case 1 showed economies of scope by leveraging knowledge in different areas that could be combined and thus reach critical mass in new technological fields. Interestingly, such behavior is explicitly stated by Cassiman et al. (2005) as typical for complementary technology firms. In the quantitative study by Cassiman et al. (2005) stronger R&D efficiencies for technologically complementary firms than for substitutive ones was found. However, case 1 mentioned that the synergies for their second merger, which was slightly more substitutive than their first one, had more synergies for R&D. Several R&D efficiencies were also mentioned in case 2, which had many substitutive technologies. One might therefore question whether or not it is correct to say that complementary technology relatedness is preferable to substitutive technologies for R&D efficiency gains. Indeed, as Cassiman et al. (2005) shows in their literature review; neither purely substitutive- nor complementary technologies are good. There is a nonlinearity in which an adequate (Swedish: lagom) amount of technological complementarity is the best.

5.2 Synergies and economies of scale and scope

Economies of scale in its classic form, i.e. that cost per unit can be decreased because of a larger output, was experienced in case 2. By using the same platform on a larger amount of car models, the very large cost of platform R&D could be distributed on more cars and thus reducing unit costs. Such economies in scale were not experienced by the other cases, and were also rejected in the study by Cassiman et al. (2005). However, the increased size following the M&A led to increased funding possibilities due to a larger budget, mentioned by case 3. Reaching a critical size and thus enabling R&D projects that were not feasible before the M&A was mentioned in case 1. Therefore, the synergy effect gained from increased company size, as mentioned by for example Pike and Neale (2009) seems to be present for R&D.

Synergies and economies of scope were experienced or expected in all cases. Case 1 described how existing knowledge in mechatronics and automation could be combined with the acquired knowledge in lubrication to build state of the art automatic lubrication systems. Case 2 explained how different areas of expertise from the different subsidiaries, for example safety in the case of VCC, could be used to develop well performing products. Thus, these M&As increased development capability, which is one of the implications of successful R&D (Ulrich and Eppinger, 2011).

5.3 Geographically dispersed R&D

Since all case studies were cross-border M&As and in none of those cases were large existing R&D centers moved following the M&A, geographically dispersed R&D, i.e. R&D centers located in many places, in the new entity was the result in all cases. Case 1 considered it important to have a geographical spread of the R&D centers in order to capture local tastes and requirements as well as using local knowledge clusters. Case 2 used geographically dispersed centers of excellence to use local knowledge clusters and to attract the best engineers. There are both pros and cons with such spread of the R&D centers. By being present in different regions, local tastes can be understood and access to knowledge clusters is enabled (Eppinger and Chitkara, 2006). However, both case 2 and 3 described the importance of personal contacts for the R&D work and how geographical distances restrained such personal contacts. To enable personal contacts across large distances, some

kind of Global Product Development might be used. Case 2 described frequent telephone and video meetings between engineers and also cooperation between different R&D centers by the use of IT tools, as was also mentioned by Case 1. Case 2 further emphasized the need for clear interfaces between different sub-systems, which is also described by Eppinger and Chitkara (2006) as the need for product modularity. Even though such tools for geographically dispersed R&D cooperation are useful, case 2 stressed the importance of face-to-face meetings of the involved engineers at least once during the development phase. Case 3 also mentioned the importance of face-to-face contacts, and even Eppinger and Chitkara (2006) mention that bi-directional travel is an important tool to build necessary trust between R&D employees.

5.4 Where in the PD process can synergies be achieved?

Case 1 experienced a widened scope of knowledge in the new entity compared to the old ones, which lead to an increased creativity that was most useful in the idea generation phase of the PD process. Case 3 mentioned monthly meetings with the R&D managers of all subsidiaries that could transfer ideas and knowledge, which in turn could lead to an increased creativity in the entity as a whole. Case 2 saw synergies for a larger part of the PD process, from idea generation to detailed product design. Are these differences based on technologic relatedness? It can be theorized that M&As of technologically complementary firms mostly generate efficiencies in the first part of the PD process because of the divesting into new technological fields that has been enabled by reaching critical mass. When new R&D projects have been launched, the two merged entities specialize in their own particular knowledge fields and then develop these precisely as they used to do before the merger, thus seeing most benefits in the initial phase of the PD process. For M&As of substitutive technology firms it has been shown that different parts of a product can be better developed by different subsidiaries of the new firm. By allocating the development of different parts where they can be most efficiently developed, such “complementary expert knowledge” gives the entity as a whole synergies throughout the PD process.

5.5 Harmonizing different working processes

Case 3 described pretty substantial problems with adapting to the acquiring company's processes for tracking R&D projects. The extra workload of changing the working procedure as well as a larger focus on positive results to the acquiring firm put pressure on the R&D personnel. It was perceived by case 3 that the new processes were in fact inferior to the ones previously used which further decreased motivation to adapt. Case 2 described similar problems although in that case the systems were more alike. However, it still took between 2-3 years of process integration until the project management procedures had converged. Case 3 also described initial problems due to different technical and regulatory standards. Case 2 described how different software systems were used which required some years to change. Thus, the PMI problems discussed by for example Kummer (2009) and Hill (2010) consists, among other factors, of problems with aligning both technical- and managerial processes. Since these problems existed several years in both case 2 and 3 it seems hard and expensive to make them converge. It should therefore be considered how much the working procedures differ between the firms prior to an M&A. This finding corresponds to Hitt et al. (2001) where they explain that for an M&A to give synergies for R&D; organizational- and strategic fit are both necessary.

5.6 Employee retention

All cases stressed the importance of retaining key employees and none had suffered any major problems with employee turnover. Case 1 described how they used a soft approach when merging the two entities and that they decided not to relocate the large R&D centers due to the fear of losing engineers. Case 2 saw no significant increase in employee turnover purely due to the M&A, a sensitive approach to the integration by FMC could be the reason for that. Case 3 mentioned that some R&D projects had been scrapped by the new owner which had an emotional effect on the R&D employees, although no cases were identified where persons had left as a result of the M&A. It is notable that although for example Walsh and Ellwood (1991) and Ranft and Lord (2000) show a significantly higher employee turnover following M&As, no such effects were noticed by the participating interviewees. All case studies showed that the acquiring company used a soft and careful approach to integration, probably with the purpose of retaining employees. Case 1 had experienced previous problems with employees that voluntarily left the company following M&As. The problem

was perceived more common for acquisitions of small and entrepreneurial companies, which might be explained by that such small companies could not adapt to the bureaucratic processes in the larger new entity.

5.7 Unused synergies

Case 3 described that possible synergies from a widened scope of knowledge was prohibited by the fact that the new owner did not clearly communicate where in the new entity such knowledge existed. It was also suggested that too much focus of the integration was put on the higher hierarchical levels and that a stronger emphasis of the integration of middle management and R&D employees could be useful. From the findings in case 3, another PMI problem could be identified as a failure to show existing sources of knowledge in the new entity, which prohibited the use of possible synergies. Case 1 stressed the importance of having an integration plan in order to avoid such problems.

6 Conclusions

This chapter presents the conclusions drawn from the research questions based on the empirical findings and the analysis in the previous chapter. Lastly, theoretical contributions, managerial implications and suggestions for future research are presented.

6.1 How can positive synergies for R&D be utilized following an M&A?

This report has shown that economies of scale, economies of scope, benefits of increased size and synergies from a combination of different knowledge inputs all could be a result of an M&A. Synergies from different knowledge inputs has been most prominent, and was discussed in all case studies. It can be assumed that such synergies are mostly found in M&As of technologically complementary firms since they should broaden the knowledge more than M&As of technologically substitutive firms. However, it was found that M&As of technologically substitutive firms also could achieve such synergies due to different levels of expertise in different areas of R&D. By combining the best parts from each subsidiary the entity as a whole could achieve R&D efficiencies throughout the PD process. Following cross-border M&As the new entities will have R&D centers in different countries. Such geographically dispersed R&D has the benefits of capturing local tastes and getting access to local knowledge clusters. Thus, although coordination of the R&D in the new entity might be harder due to large distances, it seems unadvisable to move R&D centers following M&As. Also, if the R&D centers are to be moved following the M&A, the risk for losing key R&D employees is higher and therefore many of the possible synergies of the M&A are lost.

6.2 What are the main problems for R&D post M&A?

Harmonization of technical systems and R&D management procedures were the most prominent PMI problems elicited in this study. Solving such problems is time consuming and a source of frustration for R&D employees. The problem appears larger for M&As of technologically complementary firms than for technologically substitutive ones. Another problem is that it can be unclear where to find different sources of knowledge in the new entity. Such confusion effectively prevents the synergies from combining different knowledge. Another problem following an M&A is that to allow efficient R&D cooperation between the different parts of the new entity, new personal relations need to be formed.

Such personal relations are best developed face to face which is problematic if the geographical distance between the merging firms is large. Lastly, since most synergies for R&D originate from combinations of different knowledge, it is of vital importance to retain key R&D employees in order not to lose such knowledge.

6.3 Theoretical contribution

The research in this study is in its nature not able to create a new theoretical model by itself. It has however shown both contradictions and resemblances to current theories. The empirical data adds on the current research that an adequate mix of both technological complementarity and substitutivity between the merging parts is best for utilizing R&D synergies post M&A. Current theories on why M&As fail often blame PMI problems. This research has deepened those theories by finding what the PMI problems are in the case for R&D. The empirical data has shown that managerial strategies and different working procedures are the main causes of such PMI problems for R&D. Thus, these findings correspond to current theories that advocate an organizational- and strategic fit as important requirements for successful M&As by showing that they are also relevant in the case of R&D. The study has also shown reluctance to move R&D centers following M&As, which in the case of cross-border M&As result in a geographically dispersed R&D organization. Therefore, the theories of co-located and cross-functional teams cannot easily be applied, which increases the necessity of new theories of organizing R&D such as GPD.

6.4 Implications for managers

In order to improve the chances of a successful M&A two managerial implications prior to the M&A has been identified in this study. In order to ensure a fit between the merging entities the degree of technological complementarity and substitutivity should be assessed. Both should be present, if either is too dominant, the synergies from the M&A might be limited. The fit between the companies' technological systems and R&D management procedures should also be analyzed since a lack of such fit can lead to integration problems.

Following the M&A, a distinctive and clearly communicated integration plan should be presented to all employees. The plan should not only focus on the higher hierarchies of the firms but also facilitate cooperation between R&D employees by clearly showing where

different sources of knowledge exist in the new entity. Furthermore, the integration process should allow personal relations between R&D employees in the different parts of the new entity to be established by face-to-face meetings.

6.5 Suggestions for future research

In the analysis we speculated on whether different technological relatedness between the merging parts could result in different synergies for R&D. Our assumption was that for complementary technology M&As, the synergies were mostly focused on the initial part of the R&D process, whereas for substitutive firms synergies were found throughout a larger part of it. By the small sample in this study, this phenomenon could not be confirmed. However, if it can be confirmed as correct, it would be of importance to consider prior to doing M&As and it is therefore an interesting subject to study further. Another suggestion for further research is related to GPD and cross-border M&As. This study showed that cross-border M&As result in geographically dispersed R&D, which makes it hard for the new entity to use co-located and cross-functional teams in the R&D organization. Therefore, it would be interesting to study if GPD is actually a product of an increasing amount of cross-border M&As, and also if firms that prior to M&As already use GPD achieves more synergies than firms that do not use GPD.

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Appendix 1 – The categorization process

