Mergers in the Pharmaceutical Industry
The Impacts of Mergers on R&D Activities of Large Pharmaceutical Companies

- Gothenburg School of Business, Economics & Law -

Key words: Mergers, Pharmaceutical, Research and Development
# Abstract

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## Background & Problem Discussion:
The pharmaceutical industry is characterized by many industry-specific conditions that differentiate pharmaceutical firms from other industries. These conditions have motivated large pharmaceutical companies to merge with or acquire other companies in order to develop their capabilities. However, several industry experts and studies show that such strategies have had negative impacts on the R&D activities of firms and their abilities to meet the perpetual need for pharmaceutical products that society demands.

## Aim & Purpose:
The purpose of this report is to develop a deeper understanding into how mergers have impacted Research & Development units of large pharmaceutical companies. Previous studies have been conducted with similar purposes yet from a quantitative perspective. This study will aim to supplement such studies using a qualitative perspective in order to see if there are variables outside those used in previous studies that are significant to the subject matter.

## Methodology:
A qualitative approach is used to meet the purpose of the study. Primary data has been produced from two perspectives through interviews with industry experts and secondary data has been collected to solidify the analysis in the form of theoretical framework, references to empirical sources, and composed to case studies of recent mergers.

## Results:
Having compared the empirical research to primary data and recent case studies, the authors of this report have found that there is little evidence in congruence between the subjective views of various industry experts. Furthermore, the qualitative approach to a problem well documented and concluded by quantitative studies has questioned the variables and parameters used in these studies. The majority of experts see mergers as necessary tool as pharmaceutical companies transition adapt to the contemporary expectations of the modern industry.

## Acknowledgements:
The authors of this study would first and foremost like to thank the respondents who sacrificed their valuable time to be interviewed. With out them, this study would not have met its completion. Furthermore, the authors are incredibly grateful for the individuals who helped connect the authors with the respondents. These individuals were the lifelines to primary data gathering. Last but not least, the authors would like to share their gratitude for the valuable feedback that was given by thesis supervisor Hans Jeppsson and peer students during the process of writing this study.
Glossary

**Acquisition:** A corporate action where a company buys all shares of the targeted company.

**Big Pharma:** The largest pharmaceutical companies in the world.

**Biologics:** Medical product manufactured in or extracted from biological sources, also called biopharmaceutical.

**Blockbuster:** A successful drug that often is the main income for a pharmaceutical firm until the patent expires, generating more than $1 billion of revenue each year for the pharmaceutical company that sells it.

**eNPV:** Extended net present value, NPV of an investment or a project with real option calculations.

**Generic drug:** A non-branded drug that is comparable to a brand/reference listed drug product in dosage form, strength, quality and performance characteristics, and intended use. Generic drugs are virtually identical to an already existing drug on the market for which the patent protection has expired. Generic drugs are less expensive as they do not emerge from costly R&D but are based on already existing R&D.

**M&A:** A term for both Mergers and Acquisition that is commonly used within large firm transactions.

**Me-too drugs:** A new drug that structurally is very similar to an already existing drug and thus does not represent any new discovery.

**Merger:** A combination of two or more companies, where shareholders of the acquired company often will be offered shares in the new company in exchange to surrender their stock.

**Molecules:** Chemical compound.

**NME:** New Molecular Entity. A drug containing an active molecule never before approved by regulatory bodies or marketed.

**NPV:** Net present value, the present value of future cash flows of an investment or a project less initial outlay.

**Oncology:** A branch of medicine that deals with cancer.

**Pharmacokinetics:** The movement of a drug through the body, in-through-out.

**Phase I:** Test of drugs on healthy volunteers and determines if the drug is safe to use for the purpose.

**Phase II:** Testing on patients where the safety and function of the drug is analyzed.

**Phase III:** Testing on patients where the safety and function of the drug is analyzed as well as the potential effect of the drug.

**Pipeline:** Referring to the drugs that the company has in its portfolio, at various stages of development, including drugs in early stages.

**Pre-Clinical:** Test of new drugs on non-human subjects.

**R&D:** Research and Development is a general term for developing new drugs through innovating science.

**RNA interference:** A biological process in which RNA molecules inhibit gene expression, typically by causing the destruction of specific mRNA molecules. This process shows promise for future therapeutic purposes.

**RNA:** Short for "ribonucleic acid" which is a chain of nucleotides, similar to DNA in structure, but different in function.

**Term sheet:** A non-binding agreement that sets the basic terms and conditions under which a potential M&A deal will be made.

**Therapeutic areas:** Broad targets for medications, for example infections, dermatology, gynecology, diabetes, cardio-vascular diseases, oncology, neurology etc.

**Vaccines:** A biological preparation with properties that mimics disease but without causing disease and able to trigger the immune system in a way that generates lasting immunological memory and thus protection against future encounter with the disease.
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1 Introduction & Background

1.1 Mergers in the Pharmaceutical Industry

The pharmaceutical industry is characterized by many industry-specific conditions that differentiate pharmaceutical firms from other industries. Historically, the largest firms, referred to as “Big Pharma”, often owe their successes to their historical achievements in developing “blockbuster drugs”. With substantial revenues from such drugs throughout the duration of their patents, firms can funnel funds into their research and development units in order to discover new drugs.

Although blockbuster drugs can ensure the survival of a firm and the sustainability of profits over the long run, the chances of such a pharmaceutical being discovered and penetrating the market are extremely slim. Drug production is characterized by high cost, high risk and long development timelines. Only one out of 10,000 conceptual drugs reaches the market, which is followed by a 7 to 14 year duration. Only 3 out of 20 approved drugs break even. Only 1 out of 3 drugs cover costs from previous failures. Furthermore, government bodies tightly regulate the industry in order to ensure fair pricing towards consumers, social benefits, health and safety criteria, and sustainable competition. (Ravenscraft & Long, 2000)

Following the 1984 Hatch Act, the development of generic drugs, drugs that perform the same function as an already existing drug, became all the more advantageous in terms of costs. Although its effect was delayed by various factors, by 1992 the market gained trust towards generic drugs. The increasing number of generic drugs and “me-too” drugs has generated fierce competition between pharmaceutical companies since the 1990’s. It is under these premises and with the large cash positions from blockbuster drugs that large pharmaceutical companies ignited a merger wave in the quest for products, competence, patents and market power. (Ravenscraft & Long, 2000)

Even today, the pharmaceutical industry is characterized by M&A activity where the largest companies are in the process of acquiring targets with promising pipelines. Recent events, where Actavis intervened as a “white knight” in the takeover attempts
issued by Valeant for Allergan, was addressed by an article in *Financial Times* (2014):

“[…] This deal was always about more than price. It was a fierce battle for the soul of modern pharmaceuticals, with two competing visions of what 21st century drug making is all about.”

Thus, for the long-term prosperity and competitiveness of the pharmaceutical industry, new products need to be developed and fed into the product portfolio, which in turn entirely depends on the availability of a healthy R&D activity.

1.2 Problem Discussion

In the past decades, there has been a high frequency of merger activity in the pharmaceutical industry, with large companies merging with or acquiring other large companies or smaller companies. Although the motives for mergers and acquisitions have varied, they have the mutual ambition to promote better financial and operational performance as an aggregation of organizations. However, this notion has been met with resistance from various current and former stakeholders as well as experts in the fields of Research and Development (R&D), who claim that mergers and acquisitions undermine the performance of R&D activities.

“It is argued that although mergers and acquisitions in the pharmaceutical industry might have had a reasonable short-term business rationale, their impact on the R&D of the organizations involved has been devastating.” (John L. LaMattina, Former president of Pfizer Global Research and Development)

The rationale in the above mentioned citation stems from the general understanding that mergers and acquisitions are followed by efforts to reduce costs, enhance revenues and consolidate assets and capabilities (Ravenscraft & Long, 2000). There is a widespread concern that these efforts, particularly the reductions in R&D spending, inhibit corporate R&D units’ abilities to be innovative, productive and progressive.

Grabowski & Kyle (2008) echoed the aforementioned concern in a study whereby they quantitatively analyzed the progressions of projects in the pipelines of pharmaceutical companies that had been involved in mergers and acquisitions. The
study was executed using samples of large and small pharmaceutical firms in order to perform regression analyses on project advancements and controlling for certain variables. They found that although many large companies had managed to mitigate short-run issues, there was frequent underperformance of R&D activities in the longer run and little evidence suggested that it would improve. What the study conducted by Grabowski & Kyle does not account for is the qualitative parallel to their study, as experienced by those individuals who have been exposed to and have helped form the pharmaceutical industry as it is today. Furthermore, other studies around the same time produced similar results using quantitative methods. If one were to use these past studies as the backdrop for current analysis and foundation for conclusion it would mean a disregard for the dynamic nature of the contemporary pharmaceutical industry. In making such an analysis one does not take into consideration the fact that there are many variables that are not accounted for when drawing conclusions from past events. Such analyses are defined by *ceteris paribus* or “all other things held constant”. The authors of this study believe that recent and qualitative data may offer complementary, contrary or alternative views regarding the aforementioned concerns for the decline of R&D performance in large pharmaceutical companies following mergers.

1.3 Questions

| How do mergers impact the performance of R&D activities in large Pharmaceutical Companies? |

The above question builds on the arguments issued by the studies and claims voiced by industry experts as presented on the problem discussion. The initial assumption builds on these claims, namely that mergers have an unfavorable impact on the performance of R&D activities in large pharmaceutical companies. This question is the central research question that the study builds on. The answer to this question will be motivated by an answer to the sub question stated below.
Are the arguments and findings, as voiced by several experts and quantitative studies, in consensus with the statements of the respondents introduced in this study?

Answering this question will shed light upon whether the arguments raised by respondents through structured interviews are conflicting or complementary to the claims that mergers have a negative impact on R&D activities. The answer may also introduce alternative explanations. For instance, the cause and effect of underperforming R&D activities does not necessarily have to be owed to mergers but rather external circumstances such as changes in the industry.

This question also introduces a limitation to the central question and the applicability of the study in a wider context, as the answer will be determined by the authors’ interpretation of the empirical research as well as the choice of respondents. One cannot conclude for instance that mergers are indisputably detrimental to R&D activities when the selection of empirical sources and respondents is limited.

1.4 Purpose

The purpose of this report is to develop a deeper understanding into how mergers impact Research & Development units of large pharmaceutical companies.

Acknowledging the fact that individuals associated with the industry and readers of this report will have biased opinions, the authors aim to project information that may solidify the readers’ understanding of the subject matter by exemplification through case studies and interpretation of industry experts.
2 Methodology

2.1 Type of Study
In contrast to the more mentionable studies on the matter, this report builds primarily on qualitative research. Pathak et al. (2013) state that although qualitative research is less reliable than quantitative data as the latter can be measured and certified by other researchers, it generates non-numeric data that increases understanding of individuals’ beliefs, experiences and attitudes. In an industry that is heavily dependent on the human factor, with throughput of pharmaceutical products stemming from the application of knowledge to experimentation, such data deserves careful attention in extension to the quantitative dimension of the problem.

2.2 Framework of the Study
Research to this study has been built upon three components. The first component consists of empirical sources that constitute the theoretical framework of the study. The second component is case studies. Bryman & Bell (2005) argue that case studies allow for a more in-depth understanding of past events. Although the case studies have been produced by the authors of this report, they serve to project the outcomes of mergers that have appeared in recent years based on empirical secondary data. The main source for primary data and the final component is derived from structured interviews with industry experts. Structured interviews, as described by Holstein & Gubrium (2003), are aimed at coordinating conversations with respondents in a manner that derives desired information.

An analysis ties together the primary data with the empirical research and is supplemented with examples and findings from case studies in order to produce a final conclusion.
2.3 Collecting of Data

2.3.1 Primary Data

Responses collected from respondents during the interviews constitute the primary data in this report. This data is qualitative by nature and builds on a series of structured interview questions that have been revised by an industry expert in order to ensure robustness and consistency with the aim of the study.

The respondents have been selected on behalf of two perspectives, “Concentrated” and “Panoramic”. The “Concentrated” perspective applies to respondents that work for a private firm and whose primary task is to operate in goal congruence with that firm. The “Panoramic” perspective is applicable to those respondents who are not working for one firm in particular, but whose efforts are projected onto a network of organizations and firms. Respondents will be presented further in Chapter 5.

![Diagram of Company A and B](image)

The “Concentrated” perspective is illustrated to the left. Respondents are responsible for working in congruence with employees and the company’s goals. A cross-company relationship would imply that the respondent works primarily in favour of the industry (the field in which companies are branched) rather than at the primary interests of the company.

In contrast to the “Concentrated” perspective, the “Panoramic” perspective branches different companies to the work of the respondent, imitating the nature of an
industry. In other words, the Respondent works on behalf of industry interests as his/her work applies to all companies and organizations involved in the network. The authors therefore assume that the goals of the respondent prioritize the needs and demands of the industry before a specific firm.

2.3.2 Validity & Reliability of Primary Data
Hermon & Schwartz (2009) owe issues of validating qualitative research to factors such as credibility, transferability, conformability and dependability. One cannot neglect the inevitable response bias of interviewees, which concerns the notion of credibility. For this reason, the interviews have been conducted with individuals that have an in-depth knowledge of the industry as a whole. Although they will assumedly speak in defense of the organization(s) that they are associated with, their positions in the organizations and years of experience strengthen the credibility of responses. The issue of bias has been somewhat mitigated by interviewing individuals from both the private and public sector as private benefits can be weighed against social benefits. Furthermore, by keeping the respondents anonymous, their identities and stakes have been protected which relieves pressure to speak on behalf of the respective organization and not from the individual’s own beliefs.

2.3.3 Secondary Data
Church (2002) defines secondary data as which the author of a study uses, yet has not generated him/herself. Sources of secondary data that have been used in this study are financial reports, academic literature, scientific articles, newspaper articles, case studies, Bloomberg terminals and transcripts from press conferences.

In order to offer a clear representation of the information provided by secondary sources, data has been compiled into case studies. These case studies enable readers to see the connection between financial figures and claims made public by stakeholders and experts in media. Furthermore, it develops a bridge between the theoretical framework of the study and the untested data collected from the respondents in the interviews.

2.3.4 Validity & Reliability of Secondary Data
The credibility of secondary data relies heavily on the credibility and accuracy of its originator. For this reason, the subjectivity or role of the author and the public approval of the authors’ claims must be carefully examined. Although the authors of
this report have conducted the case studies, they build on information provided and made publicly available by the corporations involved in the cases. The issue of asymmetric information undeniably impacts the validity of these case studies and readers should take heed of this.

2.4 Limitations

Brutus, Aguinis & Wassmer (2013) state that limitations not only need to state the shortcomings of a study’s research, but also how these shortcomings impact the interpretation of the research. In the context of this study, limitations aim to place constraints on the extent to which the study can be generalized as well as complementing the parameters of the chosen methodology.

2.4.1 General Limitations

Three cases of mergers have been portrayed by case studies to support the research entailed in this study. Firstly, the term “merger” has been defined and used ambiguously among sources. In this study, “mergers” are defined as deals where the value of the transaction exceeds $20 billion and where the sizes of the two firms are relatively equal in size.

Another aspect of this study’s terminology that presents an issue to the authors’ research is the manner in which mergers and acquisitions (or M&A in writing) have been used interchangeably by interviewees and other sources. This study focuses on mergers, however where the authors of the study have been uncertain as to whether a statement concerns both mergers and acquisitions or whether it is the result of a linguistic simplification on behalf of the source, “M&A” has been used to brace against discrepancies.

2.4.2 Case Study Limitations

The choice of mergers were based on the following criteria: the mergers must have occurred after year 2000 in order to distinguish them from merger waves of earlier years. Furthermore, a significant amount of relevant empirical data surrounding the mergers must be accessible to the public. The latter criterion supports the former as sources such as financial reports and online databases are limited prior to the expansion of the Internet.
The depth and scope of the case studies differ primarily due to the accessibility of relevant data. This limitation questions the ability of the case studies to represent past events to the extent that can be reliable and conclusive. This has resulted in a degree of incomplete information and so rather than analyzing past merger cases through the lenses of case studies, the authors use data from past mergers to supplement empirical research through the concentration of scattered data into eloquent case studies.

2.4.3 Limitations of the Interview Process

The selection of respondents adds strict limitations to the applicability and generalization of this study in a wider context. Every respondent is unique, and the data collected may be affected by factors such as the time period, method of interviewing and the author’s manner in which the answers have been interpreted. With respect to this, the study cannot apply to any other context than that of its present form. However, it may supplement and/or complement research in areas of relevance in manners that other researchers see fit.

2.5 Choice of Mergers for Case Studies

A dominating reason for the selection of mergers presented in the case studies is the availability of information. The Pfizer-Wyeth merger was richly documented and Pfizer has made public data that the authors of this study believe to be significant for the study. Furthermore, the Pfizer-Wyeth merger has been mentioned numerous times in media and Pfizer acts as a focal point for much of the critique pointed against mergers in the pharmaceutical industry.

Public data regarding the merger of Sanofi-Synthélabo and Aventis has to the author’s knowledge been limited. However, the case offers a presentation of a merger that was conducted under different conditions than most mergers which makes the strategic aspects surrounding the merger stand out.

The merger of Merck and Schering-Plough differs from Pfizer’s merger with Wyeth in terms of outcomes and therefore adds weight to argumentation against generalizing claims that support excessive cost cuts following mergers by the likes of the Pfizer-Wyeth merger.
3 Theoretical Framework

3.1 Drug Development in Different Stages

*Figure 3.1*

Figure 3.1 illustrates the typical drug development process and its stages. The drug development is preceded by the identification of unmet medical needs where the aim is to find chemical compounds or biologics that can be developed to a new drug candidate with the aim to cure or alleviate disease. The discovery phase comprises the identification of a large number of potential chemical compounds that are screened down to a lower number of compounds with the desired properties. The preclinical phase is when the drug candidate is tested on animals in order to confirm that it should be safe to proceed towards clinical studies on humans. In clinical trial phase I the drug is tested on volunteers to evaluate its safety and pharmacokinetics. In phase II, 100 to 200 volunteers are testing the drug to evaluate the safety, potential side effects, and optimal dose. In phase III, about 1000 to 3000 patients are included in the research to monitor side effects and to test effectiveness, also to establish additional information about the drug to be safe for usage. It should be noted that a large proportion of drug candidates are rejected at each of these steps. After going through Phase I-III, the drug must receive an approval from an external authority. This is a crucial step for the firm since the verdict of the authority may jeopardize the drug's survival. The decision is made after having examined all data regarding the drug, including safety monitoring, efficacy, and any additional information. The final step in the process is to launch the drug on the market. This is when the financial harvest begins for the pharmaceutical company and the drug that reaches the market will hopefully start to pay back for development expenses for it and other drugs that failed or had to be discontinued. Once the drug is placed on the market, a race against the clock begins, as the blockbuster effect will likely fade significantly once the patent expires. (PhRMA, 2007; Novartis, 2015)

3.2 Mergers

Berk & DeMarzo (2014) identify the participants of a merger or acquisition as the acquirer, or bidder, on the buy side and the target firm on the sell side. The process of
both manners of takeover, merger or acquisition, involve the acquirer purchasing stock or assets of the target for cash or something else of equivalent value. The merger transaction’s structural representation comes in the form a term sheet.

According to Berk & DeMarzio (2014), merger waves, or periodical concentrations of heavy merger activity, are frequent during bull markets. The economic activities that motivate expansion seem to trigger merger waves. In the context of the pharmaceutical industry, Ravenscraft & Long (2000) state that merger waves have occurred in response to increased buyer power, regulatory control, and increased competition from generic drug producers. The merger waves were enabled due to the large amounts of cash that large pharmaceutical companies had obtained during economic booms that allowed high price settings and monopolistic supplier conditions for patent protected blockbuster drugs.

An acquisition premium, defined as the difference between the acquisition price and the premerger market value, is usually offered to the target firm upon a merger. The motivation for paying a premium, which in its essence contradicts the theory that stock market investments yield a null NPV, is the belief that the obtainable synergies of a merger will compensate for the value of the premium.

3.3 Empirical Case studies

Some of the synergy effects that apply to the pharmaceutical industry are reflected upon in an article by Ravenscraft & Long (2000). They state that large pharmaceutical mergers create value by reducing costs and enhancing revenue. The cost savings are owed to economies of scale and/or scope, elimination of excess capacity and elimination of inefficiencies. Revenue enhancements are said to have been achieved by expanding market reach and product portfolios as well as being able to implement new technologies and increasingly elaborate intellectual capital. According to Ravenscraft & Long (2000), the inconsistent cash flows of pharmaceutical companies owed to dependencies on blockbusters further motivate mergers in the pharmaceutical industry as R&D can be funded internally. The substantial profitability of blockbusters is limited by patent duration. When these patents expire, potential mergers tend to be actively contemplated.
As a comment to Ravenscraft & Long, Gertner (2000) emphasized the prevalence of large-scale pharmaceutical mergers for the acquisition of market power. For instance, if two firms are competing on the basis of research and development, an acquisition of the rival R&D unit can have significant advantages to the acquirer.

In the case of the Glaxo-Wellcome merger that has been studied by Ravenscraft & Long (2000), the merger was believed to be successful. The merger allowed the merged company to close major manufacturing plants in different geographical locations, downscale their workforce substantially and consolidate related assets. Research costs were reduced by a prioritization of projects, where projects in the later phases were prioritized over early-stage projects. Marginal projects were put on hold or disregarded. In terms of revenue enhancements, the merger allowed for a broader product line due to the consolidation of best practices, expansion of global reach, technological and scientific gains and the instatement of a new corporate culture.

**Figure 3.3**

![Cost savings from horizontal pharmaceutical mergers](Adopted from Ravenscraft & Long [2000], derived in turn from a Morgan Stanley presentation)

Figure 3.3 represents an exemplified process of cost cutting in the cost structure of pharmaceutical firms, pre- and post-merger, that would yield an increase in operating profit. The graph emphasizes the notion that combined business units can incur proportionately less expenses as synergy effects are realized and excess capacity disposed of.
One major success factor of the Glaxo-Wellcome merger that Ravenscraft & Long (2000) emphasize upon was the swift post-merger integration process, which is necessary in order to minimize disruption costs. However, even though the integration plan was carried out over 9 months, GlaxoWellcome faced several issues in the form of key employee losses, necessitated prioritization of cheap infrastructure over “best” infrastructure and the need to reeducate a reformed sales force. Furthermore, the approaches to merging R&D efforts were notably misconducted. Rather than benefiting from economies of scale by sharing expensive laboratory equipment, GlaxoWellcome seemed more concerned with reducing headcounts and cancelling or delaying projects. According to Ravenscraft & Long (2000), this practice hints towards the tendency to substitute internal R&D for external R&D. Gertner (2000) stresses the impacts of mergers on R&D. Although R&D is to be carefully considered during mergers, the effects on output from downscaling R&D may be visible only in the very distant future.

A case study conducted by Mittra (2006) analyzes a merger in 2004 between Sanofi-Synthelabo and Aventis. The study addresses the complexities and challenges that characterized the merger with reference to the involvement of the French government in the merger process.

First and foremost, it is significant to underline part of the theoretical framework that builds to this case study. The author references recent studies suggesting that innovation systems and strategic management have questioned the conventional notion that M&A activities and their outcomes is the product of rational assessments of tangible financial and technological assets. Instead, contemporary literature stresses the importance of weighing in variables such as internal culture and positioning in the global value chain. (Mittra, 2006)

Mittra (2006) argues that pharmaceutical companies increasingly engage in cross-border mergers and acquisitions in search of knowledge, elaborated product portfolios, expertise and market penetration. All the while, firms are trying to manage innovation and productivity shortcomings. Mittra continues by illustrating the contemporary trend in pharmaceutical R&D in saying,

“The globalization of pharmaceutical research and development, reflected in the geographic fragmentation of research discovery, manufacturing and marketing
capabilities, is constitutive of a broader inter-industry trend towards international and supranational merger and acquisition activities within the modern global economy”

To effectively implement synergies and gain efficiencies following M&A, firms need combinational potential. Combination potential depends on “economies of sameness”, where similar operations are consolidated, but can also be dependent on “economies of fitness”, where different but complementary operations are combined. The latter is supported by the arguments of Larsson and Finkelstein (1999) who state:

“...Strategic differences can create opportunities for synergistic complementarities by combining different operations that enhance the competitive position of the resulting entity”

Furthermore, the theoretical framework in the study emphasizes the importance of national cultures and the consequences that follow cross-border mergers. The political and cultural landscape of a nation or society can have a significant impact on the outcome of mergers. Especially in the context of Europe, it is stressed that although post-merger facility terminations and job losses may be justified and even necessary from a “business perspective”; they are likely to meet resistance from broader civil society and the political institutions of that society. (Larsson & Finkelstein, 1999)

3.4 Quantitative Studies

Higgins and Rodriguez (2006) produced a quantitative study addressing the effects of outsourcing R&D via acquisitions among pharmaceutical companies. The study has been conducted using a sample of 160 acquisitions with firms that were involved in strategic alliances between 1994 and 2001. Using a “desperation index” based on expected patent duration of marketed and pipeline products they found that positive post-merger returns were positively correlated to prior alliances between parties. They highlight the importance of R&D for the health and prosperity of companies in the pharmaceutical industry, specifically through careful management of R&D pipelines, thereby focusing their research around the effects of R&D following M&A. They conclude in their study that, on average, firms that have engaged in mitigating the issue of information asymmetries prior to acquisitions have been able to avoid the winner’s curse. Furthermore, firms who have experienced deterioration of pipelines have been more inclined to engage in acquisition activity.
These activities have on average stabilized or reversed the deterioration of the pipelines. However, there is little evidence suggesting how these effects evolve in the long run.

Danzon, Epstein & Nicholson (2007) produced a study that extends on the research of Higgins & Rodriguez in order to account for long-term effects of mergers and acquisitions. Using a multinomial logit model to test numerous competing hypothesis, they measured firms’ propensity to merge based on a sample of 383 firms, subdivided into “Large firms” (minimum of $1 billion in enterprise value, n = 213), and “Small Firms” (minimum of $20 million in sales in at least one year yet with an enterprise value below $1 billion; n = 170) with observations from 1989 to 2000. They then analyzed various firm-specific performance measures controlling for the firm’s propensity to merge. In their study, they conclude that there is no evidence that firms involved in pre-merger R&D relationships, or strategic alliances, mitigate R&D issues related to pipeline gaps in the long run. Furthermore, their findings state that large firms with high propensity to merge (as a response to distress and underperformance) did not yield significantly different performance measures between those that actually merged and those that did not. For smaller firms, the authors suggest that those that merged witnessed lower R&D growth than those that did not merge, which suggests that funding is allocated from R&D to address other needs. In short, Danzon et. al. (2007) conclude,

“Thus, although merger in the pharma-biotech industry is a response to being in trouble for both large and small firms, there is no evidence that it is a solution.”

A study conducted by Grabowski & Kyle (2008) addresses the concept of R&D productivity. R&D pipeline data was collected from a sample of large and small pharmaceutical firms in order to perform regression analyses on project advancements in pipelines with respect to variables such probability of advancements and firm size. The authors conclude that the mergers in the sample that had been conducted in response to R&D pipeline issues did not improve the performance of R&D activities within a five-year time frame. The authors also echoed the notion that mergers of large pharmaceutical companies were a result of pipeline gaps, and that some of these gaps had been mitigated in the short run. However, the authors present a more optimistic view on strategic alliances, whereby a biotech company complements the
R&D performance of large pharmaceutical companies at various stages or areas of the pipeline. The authors also make reference to a study that suggests firms involved in a broader range of research activities were more productive than niched firms.

The aforementioned studies have based their conclusions on quantitative analyses on firm performance with emphasis on R&D activities. The research suggests that the nature of the outcomes vary depending on motives, operational size of the companies and the choice of combination strategy.

3.5 Media & Other Empirical Sources

To reiterate the effects of mergers and acquisitions and their impacts on R&D, John L. LaMattina (2011) has expressed concerns regarding the outcomes, based on his experience as president of Pfizer Global Research and Development. In a comment, he mentions studies that suggest that the amount of drug approvals during 60 years prior have been correlated with the firm population. According to LaMattina, realizing that major companies today are less involved in pharmaceutical R&D, there would be a significant loss of successful throughput. This claim is supported by evidence concerning major investment cuts in R&D.

LaMattina (2011) examines the integration process and its impact on R&D. He emphasizes the delicate nature of the R&D field due to the commercial sensitivity of the pipeline and the difficult transferability of intellectual property. These conditions demand extensive reviews of projects, where Phase III projects are prioritized and early-stage projects are reviewed last. This, coupled with actually intertwining the processes practiced by the pre-merged firms, result in a lengthy lag that severely impacts the R&D units as the undertaking of new projects is neglected. All the while, social consequences such as declines in motivation may be expected to impact the working staff.

An article produced by Dhankhar, Evers & Möller (2012) at McKinsey&Company describes their perspective on the the situation of pharmaceutical R&D. They agree at that the pharmaceutical industry has witnessed a collapse in R&D productivity and innovation. According to them, average economic return on R&D has dropped from between 13 and 15 percent in the 90’s to between 4 and 9 percent in the past decade.
Furthermore, they estimate a 50% decline in success rates of projects, while the cost per program has near doubled.

The reason for this “recessive” nature of the R&D landscape, as argued by Dhankhar et. al. (2012), is due to various reasons. Firstly, the regulatory climate in the pharmaceutical industry has had limited development. Secondly, they claim that pharmaceutical firms spend too much time and resources processing projects that have low quality and that are eventually discontinued in the second and 3rd phase of the development process. Thirdly, it is argued that, “Most low-hanging fruit has already been picked”. What is implied is that some firms are spending resources on “simplistic” and similar medical needs, whereas others are venturing in more complex and less frequented areas of science that have not yet matured and are faced with uncertainties. Fourthly, as the interest in personalized medicines is increasing, innovation through differentiation is becoming a significant obstacle for firms as this novel method of care segments the therapeutic areas into niches, forcing drugs to be all the more specific in their functions. Finally, the authors emphasize that overcapacities that emerged following the bull markets of the 90’s have been carried on to this day. As of a result, R&D restructuring, site closures and M&A have prevailed in recent years.

Although the aforementioned description may seem concerning, Dhankhar et. al. (2012) express optimism towards the future of the pharmaceutical industry. They state that, firstly, regulatory bodies are beginning to adapt to contemporary science. Secondly, the public sector is becoming increasingly involved in developing competence that may catalyze the breakthrough of novel technologies such as personalized medicines.

Dhankhar et. al. (2012) offer guidance as to how the R&D of pharmaceutical companies should be revised. They argue that R&D pipelines should be measured by quality of the projects and not the quantity and that R&D budgets should not be pegged to a percentage of sales, but should be flexible to the opportunities that present themselves. Furthermore, researchers should receive improved incentive schemes and should be empowered to work as independent R&D boutiques rather than being centralized by corporate governance and control.
4 Case Studies Based on Empirical Research

The following case studies have been produced from financial reports, figures from Bloomberg Terminals, conference transcripts, articles, and corporate web pages. These case studies are aimed to inform the reader on various mergers in recent history, as well as to summarize and present empirical research in a manner that will complement an analysis of primary data.

4.1 The Merger of Pfizer and Wyeth

4.1.1 Background and Motives for Merger

In the Pfizer-Wyeth merger announcement on January 26, 2009, former CEO of Pfizer Jeff Kindler outlined the different opportunities that Pfizer could capitalize on following a merger with Wyeth. These opportunities included enhancements of their patent-protected portfolio in key areas, strengthening in the areas of biotherapeutics and vaccines, accelerating growth in emerging markets, developing opportunities for mature products and establishing a lower and more flexible cost base. Furthermore, Jeff Kindler addresses the issue of their top drug Lipitor’s loss of exclusivity and how the acquisition will mitigate declines in revenue. However, what is emphasized to be of utmost significance is stated as follows,

“And finally and fundamentally, this deal will significantly enhance the ability of our world-class people to advance our core mission, applying innovative science to improve world health.” – Jeff Kindler, CEO of Pfizer

During the announcement, Pfizer stated that the transaction would contribute $4 billion in synergies. 50% of the synergies would be achieved within a year after the close, 75% within two years after the close, and 100% within the first three years after the close. (Pfizer Conference Transcript, 2009)

4.1.2 Pfizer’s Research & Development

A significant share of R&D activities is performed internally. However, there is focus on expanding their pipeline through external partnerships in the form of contractual agreements, collaboration and acquisitions in order to acquire compounds and optimize technologies and capabilities. Pfizer’s main R&D areas are immunology and inflammation, cardiovascular and metabolic diseases, oncology, neuroscience and pain, and vaccines.
In 2011, 2012 and 2013, Pfizer reports R&D expenses of $8,681 million, $7,482 million and $6,678 million respectively. Measured as percentages of revenues, the aforementioned figures yield 14.2%, 13.7% and 12.9% respectively. According to Pfizer, this decline is owed to a $250 million payment to AstraZeneca in 2012 to acquire patent rights for a drug called Nexium as well as implementation of cost-reduction and productivity efforts. (Pfizer Annual Report, 2013, 2011)

Pfizer’s R&D is organized into a number of matrix organizations. Research spending occurs within the Worldwide Research and Development Organization, which deals with projects that have yet to achieve proof-of-concept. Research spending decreased by 15% from 2011 to 2012 and 1% from 2012 to 2013. Projects that have achieved proof-of-concept and are undergoing further development are allocated and paid for within the various Business Units. Science-based and platform-services organizations bear a significant proportion of total R&D spending. These organizations provide consulting services to the various projects as well as dealing with non-science-based functions such as business technology and finance. The Science-based and platform-services organizations address all R&D operation segments; therefore expenses weigh these organizations significantly rather than specific R&D areas. (Pfizer Annual Report, 2013)

*Figure 4.1.2*

*Graphs illustrating Pfizer’s R&D expenditures and projects in the pipeline between 2008 and 2013.*

*Source: Pfizer Annual Report (2013), Bloomberg Terminal*
4.1.3 Cost Reduction Actions

Following the acquisition of Wyeth, actions to eliminate duplicative facilities and install rationalization were undertaken. Manufacturing plants amounted to 59 after the acquisition of Wyeth. 11 sites were closed, and 8 sites were added as a result of further acquisition activity. By December 2013, Pfizer had 56 sites operational. (Pfizer Annual Report, 2013)

After the Wyeth acquisition, Pfizer had 20 R&D sites. Several of these sites, along with projects and therapeutic areas, were closed or rationalized in order to promote R&D productivity and strengthen Pfizer’s prioritized areas. These actions included but were not limited to the closure of their R&D facility in Sandwich, UK as well as R&D sites in Aberdeen and Gosport, UK. A number of further closure or rationalized actions are planned. (Pfizer Annual Report, 2013)

Headcount decreased from 2009’s approximated 130,000 employees to 77,700 employees in 2013. This figure includes the disposition of their subsidiary Zoetis in 2013, resulting in a 9,300 staff reduction. (Pfizer Annual Report, 2013)

On February 1st 2011, Pfizer announced the commencement of R&D productivity initiatives that would optimize innovation and productivity by prioritizing and strengthening segments that had the most scientific and commercial promise and were assumed to be able to deliver most value in the short and long run. (Pfizer Annual Report, 2013)

Costs associated with acquisitions and productivity initiatives were $1,704 million in 2013, $2,775 million in 2012 and $4,415 million in 2011 (translates into YoY percentage changes of 39% (13/12) and 37% (12/11). (Pfizer Annual Report, 2011)

According to Pfizer, acquisition-related expenses are allocated towards executing transactions, integration efforts, consulting charges and restructuring charges (such as dismantling of assets and lay-offs). Productivity/Cost-reduction plans incur expenses when closing or rationalizing facilities and sites, reducing headcount and expanding shared services. Cost-reduction goals for acquisition expenses were achieved in 2011, a year in advance of the target year. By 2013, cost-reduction and acquisition-related costs since 2005 had amounted to $16.3 billion. (Pfizer Annual Report, 2013)
Figure 4.1.4

This graph represents revenues and operating expenses in billion USD from Pfizer’s pharmaceutical products between 2008 and 2013.


4.1.4 Revenues from products

Figure 4.1.4 represents the revenues from pharmaceutical products from 2008 to 2013. A significant factor affecting these revenues was the drug Lipitor that recorded revenues of above $10,000 million from 2007 to 2010, $9,577 million in 2011, $3,948 million in 2012 and $2,315 million in 2013. Lipitor’s patent expired 30 November 2011. Prior to the merger, Lipitor stood for more than 25% of pharmaceutical revenues. This leads us to assume that one major incentive for merging with Wyeth’s was to offset future revenue reductions with revenues from Wyeth’s product portfolio.

In 2012, Pfizer reports Lipitor falling to a second place behind Lyrica in terms of revenue size. Following up are Enbrel and Prevnar 13- two products acquired from Wyeth. The cumulative revenues of the former Wyeth blockbusters and Lipitor are level with Lipitor’s contributions to revenue prior to its patent expiration. Although there are a lot more products and factors to take into consideration when managing merging product portfolios for revenue enhancement, this hypothesized reasoning exemplifies the traditional rationale behind revenue enhancements in M&As. (Pfizer Annual Report, 2013, 2011, 2009)
4.1.5 Pfizer’s Pipeline
On January 27, 2010 Pfizer reported a total of 133 projects in their pipeline, of which 49 were in Phase 1, 44 in Phase 2, 34 in Phase 3 and 6 undergoing registration. About half a year later, or roughly a year after the date of acquisition, Pfizer reported 46 projects in Phase 1, 37 projects in Phase 2, 26 projects in Phase 3 and 9 projects in registration, amounting to a total of 118 projects. 25 projects were subject to advancement since the previous update (January 27) and 31 projects were discontinued. (Pfizer.com)

Figure 4.1.5

This graph represents Pfizer’s total pipeline between 2010 and 2013. Figure 4.1.5 shows the number of projects that Pfizer had in their pipeline from 2010 to 2013. The quantities associated with the various activities in the pipeline a year after the merger are considerably different from those of 2013. On average, the observations of 2013 yield 28.5 projects in Phase 1, 24.5 projects in Phase 2, 18 projects in Phase 3, 6.25 projects in the registration process and an average total of 77.25 projects. On average, 7.8 projects were subjected to advancements and 4 projects were discontinued. (Pfizer.com)

It should be noted that there are various factors that may affect these results, such as external demand, regulatory influence and the inherent risk profiles of the projects. Another plausible explanation may be that Pfizer has actively committed to focusing on their strongest therapeutic areas. However, what is certain is that the reduction of projects in the pipeline reflects the decrease in R&D expenditures.
There is a connection with the management of the pipeline and the cost-saving efforts following the merger. The graphs in Exhibit 4.1.5 show that total projects in Pfizer’s R&D pipeline from 2010 to 2013 decrease with R&D-related expenses for those same years. One should take into consideration that the graphs are not consistent in terms of the number of observations per year. However, the relationship and trend is significant, as LaMattina states in an article (2014) on Forbes,

“The Pfizer pipeline of experimental medicines, as published on its website, is about 60% of its peak about a decade ago, despite these acquisitions. Clearly, a company’s success isn’t assured by numbers, but one’s chances are enhanced by more R&D opportunities”

One reason for the large volumes of projects in the pipeline in observations of 2010 is the acquisition of Wyeth’s product portfolio. According to LaMattina (2011), due to the value of intellectual property and commercial sensitivity of pipelines, consolidations of these are extremely time-consuming and extensive. This gives some explanation as to the high levels of advancements and discontinuation that still occurred a year after the acquisition. Understanding the process by which pipelines are consolidated brings to attention certain other matters of interest. In the experience of LaMattina (2011), Phase 3 projects are prioritized, followed by mid-stage projects, with discovery-stage projects handled last. One can only speculate on the immeasurable intrinsic value that discontinued early-stage projects bear.

4.2 The Merger of Sanofi-Synthélabo and Aventis

4.2.1 Background and Motives for Merger
The merger of French company Sanofi-Synthélabo and Franco-German company Aventis took place on December 31 2004. Although Sanofi-Synthélabo made an initial offer earlier in the year, Aventis saw the offer as an attempt at a hostile takeover. Using defense maneuvers (“poison pill”), the initial offer at EUR 47.5 billion was dropped and later revised at a premium value of about EUR 54.5 billion. The merger was pressured by the French government due to a concern that Swiss company Novartis would compete in the acquisition of Aventis and/or possibly Sanofi-Synthélabo. (Müller-Stewens & Alsch, 2006)
The Sanofi-Aventis merger is significantly different from the traditional conditions of large pharmaceutical mergers. Firstly, as previously mentioned, the French government was actively implicated in opting for the merger of the two countries, primarily for the purpose of protecting the domestic pharmaceutical industry. The concrete threat in this context was Swiss-based Novartis who showed a keen interest in acquiring Aventis. In an essay by Mittra (2006) that covers the government’s involvement in this case, he writes, “It appears that even in a globally fragmented pharmaceutical industry, national politics continue to play a crucial role in corporate restructuring.” This argument is owed the author’s belief that “national interest” to shield the French company and its operations from attempted foreign approaches contradicted the interests of the industry and the financial community.

Furthermore, Aventis was larger in size, more profitable, and had a diverse portfolio and competitive advantages in global research and marketing. In fact, Aventis’ company culture and compatibility of assets and research was a more logical strategic fit to Novartis than to Sanofi-Synthélabo. (Mittra, 2006)

Several motives for merger were identified. Sanofi-Synthélabo had 25 projects in late-stage development whereas Aventis’ 14 projects in late-stage development. Next to its competitors, Aventis late-stage R&D pipeline was underperforming. However, Aventis had a strong global reach including 37.5% of pharmaceutical sales derived from the United States, whereas 58% of Sanofi-Synthélabo revenues were contained within European markets. (Mittra, 2006)

Sanofi-Synthélabo and Aventis operated in disparate therapeutic areas, however they shared a number of the same core areas; cardiology, central nervous system (CNS) and oncology. Both companies had blockbuster drugs threatened by patent expiration and anticipated developments of generic drugs, especially for Plavix in the case of Sanofi-Synthélabo and Lovenox on behalf of Aventis. In 2006, Plavix was met by a competing generic drug developed by Apotex and Lovenox lost its exclusivity rights in June 2005. (Mittra, 2006)

The acquisition of Aventis had a significant impact on the merged entity’s capital structure. Sanofi-Aventis financial report of FY2005 states that, “We incurred substantial debt in connection with the acquisition of Aventis, which limits our business flexibility and requires us to devote cash resources to debt service
payments.” The increase in debt was owed to cash portion of the term sheet and the acquisition of Aventis’ leverage. Furthermore, the merger of Sanofi-Aventis necessitated indirect acquisitions of other organizations that Aventis’ had been in negotiations with prior to its acquisition. Nonetheless, the combine entity of these two companies made it the third largest pharmaceutical group in the world.

4.2.2 R&D Implications

In 2003, Sanofi-Synthélabo had induced $1.4 billion in their four major therapeutic areas of cardiovascular, CNS, oncology and internal medicine. This was less than half the R&D expenditure of Aventis, which were valued at $3.4 billion. One should bear in mind, however, that Aventis had twice as many major therapeutic areas (cardiology, oncology, CNS, respiratory, metabolism, arthritis, anti-infectives and vaccines where they were world leaders).

One major difference between the companies was how they conducted R&D. Sanofi-Synthélabo was a research-intensive company and conducted most of its R&D internally, without strategic alliances and without external innovation. On the other hand, Aventis complemented internal R&D with a large number of strategic alliances with biotech companies. When the merger was announced, there was widespread concern that Aventis’ strategic alliances for innovation would be compromised, in part due to the expected 1.6 billion in cost savings stipulated in the term sheet, but also in the event that Sanofi-Synthélabo internal R&D model would dominate the combined structure of R&D.

4.2.3 Headcount Management

There were 6,877 employees in the combined R&D units of Sanofi-Synthélabo, making up 20.8% of the total workforce. Aventis had 6,956 employees in their combined R&D units, or 9.2% of the total workforce. By December 31, 2004, the consolidated R&D units had 17,191 employees, or 17.8% of the total workforce. As of December 31, 2005, R&D headcount increased to 17,636 employees, or 18.1% of the total headcount. In total, the R&D proportion of the workforce decreased by 2.7% from one year pre-merger to one year post-merger. According to Müller-Stewens et. al. (2006), major headcount reductions were disallowed upon the agreement by Aventis’ Personnel Director and the Board of the Company that no acquisition-related
redundancies would be conducted prior to 2007. Instead, cost savings on workforce would be exercised through partial retirement and reductions in working hours.

4.3 The Merger of Merck and Schering-Plough

4.3.1 Background and Motives for Merger

In March 2009, Merck announced that the company had received approval to merge with Schering-Plough Corporation. Schering-Plough’s shareholders were paid a 34% premium to the closing stock price before announcement, making the total amount $41.1 billion to be paid by Merck. After the transaction was done, Merck owned 68% of the combined company, while Schering-Plough shareholders were left with 32%. (Merck Press Release, 2009)

The motives for Merck to merge with Schering-Plough were to construct a powerful consolidated R&D pipeline with double the phase III projects that Merck had before the merger. The merger also contributed to a broader product portfolio in critical therapeutic areas and expanded Merck’s international presence within Europe and emerging markets. The merger would also give the combined company strategic benefits in form of complementary product portfolios where pipelines are focused on key therapeutic areas and this would broaden Merck’s portfolio of medicines. Other motives were increased efficiencies and cost savings through synergies. (Merck Press Release, 2009 and Merck Transaction Presentation, 2009)

Figure 4.3.1

The graph above illustrates R&D expenses and R&D expenses divided by total revenues between 2008 and 2013.
4.3.2 Merck’s Pipeline

The merger doubled Merck’s number of Phase III projects to a total of 18. One of the key motives for merging was that the combined company would expand the current pipeline and be able to deliver innovative medicines. According to Merck’s board of directors, the combination was expected to create a deeper product pipeline with many promising drug candidates. The combined company also enjoyed a better financial situation and was more flexible with investing in new internal and external development projects. The merger enabled a faster expansion into therapeutic areas where Merck already had some research, as the contribution from Schering–Plough’s projects improved their expertise within oncology, neuroscience and novel biologics. Figure 4.3.1 represent R&D expenses and pipeline figures from 2008 to 2013. (Merck Deal Document, 2009)

**Figure 4.3.2**

The graph above illustrates the number of projects in Merck and Schering-Ploughs combined pipeline in various stages throughout 2008 to 2013. (Source: Merck Home Page)

4.3.3 Headcount Management

There were 11,000 people employed in the Merck’s R&D activities during 2008. This accounted for 10.4% of the total headcount of the firm. A year after the merger, the total R&D headcount was 15,500 employees. This accounted for 16.5% of the total headcount. Figure 4.4 shows that the combined total headcount of the firm decreased 10.6% a year after the merger was completed and according to the final call transcript,
both companies froze hiring after the merger was announced. The combined R&D expenses/sales increased from 19.7% to 23.9% year after the merger. (Merck annual reports, 2008, 2010)(Merck SGP Final Transcript)

4.3.4 Revenues by Geography

Merck expected to increase revenue growth after expanding the combined company’s product offerings. According to Merck’s CEO Richard T. Clark, the combined company would benefit in terms of a more enhanced R&D pipeline with a broader portfolio of medicines and better access to key global presence (Final transcript, 2009). Before merging, Merck’s total sales in the US were accounted for 56% while the combined number was expected to be around 47%. This figure was owed primarily to increasing sales in Europe and Latin America. The revenues by geographic segment are represented in the graph below (Figure 4.3.4).

Figure 4.3.4

Figure 4.3.4 presents changes in geographical presence for Merck before the merger to the combined company after the merger.

4.4 Summary of Case Studies

Figure 4.4 shows the changes in variables of the firms that were involved in mergers that have been discussed above. The post-merger results show that these mergers differentiate from each other significantly.

In the mergers of Sanofi-Synthélabo and Aventis and Merck and Shering-Plough, the R&D expenses increased the year after merging. However, Pfizer and Wyeth show a decrease in both R&D expenses and R&D/Sales a year after merger. Combined total headcount after the merger shows that all of the mergers analyzed had a decreasing work force a year after the merger. Coupled with the pipeline figures made publically
available, one can see consistencies in decreasing personnel, inconsistencies in R&D expenditures and there is not enough evidence to suggest that projects are significantly reduced in the pipelines for all cases of mergers. It comes to show that Figure 3.3 (Cost savings from horizontal pharmaceutical mergers), which showed the potential descaling of business units that inspire mergers, does not portray the mergers of Sanofi-Syntélabo & Aventis and Merck & Schering-Plough in terms of R&D cost savings.

**Figure 4.4**
(Figures in Million USD)

<table>
<thead>
<tr>
<th>Company</th>
<th>Year of Merger</th>
<th>Combined sales at time of merger</th>
<th>Combined sales year after merger</th>
<th>Increase/Decrease in %</th>
<th>Combined headcount at time of merger</th>
<th>Combined headcount year after merger</th>
<th>Increase/Decrease in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pfizer &amp; Wyeth</td>
<td>2009</td>
<td>71 130</td>
<td>67 057</td>
<td>-5,7%</td>
<td>138 926</td>
<td>110 600</td>
<td>-20,4%</td>
</tr>
<tr>
<td>Merck &amp; Schering-Plough</td>
<td>2009</td>
<td>42 352</td>
<td>45 987</td>
<td>8,6%</td>
<td>106 200</td>
<td>94 000</td>
<td>-11,5%</td>
</tr>
<tr>
<td>Sanofi-Synthélabo &amp; Aventis</td>
<td>2004</td>
<td>21 937</td>
<td>28 775</td>
<td>31,2%</td>
<td>108 653</td>
<td>97 181</td>
<td>-10,6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Company</th>
<th>Combined R&amp;D Expenses at time of merger announcement</th>
<th>Combined R&amp;D Expenses year after merger</th>
<th>Increase/Decrease in %</th>
<th>Combined R&amp;D Expenses at time of announcement as % of sales</th>
<th>Combined R&amp;D Expenses year after merger as % of sales</th>
<th>Estimated cost savings per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pfizer &amp; Wyeth</td>
<td>11 318</td>
<td>9 392</td>
<td>-17,0%</td>
<td>15,9%</td>
<td>14,0%</td>
<td>1 700</td>
</tr>
<tr>
<td>Merck &amp; Schering-Plough</td>
<td>8 329</td>
<td>10 991</td>
<td>32,0%</td>
<td>19,7%</td>
<td>23,9%</td>
<td>3 500</td>
</tr>
<tr>
<td>Sanofi-Synthélabo &amp; Aventis</td>
<td>3 686</td>
<td>4 261</td>
<td>15,6%</td>
<td>16,8%</td>
<td>14,8%</td>
<td>1 600</td>
</tr>
</tbody>
</table>

*Data Source: Bloomberg Terminal*
5 Primary Data

What follows are answers questions from interviews with various stakeholders and industry experts in the pharmaceutical industry. The respondents have been made anonymous in order to protect their identity and allow them to speak more freely. The respondents are labeled as “C” for concentrated (their work is/was concentrated towards a specific company) or “P” for Panoramic (their work is/was not primarily confined to one organization but to a network of organizations) and a number of identification.

5.1 Roles of The Respondents

Respondent P1 is a Professor who works in academia and is involved in several public-private partnerships with a number of the largest pharmaceutical companies in setting up clinical trials for the research of medicine in a specific field. The respondent has ongoing communication with senior management in several pharmaceutical companies. The interview was conducted by telephone.

Respondent P2 is Director General of an organization comprised of a major network of pharmaceutical companies aimed at promoting and accelerating innovation and R&D performance in the pharmaceutical industry, also by attracting collaboration with the public sector. The respondent works directly with senior management of the membership companies. Furthermore, he/she has multiple years of working experience at large pharmaceutical companies. The interview was conducted by telephone.

Respondent C1 is an independent consultant with multiple years of experience in large pharmaceutical companies. As of recently, Respondent C1 was Director of Program Management for a pharmaceutical company and has worked with several major companies in the past. The interview was conducted by telephone.

Respondent C2 is President of a therapeutic area in of the top 3 largest pharmaceutical companies. The interview was conducted by e-mail.

Respondent C3 is Director of Project Development one of the top 8 largest pharmaceutical companies. The interview was conducted in person.

Respondent C4 has multiple years of experience as a Professor in Medicine, along with six years where he/she was in charge of drug development in his/her area at a major company that was recently acquired. The respondent has also worked with a
smaller pharmaceutical and spent the remainder of his/her career consulting. The interview was conducted by telephone.

5.2 Interview Questions & Responses

<table>
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<tr>
<th>What is your view on mergers and acquisitions in the pharmaceutical industry in general?</th>
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Respondent C1 argues, “Unfettered business is the best way to do business”. He/she would was not in favour of restrictions on mergers and acquisitions even though he/she had been laid off three times due to mergers and acquisitions. He/she mentions that he would like to see employees get a better severance deal, especially in the United States where company decides what they believe is a “fair” severance deal. He/she summarizes his/her view by saying, “It’s a good and necessary process. I just think it has to be mitigated with a more humane attitude towards those who are laid off as a consequence.”

Respondent P1 is resistant against mergers and acquisitions in the pharmaceutical industry as it introduces obstacles to the respondent’s workflow and is unsympathetic to the bureaucracy of companies that increase their operational size.

Respondent P2 is in general positive to mergers and acquisitions in the pharmaceutical industry. He/she stresses that research efforts need to be consolidated into a network comprised of all stakeholders in the field of drug development and innovation and that M&A and other strategies for combination can direct companies in congruence with this aim.

Respondent C2 stresses the inevitability of M&A in the pharmaceutical industry with emphasis on vertical mergers. He explains that most biotech companies are associated with R&D and will not be able to commercialize their products without support of large pharmaceutical companies that can pass regulatory approval and introduce products into a market where they already have a strong foothold. Furthermore, declining productivity in the R&D industry may push pharmaceutical companies to constantly assess external asset. Finally, according to Respondent C2, increasing R&D costs coupled with competition and growing pressure on short-term results has
made pharmaceutical companies more pragmatic; when there is a good product to be acquired, there is no incentive to develop the product in-house. Although this response does not directly express the respondent’s personal opinion on M&A, he/she seems to support the rationale behind it and underlines benefits of its occurrence.

Respondent C3 believes that M&A is beneficial for society and involved parties if it is conducted with prudence and in a balanced form. However, he/she mentions that large horizontal mergers lead to a decrease in the rate of innovation. Furthermore, he/she believes that M&A conducted between parties for the “wrong” reasons may lead to negative externalities.

Respondent C4 uses the term “bittersweet” to describe his/her view on M&A in the pharmaceutical industry. Products will reach the market following M&A, yet people often lose their jobs as a result.

**Following Mergers, how are pipelines consolidated?**

Respondent C1 explains that the process of consolidating pipelines is generally the same across the industry in the context of M&A. The process uses the practice of portfolio assessments that are conducted ritually in large pharmaceutical companies, where projects are assessed by their commercial viability, their risk profiles, and eventual points for being further downstream in the pipeline. For instance, Phase 3 projects are awarded more points than Phase 2 projects. Included in the population of drugs submitted for assessment are also the projects that have been approved and may have been commercialized. These are assessed without difficulty to the ease at which they can be quantified.

The aforementioned template refers primarily to projects in development. In regard to the drug discovery stage, these criteria are not applicable due to the uncertain nature of the projects at this early stage as they cannot be quantified and will always yield a negative NPV. By Respondent C1’s experience, the consolidation discussion concern around 20% of the project population, and disqualified projects will be moved to outplacement.
The process by which pipelines are consolidated in large pharmaceutical mergers, in the manner by which it is illustrated by Respondent C1 raises questions as to what happens with innovation when the vast majority of “ideas” are disregarded.

In the experience of Respondent C4, who coincidentally worked at the same firm as Respondent C1 for a period of time, NPV as a range estimate was calculated for all projects in the pipeline and it was the most important indicator in the prioritization process. Respondent C4 states that the NPVs were calculated by a commercial team and that the figures were often highly subjective due to the fact that they were often based on market research. The respondent argues that the NPV of projects was the least reliable of estimates for determining the potential of projects. Furthermore, he/she states because the NPV figures were subjective, they could be manipulated to meet the demanded Return on Investment (ROI) or to be discontinued for whatever reason.

Respondent C2 states that consolidation of R&D pipelines follows the same prioritization process as when assessing the company’s own pipeline. Companies will look at the commercial potential and competitive differentiation of products, the innovative capabilities for meeting unmet needs as well strengthening therapeutic efficacy and safety. Furthermore, firms assess “portfolio balance” between high risk and low risk projects. Added to this, they will compute risk-adjusted returns on investments on the basis of cost, revenue forecasts, NPV, risk level and expanded NPV.

Respondent C2 also emphasizes the importance of strategic fit. More specifically, products must fit with the area of focus. One exception to this is if there is a willingness to be more opportunistic: acquired projects with promising data can be further developed in a way that would not have been done in-house if it did not belong to the acquirer’s area of focus, yet with the target company’s capabilities in the area, the cumulated foci may promote the project’s continuation.
Respondent C1 explains that there has been a shift from the “blockbuster model” to operating in niche markets and developing inherent strengths and competitive advantages. According to Respondent C1, Wyeth acquired Genetics Institute Inc. in the late 90’s for their Biologics business. Then, Wyeth acquired Lederle for their vaccines business. Wyeth already had a flourishing business in small molecules and women’s health. Therefore, as Respondent C1 argues, a major incentive for Pfizer acquiring Wyeth was to strengthen therapeutic areas in small molecules, biologics and to connect with the vaccines market. Specifically in the context of vaccines, Respondent C1 mentions, “[Big Pharma] are not going to home-grow vaccines. Scientifically, it is almost impossible to inch-wise move into an area like that.” With these developments in operations, there are significant changes in factors such as competitive landscapes and costs of goods sold. Furthermore, they introduce another parameter in terms of assessing and consolidating product portfolios and pipelines.

Respondent P2 expands on this shift in saying that the pharmaceutical industry in itself has developed significantly. With advancements in enabling technologies and increasing communication between different parties in both the public and private sector, conventional methods of combating diseases are being replaced by methods such as personalized medicine, whereby patients are subdivided into groups with common biological markers, and are then met with a “niched” treatment for the specific condition. According to Respondent P2, the modern industry logic will be production characterized by high costs, low volumes, and optimization of product functions. Therefore, pharmaceutical companies will aim to develop their strengths and competences in areas where they have comparative advantages to other areas or companies. Respondent C3 criticizes this movement towards personalized medicine in stating that at present, the industry has not yet adjusted to the introduction of these new technologies. In other word, their prevalence lie in the distant future.

Both Respondent C1 and P2 exemplify the shift to more focused business models with the recent transaction, announced on 22 April 2014, between Novartis and
GlaxoSmithKline. Novartis “swapped” their vaccines unit for GlaxoSmithKline’s Oncology unit as the companies believed their comparative advantages lay in the units they respectively acquired.

The motives for M&A in the 1990’s, as suggested by Respondent C2, were driven by too many players in the market and the ability to achieve “top line” synergies as well as cost efficiencies of scale. These deals were aimed primarily at improving the bottom line, or net earnings, through cost synergies. According to Respondent C2, today’s motives are driven mainly by two factors: financial optimization (e.g. increasing profitability through tax inversion), as well as increasing R&D productivity and innovation. The respondent also notes that M&A activities are still driven by shareholder pressure and the emphasis on short-term results has increased substantially since the 1990’s. On the matter of large horizontal mergers, the respondent believes the frequency of these will neither increase nor decrease. On the other hand, vertical mergers have become all the more prominent as they aim at accessing other firms’ R&D capabilities and expertise.

Respondent C2 also touches upon the movement to niche markets. He/she mentions that the major advantage of this trend is that firms can capitalize on their competitive and comparative advantages. However, Respondent C2 also identifies certain disadvantages in the form of missed opportunities in other therapeutic areas, or superior competition in the niched market.

According to Respondent C3, the time for large-scale mergers has passed, and if it was to occur, it would be for private benefits with negative impacts on R&D, innovation and society. He/she lays emphasis on vertical mergers or acquisitions between large companies and small companies. These M&A activities benefit both parties as large companies gain access to targeted R&D capabilities and molecules whereas small companies are aided with large and expensive clinical studies that the company could not have conducted independently.

On the subject of movements to niche markets, Respondent C3 believes that there is a societal benefit as firms optimize their strengths as this increases the probability of bringing an effective drug to market. There is also a profit maximization rationale in
doing so as the pipelines are stream-lined. The respondent does however mention that certain fields may suffer from this trend, such as infectious diseases and the research for antibiotics. This consequence may be especially detrimental for developing countries.

Respondent C4 believes the motives have shifted from acquiring technologies to acquiring products. Smaller firms such as biotech firms are acquired primarily for the sake of their products. As mentioned by other respondents, Respondent C4 argues that large firms can act as catalysts for the market penetration of products belonging to smaller firms. He/she does however argue that smaller firms *can* bring products to market themselves, although with greater difficulties and investors are negative to this independence as they see a buyout as their preferred and often most lucrative exit strategy.

**What is Becoming of Innovation in the “Big Pharma” Business Model?**

In the experience of Respondent P1, who has been working in a public-private partnership with large pharmaceutical companies for several years, innovation is suffering in the pharmaceutical industry. This especially concerned Respondent P1, who said, “As soon as companies become too big, innovation is killed. And the critical threshold they tell me is around 50 to 100 people.” Respondent P1 mentions that when inquiring upon the matter with small companies, these companies have argued that they keep the companies deliberately small for the aforementioned reasons. Furthermore, Respondent P1 comments that these impacts on innovation to increasing bureaucracy and control.

Respondent P1 also mentions that there is a trend among larger companies to outsource research to smaller companies and academia. This decentralization of research can be greatly mismanaged and inefficient, as Respondent P1 exemplifies with a company that located an interesting diagnostics technology developed by a small company, acquired it for almost half a billion dollars, only to realize that the business model wasn’t feasible as the cost of the product would be significantly higher than that of substitutes. Although the views and experiences of Respondent P1
are biased towards a specific research field, he/she mentions that similar concerns for the lack of innovation are echoed in several other research fields.

Adding to the issue of lack of innovation, Respondent C1 points out that certain therapeutic areas are becoming less attractive from a commercial perspective. One of these areas is the aforementioned antibacterial research. In addition, the occurrence of “me-too-ism” has to some extent replaced the drive for innovation. However, certain areas still remain significantly innovative such as RNA interference. This is explained by the trend in the pharmaceutical industry whereby certain areas of the industry will be highlighted with innovation for a period of time, as often measured by the “noise” that is made in terms of ideas and discovery- yet often these ideas never develop into projects.

Respondent P2 defends the concept of “Network Innovation”, where all entities involved in the process of developing new drugs work together in a multilateral, public-private network. Respondent P2 goes on to say that, historically, there has been a debate regarding the lack of innovation and that efforts are focused on the development of improved versions of existing drugs, but that the industry at present is characterized by many different drugs from different developers aimed at achieving the same purpose. In an ideal world, complementary technologies and research should be consolidated in order to reduce overlaps of projects and technologies.

Respondent P2 brings to attention certain hurdles that this new and reformed “wave” of innovation will need to overcome, specifically for delivery of medicines. Firstly, regulatory policies are often outdated; some have remained unedited since the 50’s. Therefore, the “regulatory pathway” may not be as transparent for a new technology as it may be for a project characterized by conventionality. Furthermore, there are concerns in terms of reimbursements as these advanced and substantially more expensive innovations will need to be subsidized extensively in order to become affordable down to the final customer. Lastly, resources will need to be allocated towards educating doctors, medical staff, and other “agents” in applying these innovative products. It is in public-private, multilateral collaborations that Respondent P2 believes that these hurdles can be mitigated.
Respondent C3 mentions that innovation is now the product of collaborations with academia and other firms. According to him/her, R&D units and their collaborations need to be small and relatively independent to maintain flexibility. Therefore, if an eventual merger should dismantle the independence of such units or even sever the cooperative ties between parties, the impact on R&D and innovation may be severe. Respondent C4 supports this in saying that large companies, “should act more like biotech companies”.

Respondent C2 explains that innovation is the key to success for large pharmaceutical firms and continues to be a major component in the internal business model of these. However, their approach to innovation has evolved since the in-house innovation that characterized the industry a decade ago. Today, companies are becoming increasingly externalized and promote innovation through collaboration, M&A or partnerships. This shift is due to an industry-wide decrease in R&D productivity and increases in R&D costs, complexity and sources of innovation. He/she concludes with saying that rather than innovation being “outsourced” to other parties, innovation is becoming “in-sourced” to complement a company’s pipeline.

Respondent C4 states that in recent times, the rate of innovation has decreased in the pharmaceutical industry. He/she mentions a reason being that the areas of research have become more complex as researchers venture further into their respective fields. This has fueled the eagerness to acquire biotech companies for their products, which to some extent offsets the demand for internal innovation.

When questioned on the matter of promoting innovation through public-private networks, Respondent C4 argues that these collaborations are inefficient and have not yet proven to work. He/she goes on to say that public institutions and organizations should focus on sponsoring training and education in order to supplement the R&D of companies as opposed to holding part of the stakes themselves.
Can R&D productivity in pharmaceutical companies be quantified accurately?

Respondent C2 claims that R&D productivity can be accurately quantified. He/she explains that R&D productivity has two components, R&D efficiency and R&D effectiveness. These are measured by Key Performance Indicators (KPIs), which are not standardized across companies. KPIs for efficiency can include the numbers of NMEs, filings, approvals and submissions. These can be accurately quantified. However, KPIs for effectiveness are less accurate as they account for assumptions and probability of success. Such KPIs may be peak sales per product/indication, NPV and eNPV.

With a clear set of KPIs spanning across R&D efficiency and R&D effectiveness, Respondent C2 means that R&D productivity can be quantified but due to the complex nature of R&D productivity, it must be addressed through multiple perspectives.

Respondent C3 supports the use of KPIs to measure productivity in R&D. He/she exemplifies KPIs with R&D cost, FTE (Full-time equivalent) per project, funding per project and time. He/she does however mention that the attrition rate of 85% in the pharmaceutical industry is a factor that cannot be neglected when making sense of R&D productivity.

Respondent P2 agrees with the argument that R&D productivity cannot be simplified by the quantities and momentum of projects in the pipeline as each project has its own inherent characteristics such as independent risk and cost profiles. Respondent P2 notes that one of the reasons for the supposed decline in R&D productivity, as it has been popularized by media, is that companies have moved into areas that are increasingly difficult to navigate and are exposed to higher chances of failure. Therefore, there may be fewer projects that demand more resources, yet they may be of far greater interest to the industry and society than conventional R&D pipeline compositions.

Respondent C1 expands on the issue of describing R&D productivity by agreeing to the argument that increasing regulatory involvement may distort the R&D productivity of companies as a performance measure for the internal R&D unit as
these regulations are by some considered outdated, overly restrictive, and ineffectively bureaucratic.

Respondent C4 finds that using the number of NMEs (New Medical Entities) over a period time is an effective measurement of R&D productivity. He/she goes on to say that this productivity is decreasing partially because discovery of drugs is becoming increasingly difficult, but also because exogenous factors such as the regulatory climate decreases the rate of NME throughput.

### Can R&D activities benefit from M&A-related cost savings?

In Respondent P2’s illustration of “Network Innovation”, he/she explains that the cost structures of major firms’ R&D units are transforming parallel to the changing industry foci. Indeed, internal R&D budgets have shrunk throughout the major R&D units of companies. However, with the increasing public-private collaborations and strategic alliances, corporate R&D expenditures may be substituted with increasing public expenditures. According to Respondent P2, R&D expenditures are not decreasing- they are allocated differently than by conventional associations.

Respondent P2 brings to attention the organizational aspect of R&D units. He/she mentions that multiple CEOs of large pharmaceutical corporations find it challenging to monitor and control R&D units. To support this, Respondent P2 quotes a CEO of a pharmaceutical company who said, “I go to the temple, sacrifice five billion euros, and pray that I will receive something in return” (translated). To the company as a whole, a candidate drug may be a project among many in the pipeline and the opportunity cost of discontinuing such a project may be marginal. However, for the employees involved in developing these projects, they may have sacrificed extensive time and personal resources in the development of the same project. This becomes conflicting if the market for the project becomes inferior and defers from the interests of the company and industry. Respondent P2 ties this to his/her belief that the major “campus-model” R&D facilities are no longer efficient and that many R&D units are still conducting research on conventional technologies whereas the industry demands is shifting to personalized medicines. Respondent P2 summarizes this logic in saying that in response to the transitioning industry, a CEO may need to save 5% or 10% of
its cost base by eliminating excess capacity in order to remain competitive, and can use mergers or acquisitions in order to justify such actions.

Respondent P2 emphasizes on disruptions in operations in saying that rather than spending resources on researching and developing conventional technologies, those resources could have been saved or distributed to shareholders. Now the disruptions are a response to the need for immediate reaction to the changing dynamics of the industry; a reaction that companies must concede to in order to remain competitive.

Respondent C2 mentions that there are several areas where R&D activities can benefit from cost-savings, primarily in terms of productivity increases. For instance, transportation costs may be reduced if facilities are consolidated and adaptive monitoring as well as protocol designs may improve in favor of R&D activities following cost saving efforts.

In the views of Respondent C3, there are two primary reasons of M&A in the pharmaceutical industry; increase efficiency or increase innovation. When companies are performing well, science will be prioritized over productivity. M&A will be conducted for the sake of acquiring molecules and research and the company will be prepared to fund projects with cost savings efforts in the periphery.
6 Analysis

In this chapter, the responses from respondents will be analyzed using the empirical research, case studies and theoretical framework.

6.1 A Changing Industry

The study conducted by Ravenscraft & Long (2000) described large pharmaceutical companies as being heavily dependent on blockbuster profits and sought to merge with other companies when the exclusivity of such products were threatened by expiration. This notion can be applied to the case of the Pfizer-Wyeth merger in 2009 where Pfizer’s Lipitor, a drug that had for many years contributed to over 25 percent of their revenues on pharmaceutical products, was nearing its patent expiration date of 30th November 2011. On the other hand, Wyeth had promising products on the rise that could to some degree offset the expected declines in revenue, such as Prevenar 13.

As for the case of Sanofi-Synthélabo and Aventis, the “blockbuster” rationale explored by Ravenscraft & Long (2000) is not as transparent. In this case, there were uncertainties tied to the futures of blockbusters for both parties.

Avoiding “patent cliffs” may still be a rationale to mergers in the pharmaceutical industry, yet several of the respondents who were interviewed argue that such incentives are in the periphery in the contemporary scope of pharmaceutical companies. Most respondents noted that there has been a shift from the “blockbuster model” to operating in niche markets where companies have comparative advantages. This trend has been exemplified with Pfizer’s motive to acquire Wyeth in order to strengthen therapeutic areas such as small molecules and biologics as well as entering the market for vaccines. Furthermore, the swap of therapeutic areas between Novartis and GlaxoSmithKlein further promotes the validity of this assumption.

Respondent P2’s illustration of the contemporary pharmaceutical industry and the advancements of enabling technologies carry the conventional industry portrayal as described by Ravenscraft & Long further into obsolescence. Rather, this nuanced interpretation of the industry falls more in line with the theory expressed by Larsson and Finkelstein which states that “economies of fitness” can enhance the competitiveness of the merged entity. Admittedly, this theory is applicable to M&A
activity in general; however it does promote a rationale, or motive, that can be applied to several of the mergers since 2000.

6.2 Why Merge?
One motive for merger that is reiterated in the theoretical framework and empirical studies is pharmaceutical companies’ objectives to address gaps and inefficiencies in their R&D pipelines. There is a recurring common notion that, in the majority of cases, some of these issues have been mitigated when firms have merged. However, there is evidence of discrepancies in the empirical data addressing post-merger effects on R&D in the long run.

Should the illustration of the changing industry be conclusive, former studies must be subject to a certain level of scrutiny. Higgins & Rodriguez (2006) confirmed successful mitigation of pipeline issues in the short run. Grabowski & Kyle (2008) concluded in their study whereby project advancements were analyzed that R&D productivity was not improved by mergers in a five-year time frame, although strategic alliances were deemed more favorable and firms operating in multiple areas as opposed to niche markets were more productive. Danzon et. al (2007) concluded that they found no evidence that mergers acted as solutions for pipeline issues in the long run.

What these studies have in common are that they are all based on quantitative data. Furthermore, they use statistical tools to analyze post-merger effects on research and development. One drawback with applying these studies is that variables that are not included in their methodology are assumed to be confined to the condition of ceteris paribus. This places a restraint on the dynamic nature of the industry. Put differently, the industry must be perceived as it was at the time that the studies were conducted.

6.3 Mutatis Muntandis
Assuming that the industry has in fact transformed, certain factors would need to be changed and our perception of R&D performance may need to be more “understanding” of new conditions. Mittra (2006) argues that the motives for mergers and acquisitions in the conventional pharmaceutical industry are primarily the quest for knowledge, elaborated product portfolios, expertise and market penetration. The majority of respondents claimed that it is now common practice for companies to
focus R&D pipelines at niche markets. Furthermore, Respondent P2 and C4 explained that with the advancements in technologies and a more in-depth understanding of scientific areas, research has become increasingly complex. One can therefore assume that although the rate of project advancements decreases, the intrinsic value of each project has increased significantly as the industry has become more knowledgeable.

6.4 Defining R&D Productivity

Although Respondent C4 condoned the use of throughput rate of NMEs for measuring R&D productivity, Respondent C2 argued that this measurement neglected the advancement rates of projects in the developing process. However, both Respondent C2 and C4 argued the regulatory involvement had a significant impact on the throughput of NMEs. Alternatively, Respondent C2 and C3 placed emphasis on the use of a multiple of KPIs to measure R&D productivity. Respondent C2 claimed that R&D performance had two components: R&D effectiveness and R&D efficiency. The former could be computed on data such as NMEs and filings. However, the latter was based on assumptions such as NPV and eNPV, which were less accurate. In fact, in the view of Respondent C4, the use of net NPV calculation was significantly unreliable as a measurement of the value of projects and highly subjective at that. Interestingly, none of the respondents spoke of project advancements in the pipelines as a valid measurement of R&D productivity, even though this was a central component to the methodology used by Grabowski & Kyle in their methodology. Furthermore, the financial reports of Pfizer and Sanofi-Aventis made no reference to specific KPIs as measures of R&D productivity. Rather, they claimed R&D productivity initiatives were put in motion through facility closures and cost reductions.

6.5 Saving of Costs or Reallocation of Cost?

A number of cases compiled showed that initiatives were taken to reduce costs following mergers by removal of excess capacity. Out of these cases, the data concerning the merger of Pfizer and Wyeth expresses the most compelling evidence of such initiatives. Eleven facilities were closed as a direct effect of the merger, headcount decreased from 130,000 in 2009 to 77,700 in 2013 and Phase 3 projects amassing to 26 in January of 2010 decreased to an average of 18 projects for observations in 2013.
The figures given by financial reports, pipeline updates and transcripts offer valid support to the claims of former Pfizer-employee LaMattina that his former employer has made substantial cuts in R&D expenses and that the amount of projects in the various stages of the pipeline has decreased significantly. Similarly, there is compelling evidence from data to believe that the 2009 merger of Merck and Schering-Plough resulted in significant decreases in R&D expenditures from 2010 to 2011. LaMattina argues that these R&D cuts will undermine the ability of companies to capture new opportunities for drug development as the disruptions have a significant impact on R&D activities and the risk minimizing (read cost-saving) attitude that typically follows large mergers are contradictory to the high-risk profile that is commonly associated with drug development. A recital of the extract from Sanofi-Aventis’ Financial Report of 2005 illustrates this attitude,

“We incurred substantial debt in connection with the acquisition of Aventis, which limits our business flexibility and requires us to devote cash resources to debt service payments.”

In the aforementioned statements and those that follow, the concept bias must be appointed careful consideration. First of all, the criticism of LaMattina builds on the premises that internal R&D needs to be nurtured. By the argument of Respondent P2 and the introduction of multi-lateral, public-private collaborations, internal R&D may be offset by external collaborations. This would imply that “penalization” of in-house R&D funding may be mitigated by a reallocation of certain costs to the external R&D field. The effectiveness of public-private collaborations was however scrutinized by Respondent C4 who noted that these collaborations have not proven to be working efficiently. Furthermore, the general opinions of respondents on mergers in the pharmaceutical industry express discrepancies in terms of the impact of disruptions in operations. Respondent P1 states that merger activity has proven to be disruptive to the momentum of his research. The bureaucracy of large pharmaceutical corporations mixed with the prevalence of corporate strategizing has produced ripples of inefficiencies that extend to the furthest reaches of operations in Respondent P1’s area of research. Conversely, the arguments raised by Respondent P2 affirm that disruptions in R&D activities are necessitated for the research efforts to align with the most contemporary interests of the assumedly transformed industry. Indeed, the
general attitude towards disruptions among respondents is that they are a necessary for the continuation of the industry.

6.6 The Impact on Innovation

Respondent C2 spoke of “in-sourcing” innovation through M&A. This makes reference to the tendency of acquiring other companies, and smaller companies, for their products and competences. Furthermore, Respondent P2 promoted the concept of “Network Innovation” whereby different institutions and organizations from both public and private sectors collaborate to increase and catalyze innovation. Although Respondent C4 criticized the effectiveness of such collaborations, he/she did emphasize that the public sector should focus resources on training and educating individuals to supplement the R&D of the private sector. This ambition is voiced in the article authored by Dhankar et. al (2012) who mention that such efforts can make ground-breaking concepts such as personalized medicines a dominant technology in medical care.

Respondent C3 stressed that innovation was the product of small-scale collaborations between R&D units and other firms or academia. He/she mentioned that mergers may lead to the disruption of these bonds if mismanaged that undermines the R&D performance of the combined entity. This concern was echoed by Respondent P1 who, as previously mentioned, stated that the bureaucracy of large companies is inefficient to the contribution to research when compared to small and independent R&D units. These statements are supported by Dhankar et. al (2012) who argued in their article that R&D units needed to be empowered and function independently from corporate “shackles”.

6.7 The Issues of Pipeline Consolidation

Having discussed the concerns of respondents on the organizational structure of R&D units and the changing conditions of the industry, the consolidation of R&D pipeline deserves further attention. Dhankar et. al (2012) mentioned the need to base portfolio composition on qualities of projects rather than quantities as quantities may imply a distraction from preferred demands of society when resources are placed on conventional sciences that meet matured markets. As mentioned before, the increase in inherent value of projects is becoming apparent with the emergence of personalized medicine as explained by respondent P2.
This brings to attention certain claims made in the empirical research and by respondents. Firstly, LaMattina (2011) explains the project prioritization process following pipeline consolidation as a top-down approach, where Phase III projects are prioritized. Respondent C1 portrays a similar explanation to that of LaMattina’s, yet expands on the matter of NPV calculations in saying that it is primarily projects where NPV can be calculated that are discussed in the consolidation process. Conversely, Respondent C4 explains that NPVs are calculated for all projects in the pipeline, even at the earlier stages, and that these NPV calculations are highly subjective, based on market research and produced by commercial teams. This raises issues as to how the scientific value of projects can be communicated from the R&D units to the commercial units if one is to agree to the views that projects are becoming all the more complex and expensive whilst R&D units demand a higher level of autonomy.
7 Results & Conclusion

This report was set out to examine the impacts of mergers on the R&D activities of large pharmaceutical companies. The case studies that were conducted by the authors of this report affirm that there were significant changes in variables that pertained to R&D units of pharmaceutical companies following mergers. There was evidence of closures of R&D sites, redundancies and expanded product portfolios in all cases which is consistent with the theoretical framework that this study builds on.

The problematization of these impacts was voiced by several industry experts as having a detrimental effect on the R&D activities of companies involved in mergers. Furthermore, several quantitative studies had been conducted using various statistical methodologies in order quantify the impacts of mergers (and acquisitions) on the performance of R&D units pre-and post-merger. The authors of these studies found no quantifiable evidence that mergers had a positive impact on R&D performance in the long run. Through the qualitative approach that was conducted in this report, it was found that the aforementioned conclusions and remarks were not necessarily consistent with the views of respondents.

The majority of respondents believed M&A activity to be a “necessary evil” for the advancements of the industry, even though such activities had a profound impact on stakeholders. Motives for mergers ranged from the need to restructure unproductive and/or inefficient R&D units to more opportunistic incentives for acquiring new competencies, products and/or technologies. A common notion is, however, that scientific research in medicines is becoming more complex and its translation into drugs is becoming all the more expensive. For this reason, multilateral interdependencies between firms and public institutions have become increasingly apparent in order to consolidate efforts to develop new medicines rather than to “home-grow” them. These collaborations have led to a reallocation of R&D expenditures as investments may be made among various organizations for the same project or purpose. One may assume that these forces explain or contribute to the trends of firms focusing on niched areas where they have comparative advantages, although evidence of this is not conclusive.
The contemporary industry and its characteristics lead one to question how R&D productivity is defined. Key Performance Indicators vary between firms and rely on heavily subjective judgment that intertwines financial value with scientific value, a recipe that does not always promote goal congruence between the two departments. Whereas several sources pointed at the decline in the throughput of NMEs as an indicator of the decline of R&D productivity in the industry, other sources made reference to alarming R&D pipeline compositions or declines in project advancements. Such units of measurements fall short in their ability to measure the quality of projects. Primary and secondary data argues that with the emergence of new technologies and methods of treatments such as personalized medicines, not only is the research more elaborate and expensive, but differentiation among firms demands more specificity in order to be innovative. This requests a revision of R&D productivity indicators that promote quality over quantity. When R&D units consume resources on conservative or low-value practices, or when there is an excess of obsolete capacity, data suggests that mergers and acquisitions are used as a restructuring mechanism. One consequence to which no conclusive evidence was found was how these contemporary projects are consolidated following a merger, other than that the methods used often led to concerns regarding the eventual opportunity cost of discontinued projects, especially if financial and commercial valuations preceded scientific valuations.

The common notion among respondents that were interviewed in this report is that it is less the disruptions of operations following mergers that have a negative impact on R&D activities, but rather the bureaucracy and a mismanaged corporate governance that may result as a consequence of increased operational size. The authors of this report find that R&D units maximize efficiency if they are empowered to operate independently from corporate control and in smaller numbers.

Although mergers among large pharmaceutical companies have taken their toll on a significant portion of stakeholders, the majority of stakeholders from both the public and private sectors that have contributed to this report share a common belief that if mergers are performed for the right reasons, namely the advancements of medical research and drug discovery, then they may very well be justified- from a stakeholder’s perspective nonetheless.
8 Summary

This study has aimed to answer a central research question and a sub question. The sub question was posed as follows:

| Are the arguments and findings, as voiced by several experts and quantitative studies, in consensus with the statements of the respondents introduced in this study? |

From the author’s interpretation of respondents’ arguments, the “cause and effect” of declining R&D performance following merger activities are not as convincing as the conventional wisdom of past studies and industry experts holds. Instead, the general consensus among respondents is that drug research is becoming increasingly complex, and with the introduction of new technologies such as personalized medicines, quality of projects should triumph over the quantity of projects. It is agreed that R&D performance has suffered in recent years, but a more significant cause may be the aforementioned complexity of contemporary research that may act as a rationale for merging. In short, the statements of the respondents should be viewed as alternative to the conclusions drawn by earlier mentioned sources and studies.

The answer to the sub question feeds into answering the central research question, which was stated as follows:

| How do mergers impact the performance of R&D activities in large Pharmaceutical Companies? |

Merging for the sake of adapting to an ever changing and increasingly complex industry may streamline the R&D activities of large pharmaceutical companies, as well as expanding the product portfolios through the acquisition of innovative projects and assets that may complement the areas in which a firm maintains comparative advantages. Furthermore, disruptions in R&D activities may be warranted in the effort to have sustainable R&D in the long run. However, the authors of this report find that mergers impact the performance of R&D activities negatively if the combined company extends bureaucratic rule and restrictions over R&D units. In short, merging
may very will be a successful strategy, yet companies should value entrepreneurship and autonomy of their R&D units so that they may operate with the flexibility and efficiency that they require.

Society has placed its trust on pharmaceutical corporations to develop drugs that maintain the health and prosperity of people. Inevitably, society demands scientific advancements over companies’ private gains. A merger should embrace a strategy that benefits the research and development of new drugs, and when the drug meets the demand, a company may reap the reward.
9 Suggestions for Further Research

This report is primarily aimed at discussing the impacts of mergers on R&D activities of pharmaceutical companies. One difficulty that was made apparent throughout the construction of the report and during interviews was the difficulty in separating mergers from acquisitions as these terms are often used synonymously. This does however promote an opportunity for future studies that studies the difference in impacts between the two strategies. Furthermore, the acquisition of R&D boutiques and biotech companies were recurring matters that presented themselves persistently throughout the construction of the report. There is undoubtedly a large array of interesting research topics contained within this trend that can extend on M&A activities in the pharmaceutical industry.

Moreover, as the intrinsic nature of the R&D activities as such also evolve over time, for example towards an increasing focus on personalized medicines with their need for companion diagnostics, the economics around drug production (costs and revenues) will likely change dramatically, which in turn will change how and to what extent M&A impacts on this activity.

One perspective that deserves attention when observing the impacts of M&A on pharmaceutical companies is the role of the financial institutions that are involved in the M&A process. A study that entails this perspective could add more weight to the financial implications of the relationship between sciences and business that defines pharmaceutical companies.
10 References


Bryman, A., Bell, E., (2005), Företagsekonomiska forskningsmetoder, Malmö, Liber AB


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The Impact of Mergers and Acquisitions on the R&D Activity in the Pharmaceutical Industry

1. Companies perform mergers and acquisitions with the aim of achieving synergies. What are the consequences of such synergies to the R&D activities of large companies?

2. When consolidating R&D pipelines following a merger or acquisition, what are the main factors taken into account in the project prioritization process?

3. Some pharmaceutical companies mention in their financial reports that they have undertaken initiatives aimed at increasing productivity. These initiatives are measured by their contribution to cost savings. Would you agree/disagree that R&D activities can benefit from such cost savings?

4. Can R&D productivity in pharmaceutical companies be quantified accurately? What variables need to be considered for such a measurement?

5. Some say that horizontal mergers (a large company acquiring or merging with another large company) are becoming less frequent. Instead, vertical mergers (a large company acquiring or merging with smaller companies to consolidate assets in a specific competence or development phase) are becoming increasingly common. What are the opportunities and threats associated with this trend in terms of R&D?

6. There is also a trend towards companies niching themselves in specific areas where they have competitive advantages. What are the advantages and disadvantages with such a development?

7. Is innovation still part of the Big Pharma internal business model or is it being outsourced to other parties?

8. Have the motives for mergers and acquisitions changed over the years? How do these motives compare/contrast with the motives that governed the merger waves of the 90’s?

9. What is your opinion of mergers and acquisitions in the pharmaceutical industry in general?