Assessment of Post-Merger and Acquisition Success Factors for Small- and Medium-Size German Pharmaceutical and Biotechnology Companies

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Certificate of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains neither material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma at Charles Sturt University or any other educational institution, except where due acknowledgment is made in the thesis. Any contribution made to the research by colleagues with whom I have worked at Charles Sturt University or elsewhere during my candidature is fully acknowledged. I agree that this thesis may be accessible for the purpose of study and research in accordance with the normal conditions established by the Executive Director, Library Services or nominee, for the care, loan and reproduction of theses.

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Ethics Approval

5 November 2015

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Dear Mr Leschik,

The Business Faculty Human Research Ethics Committee has approved your proposal “Post-M&A success measures of Germans pharmaceutical and biotechnology companies” for a twelve month period from 5 November 2015.

The protocol number issued with respect to this project is 200/2015/22. Please be sure to quote this number when responding to any request made by the Committee.

Please note the following conditions of approval:

- all Consent Forms and Information Sheets are to be printed on CSU letterhead. Students should liaise with their Supervisor to arrange to have these documents printed;
- you must notify the Committee immediately in writing should your research differ in any way from that proposed. Forms are available at http://www.csu.edu.au/research/ethics_safety/human/ehrc_managing;
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- amendments to the research design must be reviewed and approved by the Faculty Human Ethics Committee or if no longer minimal risk by the University Human Research Ethics Committee before commencement. Forms are available at the website above;
- if an extension of the approval period is required, a request must be submitted to the Faculty Human Ethics Committee or if no longer minimal risk by the University Human Research Ethics Committee before commencement. Forms are available at the website above;
- you are required to complete a Progress Report form, which can be downloaded as above, by 5 November 2016 if your research has not been completed by that date;
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The Committee wishes you well in your research. Please do not hesitate to contact me on telephone (02) 6933 2696 or email bramudu@csu.edu.au should you wish to discuss this matter further.

Yours sincerely

[Signature]

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Professional Editorial Assistance

Professional editor, Rosemary Purcell, provided copyediting according to the guidelines laid out in the university-endorsed national *Guidelines for editing research theses*. The editing was limited to formatting, grammar and style, and did not alter or improve the substantive content or conceptual organisation of the thesis. Rosemary’s area of academic specialisation is unrelated to this thesis.
Abstract

Mergers and Acquisitions (M&A) are commonly used business strategies, the aims of which are to generate value and synergy. However, research studies provide evidence that most do not generate value and, in fact, many reduce it (Heracleous & Murray, 2001; Schweizer, 2002; Thanos & Papadakis, 2012). As further argued by Schweizer (2012) and Thanos and Papadakis (2012) there is no agreement on a common way of measuring success. According to Papadakis and Thanos (2010), management scholars have mostly used financial performance measures (short-term financial performance, accounting performance, long-term financial performance) to assess success.

This thesis suggests that a better post-M&A performance measure of German pharmaceutical and biotechnology companies should be based on individual post-M&A success factors correlated with revenue post-M&A. The use of a broad set of success factors would add to a fuller understanding of post-M&A behaviour and lead to a more accurate evaluation of post-M&A performance.

By developing a research framework, this study seeks to integrate existing models and research traditions in a practical and comprehensible manner. The framework highlights different post-M&A success factors influencing post-M&A performance and provides important contributions to the deeper understanding of M&A measures.

A review of M&A success factors in the pharmaceutical and biotechnology industry yields different success factors: economies of scale and economies of scope, efficient allocation of personnel or resources, clinical success rate, market share, employee retention rate, weakening or eliminating competition, patent rate, gaining new knowledge, tax benefits and escape from bankruptcy. Individual post-M&A success
factors are identified to correlate with post-M&A performance, expressed in this thesis as the revenue difference between pre- and post-M&A.

This study employed research methodology incorporating qualitative as well as quantitative approaches. In order to assess the research questions and to verify the hypotheses, expert interviews and a survey questionnaire were performed. For the interviews, experts from different managerial levels of pharmaceutical and biotechnology companies involved in M&A processes revealed interesting details about M&A performance measures as well as about post-M&A success factors. The survey questionnaire validated the research framework and the hypotheses. The internal consistency and the validity of the constructs were established, and nearly all hypotheses were supported.

This thesis presents a new methodology for evaluating different success factors for M&A performance. The major implication of the research study is to recommend using the post-M&A success factors of economies of scale and economies of scope, efficient allocation of personnel or resources, market share and clinical success rate to measure post-M&A performance of German pharmaceutical and biotechnology companies. These post-M&A success factors may set new guidelines for M&A evaluation and the pre-determination of synergies for future M&A processes within the pharmaceutical and biotechnology industry. Furthermore, this thesis developed a framework for managers to assist them in M&A evaluation of German pharmaceutical and biotechnology companies.
Abbreviations

AG: Aktiengesellschaft (joint stock company)

AVE: average variance extracted

BPI: Bundesverband Pharmazeutisch Industrie

CAR: cumulative abnormal return

CB-SEM: covariance-based structural equation modelling

CBO: chief business officer

CEO: chief executive officer

CFO: chief financial officer

CMO: contract manufacturing organisation

COO: chief operation officer

CRO: contract research organisation

CSO: chief scientific officer

CTO: chief technical officer

DNA: deoxyribonucleic acid

GmbH Gesellschaft mit beschränkter Haftung (limited corporation)

HTMT heterotrait-monotrait

HTS high throughput screening

KGaA Kommanditgesellschaft auf Aktien

M&A mergers & acquisitions

NCE new chemical entities

PLS partial least squares

PLS-SEM partial least squares structural equation modelling
R&D  research and development
RNAi  ribonucleic acid interference
ROA  return on assets
ROE  return on equity
ROS  return on sales
SEM  structural equation modelling
SPSS  Statistical Package for the Social Sciences
THD  Technische Hochschule Deggendorf
US  United States
VIF  variance inflation factor
Chapter 1  Introduction

This chapter comprises four sections. Within section 1.1 “Background to the research” the reader is informed about M&A in the pharmaceutical and biotechnology industry. In section 1.2 “Research question and proposition” the reader is first informed about different M&A performance measures and their pros and cons. Furthermore, the reader is informed about the challenges to identify post-M&As performance measures for small and medium-sized (SME) pharmaceutical and biotechnology companies in Germany, following the main research question and the sub-research questions. In section 1.3 “Justification for the research” deep argumentation is build up to justify the research. This thesis will expand current knowledge and help investors, shareholders and managing directors to evaluate and assess different success factors of M&As. Section 1.4 “Outline of the research” gives an short overview of the content of each chapter. Figure 1 illustrated the structure and the concept of chapter 1.

Figure 1: Structure of the Chapter 1
1.1 Background to the research

Mergers and acquisitions (M&As) are widely employed in the pharmaceutical and biotechnology industry, as well as in other industry sectors, as one of the most common strategic business techniques to generate value and synergy. In 2012, the total value of M&A deals involving European and United States (US) biotechnology companies was USD 20.6bn (EUR 15.8bn), with a rising tendency. In 2016 the total M&A volume exceeded USD 200bn, in line with the previous two years and signalling a new plateau after nearly a decade averaging well below USD 100bn (Ernst & Young, 2017). The key driver for M&A transactions in the life science industry is the unrestrained and growing need for new and innovative pharmaceutical and biotechnology assets. This unrestrained growing need is founded on the unmet medical desires and rising expectations of patients for new life science products. Furthermore, as argued by Pervaaz (2010), the increase in M&A activities can be justified by direct and indirect factors, such as health care reform in the US, increased regulatory pressure, non-robust development pipelines and increased generic competition.

Growth of M&A activities is constant due to the consolidation of different pharmaceutical sectors and the favourable interest rate situation in the German market (Ernst & Young, 2016). Furthermore, through M&As of biotechnology firms, sales growth and access to innovation improves. The biggest pharmaceutical M&A deal in Germany was in 2015, when Boehringer Ingelheim acquired Sanofi’s animal health sector. The rationale for the deal was that Boehringer Ingelheim was looking for a solution for its over-the-counter division, and therefore performed an exchange deal with Sanofi (IMPA, 2016).

After several M&A deals in the US, but also around the world, German pharmaceutical companies lost their top ranking and counted themselves as possible takeover
candidates. However, some big German pharmaceutical companies tried to escape being takeover targets by themselves acquiring pharmaceutical companies, for example Merck Kommanditgesellschaft auf Aktien (KGaA) acquired Serono in 2006 (Ernst & Young, 2014).

Even if the reasons for M&As differ, one can nevertheless see similarities. There are for example, expiring patents for blockbuster drugs in connection with pipelines that are drying up, regulatory hurdles, and competition with generic brands that increase the number of M&As and will consolidate the market of German and world-wide pharmaceutical companies.

Despite the rising tendency of pharmaceutical and biotechnology M&As, recent empirical research studies indicate that M&A success is not at all guaranteed (King, Slotegraaf & Kesner, 2008; Papadakis, 2005). More than half M&A transactions fail due to questionable acquisition motives, problems regarding valuation and premiums paid, and challenges in the post-acquisition integration process (Agrawal & Jaffe, 2000; Datta & Grant, 1990; Schweizer, 2002; Sirower, 1997). In a research summary report by Heracleous and Murray (2001) various research studies have provided evidence that most mergers have not created shareholder value; indeed many destroyed it.

In a literature review of frequently used antecedent variables on M&A performance, King, Dalton, Daily & Covin (2004) argued that the current empirical research has not clearly and repeatedly identified those variables that impact on the acquiring firm’s performance. Furthermore, they argued that researchers have not looked at the ‘right’ set of variables and therefore should pay more attention to the non-financial variables that are currently under-represented in theory and research.
1.2 Research question and proposition

M&As are commonly used business strategies, the aim of which is to generate value and synergy. M&A strategies have been commonly used in the pharmaceutical and biotechnology industries, and have been rising steadily in recent years, as reported by Ernst and Young (2014). Research studies from Schweizer (2002), Heracleous and Murray (2001) and Thanos and Papadakis (2012) verify that most M&As do not increase shareholder value. For example, the pharmaceutical company Hoechst Roussels’ market share declined by over 50% after their merger, Ciba-Geigy’s by over 20% and Glaxo Wellcome’s by over 15%. In contrast, shares of pharmaceutical companies not engaged in mergers rose by 40–80%, for example Schering-Plough / Pfizer (Economist, 2000). However, according to the Economist (2014), something has changed in the nature of deal making over the years. Now it is observed that drug companies concentrate on what they do best, and get out of areas in which they are weak. The most notable recent example is GSK’s agreement with Novartis to swap assets so that GSK strengthens its lead in vaccines and Novartis fortifies its position in cancer drugs (Economist, 2014).

Of M&A failures, half are attributed to questionable acquisition motives, problems regarding valuations and premiums paid, and challenges in the post-acquisition integration process (Agrawal & Jaffe, 2000; Datta & Grant, 1990; Sirower, 1997). There is no agreement on a common way of measuring M&A performance (Schweizer, 2012).

Post-M&A performance is evaluated by different approaches, the most popular being short-term financial performance measures followed by accounting-based performance measures and long-term financial performance measures (Thanos & Papadakis, 2012). However, post-M&A performance measures underestimate the achievement of other
goals, some of which may be longer term or less quantifiable, painting an inaccurate picture of post-M&A success (Brouthers, Hastenburg & van den Ven, 1998; Larson & Finkelstein, 1999; Thanos & Papadakis, 2012). Additionally, financial post-M&A performance measures may be strongly influenced by external variables, biased to reflect expectations, subject to manipulation, and they can only be used for publicly listed firms (Brouthers et al., 1998; Thanos & Papadakis, 2012).

In addition to the fact that M&A activities will continuously occur in the future, there are still questions about how M&As perform. According to Papadakis & Thanos (2010), management scholars mostly have used financial performance measures (short-term financial performance, accounting performance, long-term financial performance) to assess performance. Only occasionally have key respondents’ retrospective assessment of M&A performance in relation to aspects such as divestiture, integration process performance and innovation performance been used (see Figure 2).
However, as argued by Papadakis and Thanos (2010), financial performance measures, especially in the short-term event window performance measure, should be treated with caution as they do not measure realised (actual) performance but the investors’ expectations about future performance. Accounting-based performance measures compare the post-M&A return of the merged or acquired company with the weighted pre-M&A average return of the target and acquiring companies.

According to Papadakis and Thanos (2010), typical accounting-based measures are return on assets (ROA), return on equity (ROE) and/or return on sales (ROS). Accounting-based measures have been criticised as they reflect past performance and are limited in their focus as they measure only the economic performance of the company (Montgomery & Wilson, 1986; Papadakis & Thanos, 2010). Another limitation is that they do not capture the effect of events such as M&As (Larsson &
Finkelstein, 1999; Papadakis & Thanos, 2010). However, the strategic aim of a business is to earn a satisfactory return on capital after the M&A process. The use of accounting metrics is based on the premise that synergies obtained from the M&A are best reflected by assessment of pre- and post-M&A revenue. The reason for this is that the difference in revenue measures the economic performance of a firm in a suitable and accurate manner. Furthermore, it reflects pre- and post performance using a limited amount of financial data.

Most of the studies reviewed by Papadakis and Thanos (2010) analysed M&A performance using various measures such as market measures (e.g., stock price performance), accounting measures (profitability and sales ratios), or mixed measures (e.g., operating cash flow and measures of stock price reaction).

An important subjective performance measure is a retrospective assessment of M&A performance. Within this assessment process, key respondents such as directors, managers and consultants are asked to rate the degree to which a series of objectives set before the M&A have been effectively met after the M&A (Thanos & Papadakis, 2012). The objectives refer to financial aspects, non-financial aspects or both. These subjective assessments of performance have limitations due to respondent bias, inaccurate recollection of past events, post-rationalisation symptoms and familiarity with the particular M&A. This subjective performance measure is similar to the research approach used by Brouthers et al. (1998).

Brouthers et al. (1998) determined objectives (motives) for M&As and used them as key success factors to evaluate to which degree they had been achieved post-M&A. Statistical correlation analysis on the merger motives and performance measures were performed to assess success. They suggested that the measure of better performance of an acquisition is not an arbitrary economic measure of profitability or shareholder value,
but is the achievement or non-achievement of the original objectives of the merger. However, it should be kept in mind that the proposed performance measures are predetermined objectives of the M&A and are not linked to financial performance measures. Such success factors are cost reduction, technical economies of scale, pursuit of market power, increased profitability and marketing economies of scale (Brouthers et al., 1998).

According to Weber (2011), M&A researchers have focused on pre- and post-acquisition factors influencing performance. Gomes, Angwin, Weber and Tarba (2013) discussed different critical variables promoted by different disciplines regarding M&A, especially the connections between critical success factors within each M&A stage as well as between pre- and post-merger stages. These connections should better explain M&A performance (Gomes et al., 2013). They proposed using pre-acquisition critical success factors such as choice and evaluation of strategic partner (strategic fit and organisational fit), paying the right price, size and organisation mismatches, overall strategy and accumulated experience on M&As, courtship period, communication before the merger and future compensation policy. Their post-acquisition success factors were integration strategies, post-acquisition leadership, speed of implementation, post-merger-integration team, disregard of day-to-day business activities, communication during implementation, managing corporate and national cultural differences and human resource management (Gomes et al., 2013).

M&As are complex events and researchers have tended to consider only partial explanations of them. Larsson and Finkelstein (1999) developed a conceptual framework that integrates theoretical perspectives from economics, finance, strategy, organisational theory and human resource management to describe how synergy realisation is a function of the similarity and complementarity of the two merging
businesses, the extent of interaction and co-ordination during the organisational integration process, and the lack of employee resistance to the combined entity. Their research approach differs from traditional methods of studying an M&A as its success is gauged by the degree of synergy realisation rather than accounting or market return assessment.

Ravenscraft and Long (2000), Higgins and Rodriguez (2006), Danzon, Epstein and Nicholson (2007) and Malik (2009) have analysed a limited sample of big public pharmaceutical M&As. These studies measured the post-M&A performance using event studies of abnormal return on the US market using easily accessible data (using short- or long-term financial performance measures). However, the majority of small-and medium-sized German pharmaceutical and biotechnology companies are private and therefore access to financial data is limited. Furthermore, as the majority of research studies (Christopher & Arishma, 2013; Danzon et al. 2007; Haeussler, 2007; Martinez & Goldstein, 2007) on pharmaceutical and biotechnology M&A performance primarily analysed large public US pharmaceutical and biotechnology companies, it is unclear whether the implications of these studies are valid for small- and medium-sized German pharmaceutical and biotechnology enterprises. Smaller and younger biotechnology or pharmaceutical firms can be more flexible and think up new ways to attack a disease. But small and medium-sized companies typically lack the expertise to organise clinical trials, deal with regulators and get a drug successfully to market (Economist, 2014).

The majority of German biotechnology and pharmaceutical companies fall into these categories, where the number of employees for small-sized companies is <10 and for medium-sized companies is <250. According to the European Commission, recommendation 2003/361, the term small and medium-sized companies (SME) are
defined by the staff headcount and turnover or balance sheet total. Table 1 summaries the companies’ category determined by staff headcount, turnover or balance sheet.

Table 1: Definition on small and medium-sized companies

<table>
<thead>
<tr>
<th>Company category</th>
<th>Staff headcount</th>
<th>Turnover</th>
<th>Balance sheet total</th>
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<tr>
<td>Micro</td>
<td>&lt; 10</td>
<td>≤ € 2 m</td>
<td>≤ € 2 m</td>
</tr>
<tr>
<td>Small</td>
<td>&lt; 50</td>
<td>≤ € 10 m</td>
<td>≤ € 10 m</td>
</tr>
<tr>
<td>Medium-sized</td>
<td>&lt; 250</td>
<td>≤ € 50 m</td>
<td>≤ € 43 m</td>
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In addition to the aforementioned argument, most of Germany’s small- and medium-sized pharmaceutical and biotechnology companies are private companies, and access to financial data is limited. The particular attention of this research study is set on small- and medium-sized German pharmaceutical and biotechnology companies, as 44.7% of the total 579 dedicated biotechnology companies has fewer than 10 employees and 40.4% has between 10 and 50 employees (biotechnologie.de, 2015). The total percentage amount of 85.1% represents more than three quarters of the entire biotechnology industry in Germany.

The limitation in the availability of financial data and the inherent limitations of abnormal return performance measures from small- and medium-sized companies that have performed an M&A, suggests the need for further performance measures, including the evaluation of success factors, instead of single financial indicators (Schoenberg, 2006; Schweizer, 2012; Thanos & Papadakis, 2012).

The use of a broad set of success factors would add to a fuller understanding of post-M&A behaviour and lead to more accurate evaluation of performance. In addition, it
would permit a composite evaluation of post-M&A performance. This is because multiple post-M&A success factors allow the evaluation of M&A behaviour from multiple disciplines like finance, operations, marketing and sales, and social integration, rather than just by a single objective measure.

This thesis suggests that a better post-M&A performance measure of small- and medium-sized German pharmaceutical and biotechnology companies is not based on short- or long-term performance measures or shareholder value, but on individual post-M&A success factors correlated with post-M&A revenue.

As suggested by Papadakis and Thanos (2010), multiple measures for evaluating performance should be considered. Therefore, this thesis evaluates post-M&A performance, expressed as the revenue difference pre- and post-M&A, linked to individual success factors. The reason for this is that revenue measures the economic performance of a firm in a suitable and accurate manner. Furthermore, it reflects pre- and post performance using a limited amount of financial data. The success factors are determined as the objectives of the M&A (Brouthers et al., 1998). This way of evaluating performance is in line with Halebian, Devers, McNamara, Carpenter & Davison (2009), underlining the need for a match between M&A performance measures, the subject of analysis and the question of interest in order to effectively measure M&A performance.

The purpose of this thesis is to evaluate individual post-M&A success factors for small- and medium-sized German pharmaceutical and biotechnology companies and to assess their post-M&A performance.
Therefore, the core research question is defined as:

*What are the post-M&A success factors for small- and medium-sized German biotechnology and pharmaceutical companies?*

In addition to the main research question, it is important to answer the following sub-question:

*What post-M&A success factors affect companies’ financial performance?*

This thesis builds upon prior research on M&A performance measures, success factors and motives, underlining current gaps in the literature as well as future opportunities. Furthermore, this thesis contributes several insights to the literature on pharmaceutical and biotechnology M&A motives and performance measures. By developing a set of hypotheses, answers to the core and sub-research questions of this thesis are sought. In this vein, the most important post-M&A success factors are first identified and further evaluated for post-M&A performance. Success factors not characterised as correlating with revenue, however, are claimed as success factors as they belong to the so-called strategic fit and/ or organisation fit concept and/ or are determined as synergy creation factors (Gomes et al., 2013; Larsson & Finkelstein, 1999).

1.3 Justification for the research

Limited literature is available on the evaluation and assessment of post-M&A revenue performance linked to different success factors of small- and medium-sized German pharmaceutical and biotechnology companies. Many investors, shareholders and stakeholders within pharmaceutical and biotechnology companies expect to realise synergies and values. However, according to Schweizer (2012), development cycles of biotechnology firms are very long and therefore the projected synergy performance of
the new merged company will take a long time. This thesis will expand current knowledge and help investors, shareholders and managing directors to evaluate and assess different success factors of M&As. It will further develop a deeper understanding of M&A performance measures. The assessment of multiple post-M&A success factors will improve the understanding of M&A behaviour and lead to more accurate evaluations of post-M&A performance.

It is clearly important to understand the factors related to a successful M&A, as they determine the nature and extent of interactions between companies following an M&A, and the degree to which the firm’s operations and value-chain activities will be integrated. The degree of integration determines the resources and capabilities needed to successfully integrate the target company. The M&A transaction is comprised of decisions and operational steps that are highly complex and subject to a certain order. Understanding the success factors makes it easier for managers, investors and stakeholders to evaluate the likely success or failure of the transaction, including the potential for synergies to provide sufficient shareholder value and a better risk assessment on the investment.

In particular, this thesis should highlight success factors promoted by different perspectives and their linkages across M&A performance, in order to improve upon the connectedness of research of M&As.
1.4 Outline of the research

This thesis comprises five chapters and its structure is based on Perry (1998). A brief overview explains the topics addressed in each chapter. Figure 3 illustrates the structure and the concept of the thesis.

Chapter 1 – Introduction
- Background to the research
- Research question and proposition
- Justification for the research
- Outline of the research

Chapter 2 – Literature review
- Definition of key words
  - Mergers and acquisitions
  - Pharmaceutical and biotechnology industry
- Performance measurements for mergers and acquisitions
- Post M&A success factors
- Research framework

Chapter 3 – Methodology
- Justification of research paradigm and methodology
- Research approach
- Data source and data collection
  - Expert interview
  - Survey questionnaire
- Validity, reliability and generalisability
Chapter One—Introduction:

In this first chapter the reader was introduced to the research topic and the main research questions, with reference to relevant literature and gaps in previous research. A justification of the research was also provided.

Chapter Two—Literature review:

This chapter includes a critical review of academic literature supporting the identification of existing knowledge and gaps that are relevant for the understanding of success factors and post-M&A performance measures in the pharmaceutical and biotechnology industry. It also contains general background information and term definitions. The review is divided into parts, the first of which contains a clear
definition of M&A and what constitutes the pharmaceutical and biotechnology industry. The main focus of the literature review is on scholarly research of motives for M&As and the identification of success factors for pharmaceutical and biotechnology companies and on M&A performance measures. Based on the review of literature, a series of explicit hypotheses addressing the research questions are developed and proposed for examination and testing.

Chapter Three–Research methodology:

The reader is introduced to the qualitative and quantitative research design, the research instrument, the sampling technique and the criteria for proposition testing. Furthermore, topics of reliability, validity and generalisability in qualitative and quantitative research are discussed.

Chapter Four–Results:

In Chapter four, data collection and analysis procedures of both research methods are presented and the results are analysed. First, the expert interviews are analysed using NVIVO software, followed by the evaluation of the survey questionnaire using Statistical Package for the Social Sciences (SPSS). The research framework is analysed using SmartPLS (partial least squares). The hypotheses are tested using a variety of appropriate different statistical tools.

Chapter Five–Evaluation of the results, implications, contributions, limitations and future research:

This chapter synthesises the research findings. First, the expert interview findings are critically discussed and partially compared with the survey questionnaire. Second, the survey questionnaire statistical data are discussed together with the results from the SmartPLS analysis. Next, implications for theory and contribution to practice are
discussed. In the section thereafter, limitations of this thesis are critically presented. Finally, suggestions for future research on post-M&A success factors and their performance measures are outlined.
Chapter 2 Literature Review

The previous chapter provided a brief introduction to this thesis. This chapter provides an in-depth analysis of the relevant literature. The goal of the literature review is to build the foundation for a theoretical framework to address the research question through the exploration of the field of M&A success factors and performance measures.

In order to investigate the research question, the term M&A and the scientific business of biotechnology and pharmaceutical (biopharmaceutical) companies are explored. Additionally, literature on performance measures, in particular event studies, accounting studies, survey and case studies, is reviewed. Furthermore, the literature review covers M&A success factors in the pharmaceutical and biotechnology industry. Finally, the hypotheses and the design of the research framework are presented.

2.1 Mergers and acquisitions

This section provides an overview of the term M&A and explains the differences between ‘mergers’ and ‘acquisitions’.

A merger is a component of corporate and financial strategies that includes the forming of a single new company through the collaboration of two different firms of similar size (Christopher & Arishma, 2013; Danzon et al., 2007). This action allows the mutual ownership and operation of the two firms rather than an independent functioning (Christopher & Arishma, 2013). Although the buying firm may be a considerably different organisation after the merger, it retains its original identity (Scott, 2003).
Acquisition is the process of taking over of one company by another company and establishing itself as the rightful new owner of the company (Christopher & Arishma, 2013). According to Scott (2003), acquisition is the purchase of an asset such as a plant, a division, or an entire company. The takeover bid in an acquisition is proposed directly to the owners of the company (the shareholders).

According to Sherman (2010), mergers typically refer to two companies joining together (usually through the exchange of shares) and an acquisition has one company (the buyer) that purchases the assets or shares of another company (the seller), with the form of payment being cash. However, both transactions fall under the general concept of takeover (Hirshleifer, 1995). Takeovers may be friendly or hostile. Jenkinson and Mayer (1995) state that it is when the target firm’s owners initially reject the acquisition offer that the takeover becomes hostile. In a merger, the takeover bid is proposed to the representative manager of the firm and in an acquisition the owners of the firm (the shareholders) are approached directly. Thus, acquisitions also fall under the heading of a tender offer; a takeover bid in the form of a public invitation to shareholders to sell their stock. In acquisitions, shareholders make independent decisions about their own shares (Motis, 2007). Occasionally, the term acquisition also refers to those deals in which the acquirer only buys minority shares or voting rights in the target company. That is, acquisition also refers to cases in which only part of the company is bought. In contrast, shareholders vote together to make a collective decision about the proposed bid in a merger. According to Hirshleifer (1995), in mergers the involved firms cease to have separate identities and combine to form one surviving entity.

This thesis does not distinguish between mergers and acquisitions as separate from each other because in the literature both terms are usually combined to describe either a merger or an acquisition of a pharmaceutical and biotechnology company. In addition,
most of the M&A performance measurement literature reviewed does not distinguish between the terms mergers and acquisitions. The M&A performance measurement literature treats mergers and acquisitions as the same as it focuses on general discussions of performance measures such as financial, accounting, retrospective assessment, divestiture, innovation and integration processes as shown by Zollo and Meier (2007). Furthermore, in order to facilitate data collation on M&As of German pharmaceutical and biotechnology companies, no distinction between the terms was made.

2.2 The pharmaceutical and biotechnology industry

This section provides a historical and explanatory overview of the pharmaceutical and biotechnology industry. It suggests that the pharmaceutical and biotechnology industry represent different technological regimes with significant implications for M&A motives and success factors.

2.2.1 The pharmaceutical industry

According to Rasmussen (2010, p. 62), the traditional pharmaceutical drug discovery process for small molecule drugs can be defined as ‘the identification and validation of a disease goal and the incipiently downstream R&D of a chemical compound, mostly a small molecule, as a drug candidate to interact with that target’. As further argued by Rasmussen (2010, p. 62), ‘the chemical compound can block, promote or otherwise modify the activity of the target’, and, ‘The history of drug development in the pharmaceutical industry over the past period has been about build up of a gradually more detailed knowledge of the interaction of the drug with the target, largely through a better understanding of disease and its causes’. The pharmaceutical industry has developed many new techniques as part of the discovery process.
Pharmaceutical companies follow two technological approaches to identify drug candidates: either the Ehrlich model, in which a search is made for small molecules of particular structures, as ‘keys to fit the lock’, or the Waksam methodology in which vast numbers of naturally occurring substances are screened and tested for their therapeutic properties (Scherer, 2000). According to Schweizer (2002), the discovery of new chemical entities (NCEs) has been very expensive and is a serendipitous event. Nowadays, new technologies allow the production of chemical variations from one known chemical block. In addition, new techniques like high throughput screening (HTS) allow the screening of chemical libraries for potential drug leads. As argued by Schweizer (2002, p. 44), ‘those new technologies are the way to a situation where drug candidate pipelines are not constrained by a limited number of promising compounds and that the old screening technique will be replaced by a science-guided screening approach’. However, this new approach will require pharmaceutical companies to develop new capabilities on many fronts. According to Schweizer (2002, p. 44), the pharmaceutical industry has three strategies for their future survival: organic growth, partnerships and M&A. Organic growth basically means that pharmaceutical companies need to build up new technological knowledge on their own. Partnerships means strategic alliances with biotechnology companies or universities in which further new technological knowledge is needed. M&A means integration of biotechnology companies, which keeps the needed knowledge and capabilities.

The biotechnology industry is segmented into: (1) green biotechnology focusing on agriculture, (2) grey biotechnology dealing with environmental methods, (3) biotechnology equipment and (4) red biotechnology dealing with human health care. The most important biotechnology segment, which is analysed in this research, is the red biotechnology industry. Most research papers and literature on M&A in the pharmaceutical and biotechnology industry do not distinguish between the four
categories of the biotechnology industry and are mainly focused on human health care M&As.

2.2.2 The biotechnology industry

Biotechnology is defined as science and technology applied to living organisms, parts, products and models to modify living or non-living materials for the production of services, goods and knowledge (Rasmussen, 2010). The oldest form of biotechnology can be found in beer brewing, bread baking and cheese making. Modern biotechnological techniques used in drug development include recombinant deoxyribonucleic acid (DNA) technology and hybridoma technology used in monoclonal antibody products (Walsh, 2002). This includes recombinant techniques used also to synthesise old drugs previously extracted from biological materials. According to Rasmussen (2010), biotechnology is an interaction of different clusters of technologies. The biotechnology industry has integrated and modified the traditional pharmaceutical technologies of screening and rational drug design. According to Rasmussen (2010, p. 61), ‘biotechnology has been built on the platform of traditional pharmaceutical technology and incorporated successfully new science technologies’.

As it has developed in parallel to the pharmaceutical industry, the biotechnology industry has incorporated some of the drug techniques from the traditional pharmaceutical industry. According to Haeussler (2007), the key for ground-breaking methods of research was the discovery of recombinant DNA technology and molecular genetics. ‘The discovery of recombinant DNA enables to design alternative living structures by modifying DNA to target diseases. The development of monoclonal antibodies allows targeted drug discovery while avoiding undesirable effects on cells and tissues’. (Haeussler, 2007, p. 111). Biotechnology discoveries essentially changed
the drug development process, and thus collaboration in the pharmaceutical industry (Henderson, Orsenigo, & Pisano, 1999; Matrave, 1999).

Before the age of the biotechnology industry, big pharmaceutical companies and academic research organisations dominated the drug development process. Lucrative inventions from academic research organisations were captured by big pharmaceutical companies and further developed through to regulatory approval and commercialisation. However, the biotechnology industry entered the life science market and rapidly adopted innovative methods and therefore changed the life science industry. According to Malerba and Orsenigo (2002), the biotechnology firms established themselves as ‘middlemen’ between academic organisations and pharmaceutical firms.

As identified by Rasmussen (2010) the distinction between the pharmaceutical and biotechnology industry is that the pharmaceutical industry focuses R&D activities on chemical compounds – small molecules – as drug candidates while the biotechnology industry focuses science and technology on living organisms, parts, products and models to modify living or non-living materials for the production of services, goods and knowledge.

### 2.2.3 The biopharmaceutical industry

Sporadically, research articles use the term ‘biopharmaceutical’ to describe the biotechnology or even pharmaceutical industry. The biopharmaceutical industry is defined as an industry sector, which manufactures pharmaceuticals by using biotechnology methods. Biopharmaceutical final products have a biological source like live organisms or their active components. Common biopharmaceutical products are monoclonal antibodies, vaccines, recombinant proteins, non-recombinant cultured-
derived proteins, blood/ plasma-derived products and cultured cells and tissues (Walsh, 2003).

In this research study the biopharmaceutical industry is integrated and associated with the biotechnology industry as it delivers research methods and technologies used by the biopharmaceutical industry.

An overview of the structure of the pharmaceutical and biotechnology industry in Germany is presented in Table 2.

Table 2: Overview of the structure of pharmaceutical and biotechnology companies in Germany (Biotechnologie.de (2017)).

<table>
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</thead>
<tbody>
<tr>
<td>Number of dedicated biotechnology companies</td>
<td>538</td>
<td>552</td>
<td>565</td>
<td>570</td>
<td>579</td>
<td>593</td>
<td>615</td>
</tr>
<tr>
<td>Number of pharmaceutical and chemical companies</td>
<td>125</td>
<td>126</td>
<td>128</td>
<td>130</td>
<td>131</td>
<td>133</td>
<td>137</td>
</tr>
<tr>
<td>Total number employees biotechnology, pharmaceutical and chemical companies</td>
<td>32,480</td>
<td>33,879</td>
<td>35,190</td>
<td>35,400</td>
<td>37,130</td>
<td>39,260</td>
<td>42,280</td>
</tr>
<tr>
<td>Turnover biotechnology companies</td>
<td>€ 2.37bn</td>
<td>€ 2.62bn</td>
<td>€ 2.90bn</td>
<td>€ 2.86bn</td>
<td>€ 3.03bn</td>
<td>€ 3.28bn</td>
<td>€ 3.54bn</td>
</tr>
</tbody>
</table>

2.3 Performance measurements for mergers and acquisitions

The purpose of this section is to review the literature on different methods of M&A performance measures. In general, objective and subjective performance measures are presented.

The choice of M&A performance measurements has long been a difficult issue facing researchers in different organisational fields. Finance and associated disciplines have relied on objective performance metrics such as share-price movements and accounting data to assess the outcome of organisational choices. Other disciplines, for example organisational behaviour and strategic management, have frequently relied on
subjective performance measures, such as surveys, including managers’ self reports. These dimensional approaches of measuring M&A performance may be partially responsible for some of the contradictory results often published in the literature regarding the antecedents of successful M&As, as defined and described by King et al. (2004) and Stahl and Voigt (2008). Schoenberg (2006), despite employing multiple performance criteria, found no correlation between objective and subjective measurements of post-M&A performance.

For managers, shareholders and participants in the M&A process, it is particularly interesting to assess the effects or consequences of the reasons which, at the beginning of the M&A process, force managers to engage in M&As. The post-M&A performance can be evaluated using different approaches. According to Bruner (2004), there are four approaches for measuring post-M&A performance:

- Accounting studies
- Event studies
- Survey of executives
- Case studies

Bruner (2004) summarised the evidence from 14 informal studies and 100 scientific studies between 1971 and 2001 and compared event studies, accounting studies, surveys and case studies. In terms of the research methodology, Bruner’s research article contains a review of a mix of articles using either qualitative or quantitative research methodology. According to Bruner, the accounting studies and event studies use quantitative methods, while the survey and the case studies use qualitative methods. He also compared the research approaches regarding the profitability of M&As as shown in Table 3.
### Table 3: Comparison of research approaches regarding the profitability of mergers and acquisitions (Bruner, 2004)

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Event Studies – market-based returns to shareholders</th>
<th>Accounting Studies – returns estimated from reports, financial statements</th>
<th>Surveys of managers</th>
<th>Case studies – clinical research</th>
</tr>
</thead>
<tbody>
<tr>
<td>A direct measurement of value created for investors.</td>
<td>Credibility. Statements have been certified. Accounts have been audited.</td>
<td>Yields insights into value creation that may not be known on the stock market.</td>
<td>Objectivity and depth in reconstructing an actual experience.</td>
<td></td>
</tr>
<tr>
<td>A forward-looking measurement of value creation. In theory stock prices are the present value of expected future cash flows.</td>
<td>Used by investors in judging corporate performance. An indirect measurement of economic value creation.</td>
<td>Benefits from the intimate familiarity with the actual success of the acquisition.</td>
<td>Inductive research. Ideal for discovering new patterns and behaviours.</td>
<td></td>
</tr>
<tr>
<td>Requires significant assumptions about the functioning of stock markets: efficiency, rationality and absence of restrictions on arbitrage. Research suggests that for most stocks these are not unreasonable assumptions, on average and over time.</td>
<td>Possibly non-comparable data for different years. Companies may change their reporting practices. Reporting principles and regulations change over time.</td>
<td>Gives the perspective of manager who may or may not be shareholders, and whose estimates of value creation may or may not be focused on economic value.</td>
<td>Ill-suited to hypothesis testing because that small number of observations limits the researcher’s ability to generalise the cases.</td>
<td></td>
</tr>
<tr>
<td>Vulnerable to confounding events, which could affect the returns for specific events. Care by the researcher and use of large numbers deal with this.</td>
<td>Backward looking.</td>
<td>Recall of historical results can be hazy, or worse, slanted to present results in the best light.</td>
<td>The research reports can be idiosyncratic making it difficult for the reader to abstract larger implications from one or several reports.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Weaknesses</th>
<th>Event Studies – market-based returns to shareholders</th>
<th>Accounting Studies – returns estimated from reports, financial statements</th>
<th>Surveys of managers</th>
<th>Case studies – clinical research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignores value of intangible assets.</td>
<td></td>
<td></td>
<td>Typically surveys have a low rate of participation (2-10%) that makes them vulnerable to criticisms of generalisation.</td>
<td></td>
</tr>
<tr>
<td>Sensitive to inflation and deflation because of historic cost approach.</td>
<td>Possibly inadequate disclosure by companies. Great latitude in reporting financial results.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differences among companies in accounting policies add noise.</td>
<td>Differences in accounting principles from one country to the next make cross-border comparison difficult.</td>
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<td></td>
</tr>
</tbody>
</table>
According to Bodie, Kane and Marcus (2005), an event study describes a technique of empirical financial research that enables an observer to assess the impact of particular event on a firm’s stock price. For example, an event study may infer the relationship between stock returns and dividend changes. Bruner (2004) also points out that an event study examines ‘the abnormal returns’ to shareholders in the period surrounding the announcement of a transaction. The standard event study methodology involves the use of Sharpe’s (1963) market model and capital asset pricing model (Dimson & Marsh, 1986).

According to MacKinley (1997), event study methodology is defined by the event of interest and the period over which the stock exchange prices of the firms involved in this event are examined and compared with normal returns from a period unaffected by the event (benchmark period). Typical short- or long-term financial performance measure methods include event study methodology or the cumulative abnormal return (CAR) method. In the short-term financial performance method the measurement window is two, 11 or 21 days. The long-term financial performance method explores the event window from some days to several months or years (Papadakis & Thanos, 2010). The abnormal return is defined as the difference between the actual return of a security paper and the expected return (Brown & Warner, 1985).

According to Krishnakumar and Sethi (2012), event study methodology has been used to a large extent in international studies. The primary justification, as described by Lubatkin (1986), is that this gives a direct measurement of shareholder value, is not prone to manipulation, is easy to measure for listed firms and shows the impact not only of the firm’s action, but also of rivals in the market. However, according to Krishnakumar and Sethi (2012), the use of event study assumes capital market efficiency, which may not be the case in all markets and for all firms. Krishnakumar and
Sethi (2012) argues further that, in the case of acquisitions of companies, which are significantly smaller than the acquiring company, the impact of an acquisition on stock price would be difficult to detect. Further researchers like Hitt, Harrison and Ireland (2001) have stated that the market may not react precisely to news concerning acquisitions if information concerning uniquely valuable synergies are kept private.

Some studies by Eckbo (1983) and Bradley, Desai and Kim (1983) show that on average there is wealth accrual for the stockholders of the merging firms, as measured by the CAR of the companies’ stock prices during the period in which the merger is announced. Furthermore, researchers including Brandley et al. (1983) showed that these financial profits are not due to the market’s reassessment of previously undervalued securities. In fact, they document that the positive revaluation of the target’s shares is permanent only if the offer is successful, that is, only if the resources of the two firms are combined and the M&A completed.

Previous studies of pharmaceutical M&As by Higgins and Rodriguez (2006) and Haeussler (2006) use event study methodology to compute the CAR and draw a conclusion on post-M&A performance. A later study by Haeussler (2007) examined biotechnology firm characteristics and external firm linkages as determinants of M&A activities. For data collection, Haeussler (2007) used in-depth interviews with experts in the biotechnology industry and a unique survey of German biotechnological companies.

Krishnakumar and Sethi (2012) found contradictory results on a comparison of results where researchers have used multiple techniques for the performance measurement of M&A. Krishnakumar and Sethi (2012), Healy, Palepu and Ruback (1992), Krishnan, Krishnan and Lefanowicz (2009), Hayward (2002), and Anand and Singh (1997) found a positive relationship between multiple techniques. On the other hand, Sharma (2010),
Schoenberg (2006), and Zollo and Meier (2007) found a negative relationship between studies with multiple methods.

Capasso and Meglio (2007) contend that both accounting returns and event studies have shortcomings. They doubted the ability of the financial market to predict the effectiveness of actual integration within a few days of deal announcement. Furthermore, they state that accounting returns are unable to account for intangible assets and provide a weak picture of performance. According to Brouthers et al. (1998) and Ingham, Kran and Lovestam (1992), accounting measures of profitability and the share price are most commonly used to measure M&A success. Brouthers et al. (1998) argue that those single financial indicators of performance measurement tend to undervalue the achievement of other goals and may fail to provide an accurate picture of M&A success.

According to Zollo (2008), the performance measurement method used in most endeavours is short-term financial performance, followed by accounting performance. Papadakis and Thanos (2010) performed a study investigating the comparability of the three most widely used performance measurements of M&As, namely accounting-based measurements, CARs and managers’ subjective assessments. Interestingly, accounting-based measurements are positively correlated to managers’ subjective assessments. Contrarily, CARs are not correlated to either accounting-based measurements or managers’ subjective assessments. Data for the managers’ subjective assessments have been collected by semi-structured interviews with the most knowledgeable managers of the acquiring firm, that is, chief executive officers (CEOs) and chief financial officers (CFOs), following a questionnaire designed to measure various variables such as the motives for M&A.
According to Papadakis & Thanos (2010), management scholars have used different performance measures as indicated in Figure 2. One of them is the divestiture measure. The divestiture measure identifies whether an acquired company has subsequently been divested, with divestment an indication of management’s disappointment with the M&A performance.

The innovation performance measures explore the extent to which the M&A influences the innovation performance of the new entity. The number of patents, research and development (R&D) intensity, and new products are used to measure innovation performance (Hitt, Hoskisson, Ireland & Harrison, 1991). However, when innovation performance data are collected by survey or secondary data they are susceptible to respondent bias and reliability respectively. Surveys are susceptible to respondent bias, as respondents may tend to exaggerate answers to some questions and understand answers to other questions. They may also have problems in recalling some information (Veal, 2005). Secondary data are susceptible to reliability as the collected data may be out-dated or inaccuracy (French & Bell, 2017). Although, one of the advantages of secondary data is that comparison which may be made between the past information and the presence events, but due to drastic changes over time to time in environment and technology, secondary data may have little or no relevance to the current situation and using such out-dated data may provide misleading information (French & Bell, 2017).

Another performance measure is integration process performance, which relates to operational, human or sociocultural integration (Birkinshaw, Bresman & Hakånson, 2000; Stahl & Voigt, 2008). Operational integration of two organizations comprises the transfer of capabilities, resource sharing and learning, the level of alignment of production, R&D, marketing and the transfer of technological know-how (Birkinshaw et al., 2000; Datta, 1991; Stahl & Voigt, 2008). The human or sociocultural integration
is comprised of employee turnover, cultural convergence, employee commitment, stress, job satisfaction and security (Birkinshaw et al., 2000; Stahl & Voigt, 2008). According to Thanos and Papadakis (2012), there exist limitations on subjective versus objective measurements for integration process performance, as subjective measures rely on survey data and are susceptible to respondent bias and objective data are vulnerable to reliability of secondary sources of data.

Accounting studies assess changes in financial performance, which are based on pre- and post-M&A accounting data of the target and the acquirer or the new firm. The focus of accounting studies is the change of net income, ROE, ROA, profit margin, growth rates, revenue and liquidity (Bruner, 2004; Pilloff, 1996). Accounting-based performance measures compare the post-M&A return of the merged or acquired company with the weighted pre-M&A average return of the target and acquiring companies.

Harrison (2011) justified the use of accounting returns, as they are not subject to market inefficiency or perception of the market, but measure the actual outcome of an acquisition. As further argued by Krishnakumar and Sethi (2012), it is difficult to compare accounting returns for companies from different geographical regions across the globe, due to differences in regulation and accounting practices. Furthermore, the accounting return measurement does not take into account the market value of the firm and is open for manipulation.

Case studies are in-depth studies performed through field interviews with executives and knowledgeable observers. Case studies are a form of qualitative descriptive research (Bruner, 2002). The purpose of a case study is to seek the patterns and causes of an activity by analysing the history and nearly every aspect of a case. In addition, case studies are usually subjective.
According to Krishnakumar and Sethi (2012), only a limited amount of research studies have selected a case study approach wherein they have studied a small sample of M&As to understand the factors that have led to success or failure in a particular situation. For example, Appelbaum, Gandell, Yortis, Proper and Jobin (2000) studied the role of culture fit, direction and leadership in the success and failure of 10 M&A cases.

According to Bruner (2004) post-merger performance can be inferred from answers to questionnaires produced by case studies. Classically, surveys use questionnaires where objective methods of assessing performance are not available or possible, for example, in the case of acquisitions of small pharmaceutical and biotechnology companies or private acquisitions.

Ingham, Kran and Lovestam (1992) questioned CEOs in 146 large firms in the United Kingdom to get their data, and achieved comparable results with respect to objective methods. According to Bruner (2004), surveys by practitioners are often rather casually reported, limiting the ability to replicate the studies and understand the methodological strengths and weaknesses.

However, within the literature analysed by Thanos and Papadakis (2012) retrospective assessment of M&A performance has been used in total by 17.51% of researchers. In this performance measure ‘key respondents’ have been asked to scale the extent to which a sequence of objectives set before the M&A have been fulfilled. As suggested by Brouthers et al. (1998), key success factors (pre- and post objectives of the M&A), such as the measure of M&A performance should be used by managers to get a better understanding of the achievements resulting from the M&A, and not just a picture of the shareholder value that has been changed. ‘Key success factors allow managers to measure performance on each objective, not just a single objective,’ (Brouthers et al., 1998, p 348). In summary, researchers such as Schweizer (2002) and Brouthers et al.
(1998) suggest measuring the success or failure of M&As by measuring the key success factors after the M&A.

The questionnaire can be used to measure perceptions and attitudes that cannot be measured using objective measurements. According to Datta and Grant (1990), accounting and market measurements are strongly influenced by external variables, hence separating the impact of acquisitions from other events becomes very difficult. They also state that abnormal returns reflect the performance expectation, not the actual outcome. According to Datta and Grant (1990), Cannella and Hambrick (1993), and Reus and Lamont (2009), questionnaires may be administered either to managers of the acquiring company, managers of the acquired company or to external experts such as stock market analysts.

Cannella and Hambrick (1993) studied the effects of executive departures on a sample of 96 acquisitions that occurred between 1980 and 1984 by collecting expert opinions from six executives from the acquired firm and six security analysts who specialised in the securities of the acquiring firm. The experts were asked to rate the profitability of the acquired firm at the time of the deal and four years later. Their study concluded that the departure of executives from acquired firms was harmful to post-acquisition performance, with a higher negative impact if the executives departing were of a higher ranking. There was a positive impact when one or more of the acquired firm’s executives took on a position in the merged firm’s top management team.

Summary of performance measures

Based on the above summary of the pros and cons of the various techniques to evaluate post-M&A success, the literature does not recommend one specific technique. However, as argued by Brothers et al. (1998), researchers have been using inaccurate measures of post-M&A performance, which accounts for their unsupportive results with respect to
M&A performance. As further argued by Brothers et al. (1998), past M&A studies that have tried to measure M&A success by studying single financial indicators of performance (profitability or share value) tend to underestimate the achievement of other goals, and many fail to provide an accurate picture of M&A performance. According to Thanos and Papadakis (2010), short-term measures of M&A performance have been used by the majority of researchers, followed by accounting-based measures, retrospective assessments of post-M&A performance, long-term financial measures, divestiture, integration process performance and innovation performance. Halebian et al. (2009) suggests emphasising the need for a match between acquisition performance measures, the subjects of analyses, and the questions of interest in order to effectively measure acquisition performance.

Based on the above arguments and the fact that only a limited number of small- and medium-sized German biotechnology and pharmaceutical companies are listed publicly, restricting information on event performance measures using financial data, the proposed method to assess post-M&A performance is to use the accounting performance measure. In particular the post-M&A performance is measured using the accounting performance measure of the revenue difference between pre- and post-M&A. Accounting studies assess the changes in financial performance, which are based on pre- and post-M&A accounting data of the target and the acquirer or the new firm. Harrison (2011) justified the use of accounting returns, as they are not subject to market inefficiency or perception of the market, but measure the actual outcome of an acquisition. As argued by Krishnakumar and Sethi (2012), accounting results are difficult to compare for companies from different geographical regions. However, as the focuses of this thesis are pharmaceutical and biotechnology M&A activities in Germany, this argument is negligible.
As suggested by Haleblian et al. (2009) and Brouthers et al. (1998), success factors are developed based on a literature review of the original objectives of M&A of pharmaceutical and biotechnology companies. This approach is also in line with arguments from Larsson and Finkelstein (1999) and Papadakis and Thanos (2010). Furthermore, the identified post-M&A success factors will be evaluated and assessed on their relationship to the post-M&A company performance, in particular to post-M&A revenue.

### 2.4 Post-merger and acquisition success factors

This section contains an extensive literature review on M&A objectives proposed as post-M&A success factors for the pharmaceutical and biotechnology industry. In addition, this section describes individual post-M&A success factors to correlate with the post-M&A performance expressed as the revenue difference between pre- and post-M&A. Furthermore, this section describes different hypotheses related to the research questions.

Because there is no common way of measuring M&A performance, measuring the success of M&As in the biotechnology or pharmaceutical sectors is still a challenging issue. Researchers, including Schweizer (2012) and Haleblian et al. (2009), suggest performing further research on the development of success factors and their correlation to post-M&A performance. As indicated by Schweizer, an appropriate success factor could be the patent rate, as it indicates the success of the M&A as an R&D strategy (Al-Laham, Schweizer & Amburgey (2010). This is in line with Haleblian et al. (2009), who underlined the need for a match among M&A success measures, the subject of analysis, and the question of interest in order to effectively measure M&A performance. As argued by Brouthers et al. (1998), managers may recognise M&As as successful as they
measure the success of the M&A against predetermined goals typically set at the beginning of M&A transactions.

In order to investigate the first research question on success factors, an extensive literature review of biotechnology and pharmaceutical M&A objectives was performed. Based on the literature review in Sections 2.4.1–2.4.10 the following post-M&A success factors were identified:

- Economies of scale and economies of scope
- Efficient allocation of personnel or resources
- Clinical success rate
- Market share
- Employee retention rate
- Weakening or eliminating competition
- Patent rate
- Gaining new knowledge
- Tax benefits
- Escape from bankruptcy

Individual post-M&A success factors were identified to correlate with the post-M&A performance expressed in this thesis as the revenue difference between pre- and post-M&A. Other success factors not characterised as positively correlating with the revenue, however, are still claimed as success factors as they belong to so-called strategic fit and/ or organisation fit concept, and are determined as value creation factors (Gomes et al., 2013).
The related research framework for the individual post-M&A success factors correlating with the post-M&A performance is presented in Section 2.5. Corresponding hypotheses are stated together with the post-M&A success factor hypotheses.

2.4.1 **Economies of scale and economies of scope**

Pautler (2003) argues that efficiency is a strong M&A motive. Firms perform M&A to combine their operations and to reduce production costs, increase output, improve product quality, obtain new technologies, or provide entirely new products. The potential efficiency, in this case, includes managerial efficiency. According to Farrell and Shapiro (2001), operational efficiencies may arise from economies of scale, production economies of scope, consumption economies of scope, improved resource allocation (more resources in the hands of better managers), moving to an alternative less costly production technology or asset configuration, improved use of information and expertise, improved focus on core skills of the firm, a more effective combination of assets, improvements in the use of brand name capital, and reductions in transportation and transaction costs.

According to Danzon et al. (2007), Cockburn and Henderson (2001) and Ravenscraft and Scherer (1987), big pharmaceutical and biotechnology companies often rationalise M&As by claiming economies of scale and economies of scope. Mergers permit the elimination of redundant manufacturing sites and therefore improve the economies of scale. According to Sharma and Ho (2002) and Kurdas (1998), economies of scale decrease the cost of production through size, whereas economies of scope relate to complementarity, making it cheaper to produce goods jointly rather than individually. In pharmaceutical and biotechnology M&As rationalised by economies of scale, production costs decrease through a cheaper joint production of more goods (like drugs). M&As rationalised by economies of scope are factors that make it cheaper to
produce a range of products together than to produce each one on its own. In 
pharmaceutical and biotechnology M&As such economies of scope can derive from 
businesses sharing functions, such as R&D, quality and assurance, finance or 
marketing. However, size matters, as larger firms are expected to profit from economies 
of scale and economies of scope and diversification of risk in the conduct of research 
(Cockburn & Henderson, 2001). As further argued by Danzon et al. (2007) mergers 
may also permit elimination of duplicative functions, thereby offering cost savings in 
the short term to offset the negative effect of declining revenues on net profits and 
generating economies of scale in the longer term. According to Cockburn and 
Henderson (2001), most research has focused on economies of scale in manufacturing. 
Production and R&D activities of pharmaceutical companies have been recognised as a 
principally important source of advantages accruing to size and diversity. DiMasi, 
Hansen, Grabowski and Lasagna (1991) determined that R&D for new drugs is a very 
lengthy and costly process. Therefore, it can be assumed that joint R&D activities on 
new drugs triggered by M&As would reduce research, discovery and development 
costs, and therefore be more efficient than R&D solo activities. The argument from 
Danzon et al. (2007), Cockburn and Henderson (2001) and Sharma and Ho (2002) 
suggest that economies of scale and economies of scope are important post-M&A 
success factors for pharmaceutical and biotechnology companies. Accordingly, the 
following two-part hypothesis is proposed:

H1a: Economies of scale is an important post-M&A success factor for pharmaceutical and biotechnology companies.

H1b: Economies of scope is an important post-M&A success factor for pharmaceutical and biotechnology companies.
It is further argued that both economies of scale and economies of scope jointly have a positive correlation to companies’ post-M&A performance measured as revenue, as the costs of production will fall due to the M&As, output will increase, and it is less costly to develop new products jointly (Cockburn & Henderson, 2001; Danzon et al., 2007; Sharma & Ho, 2002). Both success factors have an effect on the overall economy of the merged/ acquired company and therefore on post-M&A performance (revenue). Accordingly, the following hypothesis is proposed:

H2: Economies of scale and economies of scope post-M&A success factors are jointly positively related to pharmaceutical and biotechnology companies’ revenue post-M&A.

2.4.2 Efficient allocation of personnel or resources

As argued by Danzon et al. (2007) the US pharmaceutical and biotechnology industry is research-intensive, with an average R&D to sales ratio of 18% in 2003. In order to improve the R&D to sales ratio, it is reasonable that a pharmaceutical and biotechnology M&A enables the involved companies to pool their R&D activities more efficiently. Consistent with arguments from LaMattina (2011), combined companies tend to spend less money on R&D due to the efficient allocation of R&D activities. A prime example is the pharmaceutical company, Pfizer, which in 2006 merged with Wyeth. Before the M&A, 16% of sales was spent on R&D, compared to 11% post-M&A (LaMattina, 2011). With a more efficient R&D department focusing development activities on promising and ready-to-market compounds, the number of drug products should increase post-M&A.

As further argued by LaMattina (2011), a higher number of smaller research departments are better than a few big ones, as those research departments allow a wide variety of approaches to scientific challenges. The reshuffling of personnel and
resources after the M&A strengthens the focus on products that are close to market launch and ignores early-stage molecules whose commercial contribution is distant and uncertain (LaMattina, 2011). The successful reshuffling of personnel and resources post-M&A will increase output and decrease development and manufacturing costs.

Accordingly, the following hypothesis is proposed:

H3: Efficient allocation of personnel or resources is an important post-M&A success factor for pharmaceutical and biotechnology companies.

Furthermore, it is argued that efficient allocation of personnel and resources post-M&A positively influences economies of scale and economies of scope, thus maximising the value and the total output. Production efficiency involves producing the best value of goods and services with given resources, taking into account the costs of those resources. Furthermore, efficient allocation of personnel and resources saves development and manufacturing costs, therefore supporting economies of scale and economies of scope. In both cases the effect is improved economy. Efficient allocation of resources and personnel post-M&A strengthens the focus on the development of products in tandem rather than singly.

Accordingly, the following hypothesis is proposed:

H4: The post-M&A success factor efficient allocation of personnel and resources positively affects the post-M&A success factors of economies of scale and economies of scope.

2.4.3 Clinical success rate

As argued by DiMasi, Hansen & Grabowski (2003), the chance that a pharmaceutical or a biotechnology new drug candidate enters the clinical testing pipeline and is approved
to market, is defined as the clinical approval success rate. In contrast, the attrition rate describes the rate at which investigational drugs fall out of clinical testing in various phases (DiMasi et al., 2003). Powell and Brantley (1992) claim that a single biotechnology company seldom has all the necessary skills and organisational capabilities for successful clinical testing. Clinical testing of drug compounds needs to pass several clinical study phases, starting with animal toxicology studies and moving further to human clinical Phases 1–3 before national authorities approve new drug candidates for marketing. Special clinical knowledge is required in order to design proof-of-concept clinical trials for the first human studies, and gain approval for marketing of the new drug compound (Kola & Landis, 2004). Therefore, pharmaceutical and biotechnology companies post-M&A have a strong interest in focusing their clinical study knowledge and resources to increase the clinical success rate and to reduce the attrition rate. As discussed by DiMasi (2001), acquired NCEs of pharmaceutical companies have a higher clinical success rate than self-originated NCEs. It is therefore argued that the clinical success rate is a very important post-M&A success factor.

Accordingly, the following hypothesis is proposed:

H5: The clinical success rate is an important post-M&A success factor for pharmaceutical and biotechnology companies.

Furthermore, once the local authority positively approves the drug development and clinical testing of drug compounds, there is nothing preventing the successful sale of the new medication. As discussed by Pavlou and Reichert (2004) and DiMasi (2001), successful approval of a new drug will increase the sales of the merged company. It is further argued that the clinical success rate is positively correlated with the company revenue post-M&A. Therefore, the following hypothesis is proposed:
H6: The post-M&A success factor clinical success rate is positively related to pharmaceutical and biotechnology companies’ revenue post-M&A.

2.4.4 Market share

Many economists consider an active market for corporations as an important safeguard against inefficient management. Mitchell and Mulherin (1996) see an active market for corporate assets as a benefit in the form of more efficient reallocation of resources from relatively inefficient to efficient firms during periods of industry contraction or industrial turmoil.

In the pharmaceutical industry, strong benefits are being realised by M&As to strengthen the pipeline of the acquirer and subsequently the market power of a potential blockbuster drug. As argued by Danzon et al. (2007), the share of global sales of pharmaceutical companies increased from 20% in 1985 to 48% in 2002, because of M&As. Danzon (2007) further argues that for a fully integrated pharmaceutical company that has gaps in its product pipeline, merging with a company that has a good product pipeline but is weak in marketing and sales capability may create value.

Consistent with arguments from Heralceous and Murray (2001), merging companies with good product pipelines could give firms added knowledge from which potential blockbuster drugs could emerge, thereby increasing the market power of the companies. Pervaaz (2010) argues competitive advantages can be realised when M&As lead to service line extensions of portfolios into generic and consumer products. Related to pharmaceutical and biotechnology M&A activities, market share seems to be an important post-M&A success measure. Increased market share or the marketing of new drug compounds will increase sales and strengthen the financial positions of pharmaceutical and biotechnology companies. As argued by Bohlin, Daley and Thomson (2000), M&As are justified by the increase of market share motive. Therefore,
it is argued that the post-M&A success factor market share is positively related to sales. Divya and Arisham (2013) argue that the reasons for pharmaceutical and biotechnology M&As are to increase market share and to enter the market quickly with new products. The following hypotheses are therefore proposed:

H7: Market share is an important success factor for pharmaceutical and biotechnology companies.

H8: The post-M&A success factor market share is positively related to companies’ revenue post-M&A.

2.4.5 Employee retention rate

Post-M&A integration takes time, and results may not be positive. According to Olie (1990), Datta (1991), Cartwright and Cooper (1990), Child, Faulkner and Pitkethly (2001), and Ranft and Lord (2002), the post-M&A integration phase is the most challenging in ensuring success of the M&A. The integration of the target firm into an existing organisation can cause employee dissatisfaction, resulting in a higher number of resignations. This corresponds to literature from Shibayama, Tanikawa, Fujimoto and Kimura (2008), who argue that M&A disadvantages are a high outflow of employees, anxieties and conflicts among employees, and collisions of different corporate cultures.

The most serious factor is the outflow of scientists (Shibayama et al., 2008). According to Schweizer (2002), such cases were observed with the post-merger integration process of the M&A of Pharmacia and Upjohn, which was characterised by cultural conflicts (Swedish, Italian and American components). Moreover, a previous study on M&As in R&D-intensive industries reported that approximately 50% of high-achieving scientists left their organisations after M&As (Ernst & Vitt, 2000). As argued by Shibayama et al. (2008), biotechnology start-up companies have functioned as the destination for such
scientists in recent years as a result of the successful development of biotechnology products.

The biotechnology industry is a research-intensive industry, which needs talented and experienced scientists in order to maintain business growth, with start-ups luring these scientists from large pharmaceutical companies. According to Bertrand and Zuniga (2006), a positive integration of employees of the target firm can enhance innovation performance as it allows focusing on superior innovation capability. Integration implies a full consolidation of the operations, organisations and culture of both organisations.

As argued by Pervaaz (2010), one of the key success metrics to ensure that the M&A meets its primary objectives is employee engagement and retention. It is further argued that, as proposed by Bertrand and Zuniga (2006), a positive integration of employees of the target firm will increase the employee retention rate. A high employee retention rate post-M&A keeps the necessary knowledge within the new organisation, and is very important for biotechnology and pharmaceutical companies. It is further argued that the employee retention rate as a success factor is an antecedent of M&A performance reflected in strategic, organisational and human resource management considerations (Larsson & Finkelstein, 1999). Therefore, it is considered that the post-M&A success factor employee retention rate is important; however, it does not correlate with companies revenue post-M&A. Accordingly, the following hypothesis is proposed:

H9: The post-M&A success factor employee retention rate is an important success factor for pharmaceutical and biotechnology companies.

2.4.6 Weakening or eliminating competition

Divya and Arisham (2013) argue that one reason for a pharmaceutical M&A is to protect market share by weakening or eliminating competition. However, market protection is not the only reason. Increasing the market share can be achieved by an
licensing agreement with other pharmaceutical companies for desired products. Therefore, it is not necessary to perform an M&A to achieve higher market share. However, as argued by Angwin (2007), an M&A can be used as a weapon to influence the action of other competitor firms.

Especially in the pharmaceutical and biotechnology industry, where new products require fast successful R&D, and the time needed to market products, M&As of the target firm might damage the business of other firms. In other words, an acquisition might have a neutral effect upon the parent, but may severely hamper a competitor and thus future competition. As argued by Angwin (2007), thwarting a competitor may prevent further significant change or challenge in an industry, and also improve strategic options in the future. Following the argument from Yannopoulos (2011), weakening or eliminating competitors are offensive marketing strategies firms utilise to improve their own competitive position by taking market share away from rivals. Bohlin et al. (2000) argue that managers see M&As as a strategy to protect markets by weakening or eliminating rivals. The strategy of weakening or eliminating a competitor through an M&A increases market share by taking market share from rivals (Yannopoulos, 2011). Consequently, it is argued that weakening/eliminating a competitor is a part of the market share success factor. Therefore it is argued that the economic correlation of the post-M&A success factor weakening and elimination of a competitor is embedded in the post-M&A success factor market share. Literature review from Bohlin et al. (2000) and Yannopoulos (2011) refer weakening or eliminating a competitor through an M&A as an own M&A motive. Therefore, it is considered that the post-M&A success factor weakening and elimination of a competitor is an important self-contained post-M&A success factor. Consequently, the following hypothesis is proposed:
H10: Weakening or eliminating a competitor is an important post-M&A success factor.

2.4.7 Patent rate

In the pharmaceutical and biotechnology industry, patent protection on new approved and marketed drugs lasts for roughly 12 years (Danzon et al. 2007). Once the patent of a blockbuster drug expires, generic competitor companies typically erode the originator company’s sales. As Danzon et al. (2007) argues, those blockbuster drugs often account for 50% or more of a firm’s revenue, and therefore patent expiration on one or more of these compounds can decimate the firm’s revenue within a few months. In response, the company can potentially replace the patent-expired compound with a new compound or gain further compounds due to M&A of a pipeline-filled company. Due to patent expirations experienced by most big pharmaceutical companies, these companies expect a gap in their product pipeline. Such gaps cause a decline in the expected growth of future revenue and create expected excess capacities in the firm’s marketing, sales and manufacturing departments (Danzon, 2007). Therefore, for big pharmaceutical companies, M&As are motivated by the patent expiry and the resulting gap in the product pipeline (Danzon, 2007).

This argument can be found in the BioWorld Insight (2009) report, where the so-called patent cliff of the upcoming years will stimulate a higher rate of M&A in the pharmaceutical industry. For example, Pfizer’s blockbuster cholesterol drug Lipitor will face generic competition in the upcoming year; it is clear that the existing pharmaceutical R&D engines are not capable of generating enough new drugs to offset the upcoming patent cliff though internal efforts only (BioWorld Insight, 2009). The patent cliff phenomenon, described by Lewis (2009), is a major challenge for pharmaceutical companies and one of the reasons for M&As in the pharmaceutical and
biotechnology industry. Furthermore, as argued by Heralceous and Murray (2001), patent expiry can reduce the innovator’s sales by as much as 80%, and thus it is argued that merging research laboratories and product pipelines could give pharmaceutical firms added knowledge from which potential blockbuster drugs could emerge. Not surprisingly, pharmaceutical companies are looking to replace such revenue lost from patent expirations with new near-term revenue by picking up companies with approved products on the market. This M&A strategy is of minimal risk (BioWorld Insight, 2010). Pharmaceutical companies like GSK (GlaxoSmithKline) and Novartis or Pfizer are going to lose millions of dollars in revenue due to the patent expiration of blockbuster drugs. Therefore, big pharmaceutical companies are especially keen to pursue M&A with companies that have successful product pipelines (Danzon et al., 2007; Heracleous & Murray, 2001; Lewis, 2009).

As indicated by Schweizer (2012), one success measure for biotechnology companies could be the patent rate as it indicates the success of the M&A as an R&D strategy (Al-Laham et al., 2010). The patent rate is defined as the number of patents submitted due to new inventions of biotechnology products. M&As are a strategy for biotechnology companies to overcome a lack of internal expertise or specific scientific knowledge. Several sources have emphasised the important role that M&As can play as an external source of innovation and, in combination with a more efficient R&D department, can increase the patent rate of new innovative products, (Danzon et al., 2007; LaMattina, 2011; Schweizer, 2002). However, as further argued by Danzon et al. (2007), R&D ties up capital in the form of labour, equipment, human resources and various technologies to discover new compounds. Therefore, R&D investment by itself generates no revenue. Unfortunately, the fact is that new patents are no guarantee of success (Danzon et al., 2007). In general the success rate of new products is one product to market for every 10 that go to clinical trial. In terms of pharmaceutical and biotechnology M&A activities, it
is argued that the enhanced rate of new patent-protected products is a very important success measure. However, new patent-protected products do not guarantee that the product will become a top seller and improve revenue post-M&A. Consequently, the following hypothesis is proposed:

H11: The patent rate is an important post-M&A success factor for pharmaceutical and biotechnology companies.

2.4.8 Gaining new knowledge

Pautler (2003) argues that companies perform M&As to obtain new technologies and knowledge. According to Farrell and Shapiro (2001), operational efficiencies may arise from moving to an alternative lower cost production technology. It has long been believed that competitive advantages of companies come from their long-term collected knowledge, which is valuable, unique and hard to imitate (Argote & Ingram, 2000). M&As are a strategic way for companies to gain knowledge from others (Back & Krogh, 2002; Bresman, Birkinshaw & Nobel, 1999). Through M&As, companies transfer external valuable knowledge and assimilate it into their internal knowledge bases to create knowledge specialties (Huang, Ling, Yang and Zhao, 2010). As discussed by Sarala, Junni, Cooper and Tarba (2016), complementary employee skills are likely to be particularly valuable and are more likely to be transferred between the merging firms, trust and collective teaching represent important sociocultural mechanisms for transferring tacit and socially complex knowledge, whereas cultural integration creates a shared social platform for knowledge transfer. As argued by Shibayama et al. (2008) and Cloodt, Hagedoorn & Kranenburg (2006), the number of Phase 1 drug candidates and the post-M&A innovation rate improves when M&As are completed by pharmaceutical or biotechnology companies with a certain technological complementarity. In this case technological complementarity means the use of two
different causal technologies that influence the same object. In the pharmaceutical and biotechnology industry, the process of acquiring knowledge through M&As is an essential strategic way to gain knowledge in their proprietary drug discovery technology platforms, screening techniques, discovery methods, formulation structures and manufacturing processes.

A good example of a knowledge acquisition is the Merck’s deal with Sirna Therapeutics in 2006. Merck acquired Sirna Therapeutics to obtain its pioneering ribonucleic acid interference (RNAi) technology. The gained knowledge or know-how will close knowledge gaps and further allow continued development of new promising drug compounds.

However, as argued by Shibayama et al. (2008), substantial time and effort are required to establish the new knowledge to achieve the objectives after M&A deals. Furthermore, the long-term influence on R&D and the success or failure of drug development varies with how inter-firm relationships are established (Shibayama et al., 2008). In addition, newly acquired knowledge can be lost through turnover of key individuals during the M&A process (Bohlin, et al., 2000). Therefore, a positive correlation of companies’ revenue post-M&A through new knowledge acquisition is not anticipated. However, it is argued that gaining new knowledge (know-how) is an essential post-M&As success factor. Therefore, the following hypothesis is proposed:

H12: Gaining new knowledge is an important post-M&A success factor for pharmaceutical and biotechnology companies.

2.4.9 Tax benefits

Pautler (2003), and Shleifer and Summers (1987), argue that a motive for M&A, at least in the past, has been taxation. As Pautler (2003) explains, some target firms may seek
acquirers to escape financial problems, or to break unfavourable labour contracts. Other firms eventually seek leveraged purchases of their targets to increase the surviving firm’s risk-return profile. Mergers occur when managers have aspirations to run a larger company, they have considerable cash, and agency controls are imperfect. Following the argument of BioWorld Insight (2010), big pharmaceutical companies park their cash outside of their own country. This cash can be used outside of their own country without triggering taxes, and therefore big pharmaceutical firms take a keen interest in the acquisition of foreign pharmaceutical or biotechnology companies. A BioWorld Insight report from 2009 argues that pharmaceutical companies have a lot of liquid cash and they have been able to raise debt money relatively easily for pharmaceutical tax M&A strategies. As indicated by BioWorld Insight (2010), tax justified M&As are an important strategy for big pharmaceutical companies performing M&As with foreign companies and with a lot of cash. As the majority (more than 95%) of German pharmaceutical and biotechnology M&As have been performed between German companies, tax benefits play an irrelevant role and therefore a positive correlation of companies’ revenue post-M&A is not anticipated. Consequently the following hypothesis is proposed:

H13: The post-M&A success factor tax benefits is not an important success factor for pharmaceutical and biotechnology companies.

2.4.10 Escape from bankruptcy

Another motive for pharmaceutical and biotechnology companies to merge or be acquired is to escape from bankruptcy. According to Amit, Livnat & Zarowin (1989), the bankrupt-predicted firm may attract certain bidders, those for example who desire tax benefits or wish to enter new markets. Smaller pharmaceutical and biotechnology companies have significantly less cash and more often face bankruptcy than the big
pharmaceutical companies, and therefore are an attractive M&A target for big pharmaceutical companies. As further argued by Divya and Arishma (2013), for small pharmaceutical companies, M&As act as a strategy to escape financial troubles, enhance the marketing of products and to avoid a low cash sales ratio. Haeussler (2007) argues that an M&A could be an option to overcome financial distress when firms enter a partnership with a firm in a better financial position. However, financially distressed firms are not as attractive to most potential bidders as are highly liquid target firms. As argued by Amit et al. (1989), the economic gains for stockholders of highly liquid firms are expected to be larger than those of less liquid firms, which in turn, will have higher gains than those of financially distressed firms. Some researchers found that avoiding insolvency is a relevant motive for M&As (Amit et al., 1989), BarNiv & Hathorn, (1997). As further argued by Danzon et al. (2007), small biotechnology firms with financial problems, few marketed drug compounds, and low cash-to-sales ratio are more likely engage in M&As than firms in a better financial position. A research study by Amit et al. (1989) showed that the excess returns of M&A target bankrupt companies compared to high liquid targets are unimportant, claiming no influence on post-M&A revenue. However, it is argued that escaping bankruptcy is an important post-M&A success factor for biotechnology and pharmaceutical companies. Consequently the following hypothesis is proposed:

H14: Escaping bankruptcy is an important post-M&A success factor for pharmaceutical and biotechnology companies.
Summary of hypotheses and post-M&A success metrics

Based on the literature review of pharmaceutical and biotechnology M&A objectives, Table 4 summarizes the identified post-M&A success metrics, the related hypothesis and the research framework hypothesis.

Table 4: Summary on post merger and acquisition success metrics, hypothesis and research framework hypothesis

<table>
<thead>
<tr>
<th>No.</th>
<th>Hypothesis</th>
<th>Post-M&amp;A success factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a</td>
<td>Economies of scale is an important post-M&amp;A success factor for pharmaceutical and biotechnology companies</td>
<td>Economies of scale</td>
</tr>
<tr>
<td>H1b</td>
<td>Economies of scope is an important post-M&amp;A success factor for pharmaceutical and biotechnology companies</td>
<td>Economies of scope</td>
</tr>
<tr>
<td>H3</td>
<td>Efficient allocation of personnel or resources is an important post-M&amp;A success factor for pharmaceutical and biotechnology companies</td>
<td>Efficient allocation of personnel or resources</td>
</tr>
<tr>
<td>H5</td>
<td>The clinical success rate is an important post-M&amp;A success factor for pharmaceutical and biotechnology companies</td>
<td>Clinical success rate</td>
</tr>
<tr>
<td>H7</td>
<td>Market share is an important success factor for pharmaceutical and biotechnology companies</td>
<td>Market share</td>
</tr>
<tr>
<td>H9</td>
<td>The post-M&amp;A success factor employee retention rate is an important success factor for pharmaceutical and biotechnology companies</td>
<td>Employee retention rate</td>
</tr>
<tr>
<td>H10</td>
<td>Weakening or eliminating a competitor is an important post-M&amp;A success factor</td>
<td>Weakening or eliminating a competitor</td>
</tr>
<tr>
<td>H11</td>
<td>The patent rate is an important post-M&amp;A success factor for pharmaceutical and biotechnology companies</td>
<td>Patent rate</td>
</tr>
<tr>
<td>H12</td>
<td>Gaining new knowledge is an important post-M&amp;A success factor for pharmaceutical and biotechnology companies</td>
<td>Gaining new knowledge</td>
</tr>
<tr>
<td>H13</td>
<td>The post-M&amp;A success factor tax benefits is not an important success factor for pharmaceutical and biotechnology companies</td>
<td>Tax benefits</td>
</tr>
<tr>
<td>H14</td>
<td>Escaping bankruptcy is an important post-M&amp;A success factor for pharmaceutical and biotechnology companies</td>
<td>Escaping bankruptcy</td>
</tr>
</tbody>
</table>

No. Research Framework Hypotheses

H2 The post-M&A success factors economies of scale and economies of scope are jointly positively related to the pharmaceutical and biotechnology companies’ revenue post-M&A

H4 The post-M&A success factor efficient allocation of personnel or resources positively affects the post-M&A success factors of economies of scale and economies of scope

H6 The post-M&A success factor clinical success rate is positively related to pharmaceutical and biotechnology companies’ revenue post-M&A

H8 The post-M&A success factor market share is positively related to companies’ revenue post-M&A
2.5 Research framework

Drawing upon previous literature and theoretical considerations, this chapter has developed an overall research framework. A number of hypotheses relating to the importance of M&A success factors have been derived. Also a number of hypotheses relating these success factors to company revenue have been developed. In particular, H2, H4, H6 and H8 are integrated into the final research framework as displayed in Figure 4.

![Research framework diagram](image)

Figure 4: Research framework for Hypotheses 2, 4, 6 and 8

The research framework follows the idea of simplicity and comprehensibility known from the ‘Occam’s Razor in Knowledge Discovery’ (Domingos, 1999). In summary, the main supporting argument for the proposed hypotheses is that the post-M&A success factors economies of scale and economies of scope, market share and clinical success rate are positively related to pharmaceutical and biotechnology post-M&A performance.
expressed as the company’s revenue. It is argued that the post-M&A success factors economies of scale and economies of scope are positively related to company performance as the costs of manufacturing will fall due to M&As, outputs will increase, and combined product development efforts will be less costly (Cockburn & Henderson, 2001; Danzon et al., 2007; Sharma & Ho, 2002). Furthermore, the cost of production will fall due to more efficient production technology and effective combination of assets due to economies of scale and scope. As argued by Pervaaz (2010), Heracleous and Murray (2001) and Danzon et al. (2007), increased market share resulting from an M&A will increase the sales of drugs and is therefore positively related to turnover. The post-M&A success factor clinical success rate is discussed by DiMasi et al. (2003), DiMasi (2001), Powell and Brantley (1992), Kola and Landis (2004), and Pavlou and Reichert (2004) and is considered to positively to correlate with revenue as the sales of approved drug candidates will grow. The post-M&A success factor efficient allocation of personnel and resources positively influences the post-M&A success factors economies of scale and economies of scope as discussed in Section 2.4.2.

For post-M&A success factors like employee retention rate, patent rate, gaining new knowledge, tax benefits and escaping bankruptcy a positive correlation of companies’ revenue post-M&A is not anticipated. However, for weakening or eliminating a competitor it is argued that the economic correlation is embedded in the post-M&A success factor market share.
Chapter 3  Methodology

3.1 Justification of research paradigm and methodology

This chapter discusses the research approach, research strategy and data collection methods, which will enable the examination of the proposed research framework and proposed hypotheses. In order to do so, the research process ‘onion’ model from Saunders, Lewis and Thornhill (2003) has been applied. They describe the research process in a model with five layers as shown in Figure 5.

![Figure 5: The research onion: (Saunders, Lewis & Thornhill, 2008)](image)

The research onion was developed by Saunders et al. (2008) in order to describe the stages through which the researcher pass when framing an effective methodology. First, the research philosophy requires definition. This creates the starting point for the
appropriate research approach, which is adopted in the second step. In the third step, the research strategy is approved, and the fourth layer identifies the time horizon. The fifth step represents the stage at which the data collection methodology is identified. The benefits of the research onion are thus that it creates a series of stages under which the different methods of data collection can be understood, and illustrates the steps by which a methodological study can be described.

According to the research onion, the philosophy for this research study is positivism, which is ‘an epistemological position that advocates the application of the methods of the natural sciences to the study of social reality and beyond’ (Bryman & Bell, 2003, p 580). This is further described as the philosophical dimension of research to understand what researchers assume about the nature of reality and how they can know that reality.

Denzin and Lincoln (2011) describe positivist and post-positivist paradigms as working from within a realist and critical realist ontology and objective epistemologies, and they rely on experimental, quasi experimental, survey, and rigorously defined qualitative methodologies. The constructivist paradigm assumes a relativist ontology (there are multiple realities), a subjectivist epistemology (knowing and respondent concrete understandings), and a naturalistic (in the natural world) set of methodological procedures. Findings are usually presented in terms of the criteria of grounded theory or pattern theories. Denzin and Lincoln (2011) further summarise basic beliefs of alternative strategies of enquiry in their *Handbook of Qualitative Research* as shown in Table 5.
Table 5: Basic beliefs (Denzin & Lincoln, 2011)

<table>
<thead>
<tr>
<th></th>
<th>Positivism</th>
<th>Post-positivism</th>
<th>Critical Theory</th>
<th>Constructivism</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ontology</strong></td>
<td>Naive realism – ‘real’ reality but apprehensible</td>
<td>Critical realism – ‘real’ reality but only imperfectly and probabilistically apprehensible</td>
<td>Historical realism – virtual reality shaped by social, political, cultural, economic, ethic, and gender values; crystallised over time</td>
<td>Relativism – local and specific constructed realities</td>
</tr>
<tr>
<td><strong>Epistemology</strong></td>
<td>Dualist/ objectivist; findings true</td>
<td>Modified dualist/ objectivist; critical tradition/ community; findings probably true</td>
<td>Transactional/ subjectivist; value-mediated findings</td>
<td>Transactional/ subjectivist, created findings</td>
</tr>
<tr>
<td><strong>Methodology</strong></td>
<td>Experimental/ manipulative verification of hypotheses; chiefly quantitative methods</td>
<td>Case studies; unstructured or semi-structured interviews, may use surveys. Qualitative narratives including basic statistics (e.g., crosstabs, frequencies), statistics applied to quantitative components to search for broad tendencies &amp; commonalities</td>
<td>Qualitative, emphasis on detailed historical explanations. Reconstruction of constructions. Dialectic (conversational &amp; questioning). Archival, document review, interviewing, observation; ethnographic &amp; phenomenological analyses</td>
<td>Hermeneutical/ dialectical, archival, document review, interviewing, observation, philosophical anthropology, phenomenology, hermeneutics.</td>
</tr>
</tbody>
</table>

Among other things, the positivism philosophy entails the principle of deductivism, which is the most suitable basis for this thesis. In the deductive approach, a theory and hypothesis (or hypotheses) are developed and a research strategy is subsequently designed to test the hypothesis (Saunders et al., 2003).

The deductive research process, as illustrated in Figure 6 by Bryman and Bell (2003) applies to this thesis.
In adopting the model from Bryman and Bell (2003) to this thesis, the process began with an intensive review of relevant literature concerning post-M&A success factors in the biotechnology and pharmaceutical industry (see Chapter 2, Section 2.4). Further, identified post-M&A success factors and their relationship with post-M&A performance was evaluated. As a result of the literature review, the hypotheses were formed. Based on the findings from the collected data, each of the hypotheses will be evaluated and subsequently accepted or rejected, and revision of the theory will follow.

Although this research study follows a deductive approach, which is typically related to quantitative research, Saunders et al. (2003) suggest qualitative data is still valuable and relevant. However, for the deductive approach, the collection, analysis and presentation of statistical information is fundamental.
The quantitative research approach involves the gathering and statistical analysis of numerical data, and drawing conclusions or testing hypotheses. The reliability of quantitative research results can be underpinned by a relatively large number of participants in the research field of interest. The data for interpretation might be derived from questionnaire-based surveys, from observations or from secondary sources such as sales figures.

The qualitative research approach contrasts with the quantitative research approach. Qualitative research approaches use words rather than numbers, as in quantitative research methods, in order to describe findings and to emphasise seeing the world from the eyes of the participants being studied. Moreover, Denzin and Lincoln (2011) define qualitative researchers as studying things in their natural setting, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them.

The main difference between qualitative and quantitative research approaches is that the qualitative approach is not concerned with statistical analysis. According to Veal (2005), it involves gathering information about a small number of subjects. The information collected is generally not presentable in numerical form or suitable for statistical analysis. Findings may be presented as case studies of a few individuals. As further argued by Veal (2005), the approach is based on a belief in the value of a full and rounded understanding of the experiences and situations of a few individuals. The methods used to collect qualitative information include observations, informal unstructured and in-depth interviewing, and participant observation.

In the description of the philosophical and practical dimensions, quantitative and qualitative research methodologies have been used as (one) discriminator for the different paradigms. In order to understand the differences between quantitative and qualitative methodologies, Sarantakos (2005) presents a useful and complementary
extension for quantitative and qualitative methodologies. Table 6 summarises the differences between quantitative and qualitative methodologies.

Table 6: Quantitative versus qualitative methodologies (Sarantakos, 2005)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Quantitative methodology</th>
<th>Qualitative methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature of reality</td>
<td>Objective; simple; single; tangible sense impressions</td>
<td>Subjective; problematic; holistic; a social construct</td>
</tr>
<tr>
<td>Causes and effects</td>
<td>Nomological thinking; cause-effect linkages</td>
<td>Non-deterministic; mutual shaping; no cause-effect linkages</td>
</tr>
<tr>
<td>The role of values</td>
<td>Value neutral; value free enquiry</td>
<td>Normativism; value-bound enquiry</td>
</tr>
<tr>
<td>Natural and social sciences</td>
<td>Deductive; model of natural sciences; nomothetic; based on strict rules</td>
<td>Inductive; rejection of the natural sciences model; ideographic; no strict rules; interpretations</td>
</tr>
<tr>
<td>Methods</td>
<td>Quantitative, mathematical, extensive use of statistics</td>
<td>Qualitative, with less emphasis on statistics, verbal and qualitative analysis</td>
</tr>
<tr>
<td>Researcher’s role</td>
<td>Passive, distant from the subject; dualism</td>
<td>Active, equal; both parties are interactive and inseparable</td>
</tr>
<tr>
<td>Generalisations</td>
<td>Inductive generalisations; nomothetic statements</td>
<td>Analytic or conceptual generalisations; time and context specific</td>
</tr>
</tbody>
</table>

3.2 Research approach

More specifically, a semi-structured interview method was conducted to develop deep understandings about post-M&A performance measures and success factors for German pharmaceutical and biotechnology companies. The interview method was chosen as the means for collecting primary data and provided the source of the major findings. This research study also contains a survey questionnaire method associated with the quantitative research strategy. The results from the survey questionnaire combined with the results from the interview are used to crosscheck the hypotheses for post-M&A success factors of German pharmaceutical and biotechnology companies.
In addition, in order to justify the chosen research methodology and the research design (qualitative and quantitative) for the described research topic, literature articles have been evaluated using the criteria presented in Table 7.

Table 7: Evaluation of literature on research paradigm and methodology

<table>
<thead>
<tr>
<th>Selected M&amp;A research articles</th>
<th>Paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positivism</td>
</tr>
<tr>
<td>Haeussler (2007)</td>
<td>X</td>
</tr>
<tr>
<td>Capron, Dussauge and Mitchell (1998)</td>
<td>X</td>
</tr>
<tr>
<td>Ernst and Young (2013)</td>
<td>X</td>
</tr>
<tr>
<td>Amit, Livnat and Zarowin (1989)</td>
<td>X</td>
</tr>
<tr>
<td>Schoenberg and Reeves (1999)</td>
<td>X</td>
</tr>
<tr>
<td>Focarelli, Panetta and Salleo (2002)</td>
<td>X</td>
</tr>
<tr>
<td>Huang, Ling, Yang and Zhao (2010)</td>
<td>X</td>
</tr>
<tr>
<td>Ruckmann (2005)</td>
<td>X</td>
</tr>
<tr>
<td>Blonigen and Taylor (2000)</td>
<td>X</td>
</tr>
<tr>
<td>Rhoades (1994)</td>
<td>X</td>
</tr>
<tr>
<td>Harrision (2011)</td>
<td>X</td>
</tr>
<tr>
<td>Amiot and Sansfacon (2011)</td>
<td>X</td>
</tr>
<tr>
<td>Hovakimian and Hutton (2010)</td>
<td>X</td>
</tr>
<tr>
<td>Walter and Barney (1990)</td>
<td>X</td>
</tr>
<tr>
<td>Haeussler (2006)</td>
<td>X</td>
</tr>
<tr>
<td>Mukherjee, Kiymaz and Baker (2003)</td>
<td>X</td>
</tr>
<tr>
<td>Bruner (2004)</td>
<td>X</td>
</tr>
</tbody>
</table>

Score 18 2 0 0 4 20

Haeussler (2007) uses a combination of qualitative and quantitative research methods. In-depth interviews with experts and a unique survey of German biotechnology firms provided data to assess the research question. Additionally, two case studies were discussed in detail to underpin the research question.
Haeussler (2006) used event study methodology to examine her hypotheses. In order to characterise the performance of M&As, a few researchers such as Higgins and Rodriguez (2005) and Haeussler (2006) use event study methodology to compute the CAR to draw a conclusion on post-M&A performance.

Other researchers, including Danzon et al. (2007) developed a model to test several competing hypotheses to explain firm-specific merger activity and to generate a measure of each firm’s propensity to participate in a merger in each eligible year. The effects of M&As were calculated based on a range of performance measures. Amit et al. (1989) use the CAR for the post-M&A performance measure. Interestingly, all mentioned researchers use empirical study data, which have been collected from statistical data sources but not from surveys.

As shown by Haleblian et al. (2009), most research on M&A has focused on publicly traded US companies using quantitative archival data. Archival-based methodologies are a consequence of data availability; however, although such methods have provided scholars with valuable insights into the antecedents and consequences of acquisitions, they limit scholars’ abilities to get ‘inside’ the phenomenon (Haleblian et al., 2009). Furthermore, such data can reduce results disposed to local biases and interpretation. To overcome these limitations, Haleblian et al. (2009) suggest considering alternative research approaches such as including in-depth interviews, case study techniques, grounded theory development and surveys and laboratory studies.

Bruner (2004) compares different assessments of the evidence on M&A profitability in his research article. Bruner summarised the evidence from 14 informal studies and 100 scientific studies between 1971 and 2001 and compared event studies, accounting studies, surveys and case studies. In terms of the research methodology, Bruner reviews
a mix of articles using either qualitative or quantitative research methodology and also compares the research approaches regarding the profitability of M&As.

Much more interesting is the research article from Mukherjee, Kiymaz and Baker (2003) in which the researchers use a survey to indicate motives for acquisitions and the practices used to value acquisitions. Further, a research study from Brouthers et al. (1998) suggests using key success factors to measure performance on each objective and not just a single objective like the share price or accounting measure.

In summary the research philosophy for this thesis is positivism, the research approach is deductive following the research strategy to apply qualitative—expert interview—and quantitative—survey questionnaire—data collection.

### 3.3 Data source and data collection

#### 3.3.1 Expert interviews

In order to assess post-M&A success factors for small- and medium-sized German pharmaceutical and biotechnology companies and to examine the hypotheses, expert interviews were performed. The advantages of expert interviews are the high willingness to participate, controllable conversation procedure, and the low risk for misinterpretations of questions. The disadvantages are higher costs, long execution times, and interviewer bias (Veal, 2005). The sample size of interviewees should be as best as possible, however should stop at the point of saturation where no new information or idea is generated. In order to generate suitable data for analysing the hypotheses the following requirements were imposed for the selection of research participants:
1. The participant has been involved in and/or is currently involved in an M&A process.

2. The participant has been employed in and/or is currently employed in a biotechnology or pharmaceutical company in Germany.

3. The participant is an executive, such as CEO, CFO, chief operation officer (COO), chief business officer (CBO) or another managerial-level position in a biotechnology or pharmaceutical company in Germany.

The reason for the first constraint is to ensure participants have relevant M&A experience to understand and contribute to the research topic. With regard to the second constraint, the primary focuses of the research are German biotechnology and/or pharmaceutical companies. Therefore, only interviewees from German biotechnology and/or pharmaceutical companies should be included in the sample. The last constraint was set in order to ensure that the findings capture the viewpoints of high-level executives or managers within the organisation.

Interviewees were selected from German pharmaceutical and biotechnology companies that have been involved in one or more M&A activities. A request for an interview was made to potential participants either by email or telephone. A participant information sheet (see Appendix I) and consent form (see Appendix II) were forwarded via email to the participant. Within the pharmaceutical and biotechnology industry, it is not unusual for managing directors’ mother language to be English, therefore either an English or a translated German version of the information sheet and consent form were forwarded to the participants. Finally, an appointment for a personal or telephone interview was agreed with the participants.

Data were not validated on single participants; evaluation only occurred in aggregated form. See Appendix III for the English version of the expert interview questionnaire,
and Appendix IV for the German version. The primary supervisor reviewed the English translation, and small grammatical and spelling issues were corrected and included in the final version.

3.3.2 Design of the interview questions

The design of the interview questions followed protocols developed by Veal (2005) and the M&A studies of Mukherjee et al. (2003), Brouthers et al. (1998) and Arvanitis and Stucki (2015). The expert interview approach was structured and started with general questions and then moved to more specific ones. Appendix III and IV show in detail the interview questions. General questions related to the participant’s current employment position and position during the M&A process, how many M&As the participant had been involved in, the year of the M&A, the size (by number of employees) of the company involved in the M&A process, the company’s main business area and the business focus of the company involved in the M&A process, and the legal structure of the company involved in the M&A process.

Most of the specific questions were open-ended in nature and closely related to the research questions. The questions were designed to encourage interviewees to demonstrate their knowledge and understanding of M&As. Participants were asked about their opinions of post-M&A success factors of pharmaceutical and biotechnology M&A activities and their challenges using them. This line of questioning could identify novel success measures that may not have been included in the research framework. Furthermore, participants were asked about their opinions of other post-M&A success metrics given different scenarios, including a different company size (by number of employees), different business area (pharmaceutical companies would become biotechnology companies and vice versa) and business focus (contract research organisation (CRO), R&D companies etc.) and different legal structure (public to
private and vice versa). In addition, participants were questioned about when they would measure (time = years) post-M&A success, their source of empiricism and if the last M&A they were involved in met their expectations.

3.3.3 Qualitative data analysis

The process of qualitative data analysis is a difficult skill to attain. It is a skill that comes from rigorous, high quality social science training and experience (Broom, 2005). The qualitative data analysis for in total 10 interviews (point of saturation) is performed by systematically reading through each interview transcript several times, making notes and noting emerging patterns within the data collected.

According to Mayring and Fenzl (2014), the qualitative content analysis consists a bundle of techniques for systematic text analysis. As further described by Mayring and Fenzl (2014), the idea of the procedure is, to formulate a criterion of definition, derived from theoretical background and research question, which determines the aspects of the textual material taken into account. Following this criterion the material is worked through and categories are tentative and deduced step by step (Mayring & Fenzl, 2014). If required, those categories can be revised within a feedback loop, eventually reduced to main categories and checked in respect to their reliability (Mayring & Fenzl, 2014).

Analysis of the interviews was performed using NVivo 10 for Macintosh software. The NVivo 10 software allows the user to conceptualise and categorise data, which in the next step allows the identification of concepts and the formation of patterns by grouping together similar incidences or claims (Broom, 2005). In the next step, themes are established from the notes of the interviews and the interview text is searched for other related comments, employing constant comparison. In the next process selective coding is performed, bringing together the patterns, consistencies, categories and constructions,
and creating meta-themes. Meta-themes are then used to evaluate the research hypotheses (Strauss & Corbin, 1998).

### 3.3.4 Survey questionnaire participants

As indicated in Section 3.1, this thesis includes a survey questionnaire as part of the quantitative research method. In general, survey questionnaires involve the gathering of information efficiently and quickly from a large sample of participants using a formally designed schedule of questions called a questionnaire. Usually, survey questionnaires involve only a sample of participants within an industry sector that interests the researcher. The number of participants or ‘subjects’ ranks from a few to thousands, and involves the statistical quantification of the survey questionnaire’s results. According to Veal (2005), survey questionnaires are therefore an ideal means of providing quantified information for organisations that rely on this type of data for aspects of their decision-making.

This thesis focuses on German pharmaceutical and biotechnology companies. The reasons for this are:

- Most German pharmaceutical and biotechnology companies are private companies. This provides a contrast to the literature review, which contains only analysis of large public US companies.
- There is a lack of previous research focusing on post-M&A success measures and post-M&A performance of German pharmaceutical and biotechnology companies.

In order to investigate post-M&A success factors and post-M&A performance, pharmaceutical and biotechnology companies were asked to participate in the survey to obtain direct evidence of managerial perspectives on post-M&A success factors. Managing directors, chief managers and managers involved in M&A processes (CEOs,
CFOs, COOs, CBOs, chief medical officers, vice presidents) were selected as the main expert participants because they usually start and close the M&A negotiation process. In order to increase the response rate, the participant information sheet and an introduction email explicitly defined this target group was forwarded to the participants.

Some 1,222 pharmaceutical and biotechnology companies (BPI, 2014.) have their head office in Germany. Some authors believe that the larger the sample size, the more accurate the inferences and generalisations are to the total population. However, since the 1,222 pharmaceutical and biotechnology companies in Germany are subdivided into service provider, legal companies, engineering, agriculture, industrial biotechnology, veterinary and environmental protection companies, the actual number of comparable biotechnology and pharmaceutical companies is limited. As the research study focuses on pharmaceutical and biotechnology companies (see Chapter 2, Section 2.2), a total of 384 biotechnology and pharmaceutical companies in Germany were identified to take part in the online survey questionnaire.

Contact emails from the companies were identified using the database from the German Biotechnology Association, www.biotechnology.de, the German Pharmaceutical Association, www.vfa.de and the German Bundesverband der Pharmazeutischen Industrie e.V. (BPI), www.bpi.de. Each participant received a bilingual email (German/English) with the information sheet (in German and English), explaining the study goal and ethical aspects, asking them to click the appropriate survey link (English or German survey questionnaire) to start the survey questionnaire.

Web-based surveys have the advantage of speed, availability of data entry and interactivity. Blackwell, Miniard and Engel (1995) argue that the return rate and efficiency of online interviews are high. In full electronic surveys the respondent completes the questionnaire online in real-time. The researcher can immediately analyse
the questionnaire results by using appropriate software. The disadvantage of the electronic survey is that it is confined to participants with access to the Internet. However, in the 21st century Internet access in Germany by pharmaceutical and biotechnology companies is an essential communication tool and available for nearly every company. As further argued by Veal (2005), the sending of reminders is low cost; however, the problem of low response may still be a problem for some surveys.

Participation in the survey questionnaire was made possible by using the online survey tool from the Technische Hochschule Deggendorf (THD) Lime Survey in a web browser. The survey questionnaire was designed and uploaded to the Lime Survey database in English and German as separate questionnaires for a period of 2.5–3 months. The first invitation email was sent out to all participants by the middle of March 2016. In order to increase the survey response rate, two email reminders were sent to all participants at approximately 1.5–2 weeks and then 3–4 weeks after the first invitation email. In addition, companies with past M&As from 2002–2016 were telephoned during the runtime of the survey and asked to participate in the research study (see Appendix V for M&A details). Cookies were activated in the Lime Survey in order to avoid repeated participation in the survey questionnaire. The survey questionnaire was finalised by end of May 2016 when no further participation activity was observed.

**Design of the survey questionnaire**

Development of the survey questions was based on research studies by Brouthers et al. (1998), Mukherjee et al. (2003) and Ingham et al. (1992), which surveyed directors, firm managers and general managers on M&A motives and post-M&A success factors in different industry sectors. Questions about established factors were reused, and new questions regarding success factors were created where required.
Typically, the first part of a questionnaire collects some background characteristics of individuals and organisations before more detailed information on attitudes and opinions are gathered. Two basic types of question exist: questions of fact and questions of attitude. Questions of fact canvass the personal and social characteristics of the respondent, often in the form of demographic questions. Questions of attitude or opinion are emotional, and the response will be subjective. In questions of attitude a particular attitude scale of measurement is typically used, whereas questions of facts typically use simple Yes/No questions. With regard to the size or length of the questionnaire, Morrison, Oczkowski & Greig (2011) suggests that the questionnaire should be as short and to the point as possible, including only those questions which are directly related to the research themes (six pages as a maximum).

The survey for this research contains two areas of inquiry (see Appendix VI and German version Appendix VII). The first area involves background data on the survey participants and their experience with M&A processes.

- Question 1 asked participants select the number of M&As (from ‘0’ to ‘more than 5’) in which they have been involved in order to determine their experience with M&A processes.
- Question 2 asked participants to indicate the year of their involvement in the most recent M&A. A disadvantage of including non-recent M&A processes is the reliance on managers’ recollection of the original M&A criteria (Miller, Cardinal & Glick, 1997). However, as argued by Huber and Power (1985), the participants occupy an executive role and are credited with high intellectual capabilities and thus strong ability to recall events. As further argued by Huber and Power (1985), M&As are major organisational events, which tend to be recalled accurately and completely.
- Question 3 asked participants to indicate their position (CEO, CFO, chief technical officer (CTO), COO to management function) and role (either M&A-related or not M&A-related) during their most recent M&A process to verify their M&A decision-making function. M&As include complex decisions and are typically steered by executive managers and an M&A committee (Vogel, 2002).

- Question 4 asked participants if the company they were involved in during the M&A process merged/ acquired another company or if the company was merged/ acquired by another company. This was to determine the buyer and seller ratio (Duksaitė, 2009).

- Question 5 asked participants to indicate the staff headcount of their company before the most recent M&A, so as to verify it was a small- and medium-sized biotechnology and pharmaceutical company; the focus of this research study.

- Question 6 asked participants to indicate the percentage of employees who left the company within one year after the M&A. Poor retention of employees post-M&A may indicate anxieties and conflicts among employees and collisions of different corporate cultures (Shibayama et al., 2008). According to Olie (1990), Datta (1991), Cartwright and Cooper (1990), Child et al. (2001), and Ranft and Lord (2000), the post-M&A integration phase is the most challenging in ensuring the success of M&A.

- Question 7 asked participants to indicate the main industry area of the company after the most recent M&A, in order to confirm it belongs to the research target group.

- Question 8 asked participants to indicate the main business focus of the company after the most recent M&A.
Question 9 asked participants to indicate company revenue within one year before and after the most recent M&A in order to determine post-M&A financial performance.

Questions 10–13 asked more specifically about success factors in relation to M&As.

- Question 10 asked participants to rank the success metrics by importance (with 1 being the most important) in order to assess the value of their most recent M&A. Post-M&A success factors were used from known research literature as indicated in Chapter 2, Section 2.4.
- Question 11 asked participants to indicate a sensible time lapse to measure post-M&A success factors, with options ranging from one to two years to more than 15 years.
- Question 12 asked participants for further assessable important post-M&A metrics.
- Question 13 asked participants to rate the importance of a number of post M&A success factors on a Likert scale from 1 to 7 (1 = very important / 7 = not important at all). The success factors are those described in the hypotheses for this research and each success factor is measured by using a multi-item scale for measurement.

Effectively, multi-item scales are used to measure post M&A success factors in order to increase reliability and construct validity. Using multiple items helps to average out errors and specificities that are inherent in single items (DeVellis, 2003). One theoretical argument for using multiple-item measures instead of a single-item measure is that multiple-item measures are inherently more reliable because they enable computation of correlations between items, which, if the correlations are positive and produce a high average correlation (i.e., a high coefficient alpha), indicate the internal consistency of all the items in representing the presumed underlying attribute (Bergkvist
& Rossiter, 2007). A second theoretical argument for multiple-item measures according to Bergkvist and Rossiter (2007) is that a multiple-item measure captures more information than can be provided by a single-item measure.

A pre-test of the final version of the questionnaire was performed during the interview phase of the qualitative research approach. The pre-test was helpful regarding some changes in the layout and comprehensibility of the questions, especially the evaluation of post-M&A success factors for content validity. Additional items were implemented, as they were considered important to the research question.

**Measurement model specification using multiple items**

The items listed in Table 8 were developed from research undertaken by Sharma and Ho (2002) and Kurdas (1998) to measure the post-M&A success factor ‘economies of scale and economies of scope’.

<table>
<thead>
<tr>
<th>Post-M&amp;A success factor multiple items</th>
<th>Acronym for item</th>
<th>Post-M&amp;A success factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better economies of scale</td>
<td>EScale1</td>
<td></td>
</tr>
<tr>
<td>Greater efficiency in production</td>
<td>EScale2</td>
<td></td>
</tr>
<tr>
<td>Lower operating and financing expenses</td>
<td>EScale3</td>
<td></td>
</tr>
<tr>
<td>Decrease cost of production</td>
<td>EScale4</td>
<td>Economies of scale</td>
</tr>
<tr>
<td>Improved economies of scope</td>
<td>EScope1</td>
<td></td>
</tr>
<tr>
<td>Cheaper joint development of new products</td>
<td>EScope2</td>
<td>Economies of scope</td>
</tr>
<tr>
<td>Value creation through complementary skills</td>
<td>EScope3</td>
<td></td>
</tr>
</tbody>
</table>

The items listed in Table 9 were developed from research undertaken by DiMasi et al. (1991), and Kola and Landis (2004) to measure the post-M&A success factor ‘clinical success rate’.
The multiple items listed in Table 10 were developed from research by Danzon et al. (2007) and LaMattina (2001) for the post-M&A success factor ‘efficient allocation of personnel or resources’.

The next post-M&A success factor ‘new knowledge’ was developed using research by Back and Krogh (2002), Bresman et al. (1999), Huang et al. (2010), and Pautler (2003) (see Table 11).
Table 12 lists the multi-items as developed from research by Danzon et al. (2007), Heracleous and Murray (2001), Divya and Arisham (2013), and Pervaaaz (2010) for the post-M&A success factor ‘market share’.

Table 12: Definition of success factor—market share

<table>
<thead>
<tr>
<th>Post-M&amp;A success factor multiple items</th>
<th>Acronym for item</th>
<th>Post-M&amp;A success factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strengthen the pipeline and market power</td>
<td>MS1</td>
<td>Market share</td>
</tr>
<tr>
<td>Increase market shares</td>
<td>MS2</td>
<td></td>
</tr>
<tr>
<td>Gaining access to new markets</td>
<td>MS3</td>
<td></td>
</tr>
</tbody>
</table>

Table 13 lists the multi-items as developed by research by Divya and Arisham (2013) and Angwin (2007) for the post-M&A success factor ‘weakening or eliminating a competitor’.

Table 13: Definition of success factor—weakening or eliminating competitor

<table>
<thead>
<tr>
<th>Post-M&amp;A success factor multiple items</th>
<th>Acronym for item</th>
<th>Post-M&amp;A success factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protecting the market by weakening or eliminating a competitor</td>
<td>WoEC1</td>
<td>Weakening or eliminating a competitor</td>
</tr>
<tr>
<td>Influence the action of other rival firms</td>
<td>WoEC2</td>
<td></td>
</tr>
<tr>
<td>Thwarting a competitor</td>
<td>WoEC3</td>
<td></td>
</tr>
</tbody>
</table>

The post-M&A success factor ‘tax benefits’ was developed using research by Pautler (2003), Shleifer and Summers (1987), and BioWorld Insight (2009, 2010) (see Table 14).

Table 14: Definition of success factor—tax benefits

<table>
<thead>
<tr>
<th>Post-M&amp;A success factor multiple items</th>
<th>Acronym for item</th>
<th>Post-M&amp;A success factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain tax benefits</td>
<td>TB1</td>
<td>Tax benefits</td>
</tr>
<tr>
<td>Reduce payment of taxes</td>
<td>TB2</td>
<td></td>
</tr>
</tbody>
</table>

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The post-M&A success factor ‘escaping bankruptcy’ was developed using research by Divya and Arishma (2013), Haeussler (2007), Amit et al. (1989), and BarNiv and Hathorn (1997) (see Table 15).

Table 15: Definition of success factor—escaping financial troubles

<table>
<thead>
<tr>
<th>Post-M&amp;A success factor multiple items</th>
<th>Acronym for item</th>
<th>Post-M&amp;A success factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escaping financial troubles</td>
<td>EB1</td>
<td>Escaping bankruptcy</td>
</tr>
<tr>
<td>Overcome financial distress</td>
<td>EB2</td>
<td>Escaping bankruptcy</td>
</tr>
<tr>
<td>Avoiding insolvency</td>
<td>EB3</td>
<td></td>
</tr>
</tbody>
</table>

Table 16 lists the multi-items for the post-M&A success factor ‘patent rate’ developed from research by Schweizer (2002), Danzon et al. (2007), Heracleous and Murray (2001), and Lewis (2009).

Table 16: Definition of success factor—patent rate

<table>
<thead>
<tr>
<th>Post-M&amp;A success factor multiple items</th>
<th>Acronym for item</th>
<th>Post-M&amp;A success factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escape patent expiration with new products</td>
<td>PR1</td>
<td>Patent rate</td>
</tr>
<tr>
<td>Increase number of patents of new innovative products</td>
<td>PR2</td>
<td></td>
</tr>
<tr>
<td>Enhancement of new patent-protected products</td>
<td>PR3</td>
<td></td>
</tr>
</tbody>
</table>

Table 17 lists the multi-items for the post-M&A success factor ‘employee retention rate’ developed from research Shibayama et al. (2008), Bertrand and Zuniga (2006) and Pervaaz (2010).

Table 17: Definition of success factor employee retention rate

<table>
<thead>
<tr>
<th>Post-M&amp;A success factor multiple items</th>
<th>Acronym for item</th>
<th>Post-M&amp;A success factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce outflow of employees</td>
<td>EFR1</td>
<td>Employee retention rate</td>
</tr>
<tr>
<td>Increase integration success of employees</td>
<td>EFR2</td>
<td></td>
</tr>
<tr>
<td>Ensure high employee engagement and retention</td>
<td>EFR3</td>
<td></td>
</tr>
</tbody>
</table>
3.3.5  Survey questionnaire data analysis

The survey questionnaire data analysis was carried out using SPSS Version 24 and SmartPLS Version 3 as these software packages allow for the appropriate statistical analysis to examine the hypotheses. Within SPSS analysis, survey data are named, labelled and then calculated. SPSS allows analysis of different statistical data from the survey questionnaires. SPSS has scores of statistical and mathematical functions and a user-friendly interface. The most suitable function of SPSS for this thesis is that of descriptive statistics.

Statistical analysis is an essential tool for social science research. Applications of statistical methods have expanded dramatically with the advent of computer hardware and software. In the past, researchers relied on univariate and bivariate analysis to understand data and relationships. However, today more complex relationships associated with current research directions need to be analysed, and therefore more sophisticated multivariate data analysis methods are applied. Multivariate analysis involves the application of statistical methods that simultaneously analyse multiple variables. The analysis of the research framework in Figure 3 was completed using PLS structural equation modelling (PLS-SEM). PLS-SEM is primarily used to develop theories by focusing on explaining the variance in the dependent variables when examining the model (Hair, Hult, Ringle & Sarstedt, 2017). Measurement theory specifies how the latent variables are measured.

For analysis of the research framework data, SEM was chosen as it enables researchers to incorporate unobservable variables measured indirectly by indicator variables (Hair et al., 2017). Furthermore, SEM allows the use of statistical methods that simultaneously analyse multiple variables. The variables typically represent measurements, which are often obtained from surveys or observations. There are two
types of SEM: covariance-based SEM (CB-SEM) and PLS-SEM or PLS-path modelling. CB-SEM is primarily used to test (or reject) theories, while PLS-SEM is used for prediction and to develop theories. PLS-SEM focuses on explaining the variance in the dependent variables when examining the model (Hair et al., 2017). Path models are diagrams used to visually display the hypotheses and variable relationships that are examined when SEM is applied (Hair et al., 2017). Typically, a PLS-path model consists of two elements, the structural model that represents the constructs, and the measurement model that displays the relationships between the constructs and the indicator variables. The structural model shows how the latent variables are related to each other, while the measurement model specifies how the latent variables are measured using a reflective or formative measurement model (Hair et al., 2017).

Hair et al. (2017) argue that PLS-SEM should be used when:

- the structural model is complex
- the sample size is small and/or the data are non-normally distributed
- the plan is to use latent variables scores in subsequent analyses
- the goal is predicting key target constructs.

Some researchers, such as Goodhue, Lewis and Thompson (2012), and Marcoulides and Saunders (2006), criticise using PLS-SEM for small samples. However, Chin and Newsted (1999), and Cassel, Hackl and Westlund (1999) suggest sample sizes between 20 and 40, using either ‘rule of 5’ or ‘rule of 10’ can be used in order to achieve robust results. Researchers like Hair et al. (2017), and Barclay, Higgins and Thompson (1995) often cite the 10-times rule, which says that the minimum sample size should be 10 times the maximum number of the arrowheads pointing at a latent variable anywhere in the PLS-path model. In case of the ‘rule of 5’, sample size should be five times the maximum number of the arrowheads pointing at a latent variable. As argued by Hair et
al. (2017), PLS-SEM has some limitations and therefore researchers use CB-SEM when:

- error terms require other specifications
- the structural model has circular relationships
- the research requires a global goodness-of-fit criterion
- the goal is more in theory testing rather than identifying key ‘driver’ constructs.

3.3.6 Validity, reliability and generalisability of survey questionnaire and research framework

According to Veal (2005), questionnaires are designed to gather information from individuals about their characteristics, behaviours and attitudes. However, questionnaires have their limitations in that respondents may tend to exaggerate answers to some questions and understate answers to others. Veal (2005) further argues that respondents may tend to give answers they believe will please the interviewer. Therefore, Veal suggests approaches to test the validity of survey questionnaires. One approach is to include dummy categories in some questions. Another is to include two or more questions in different parts of the survey questionnaire that ask the same thing. According to Grichting and Caltabiano (1986), small changes to questions in the questionnaire provide checks of respondent consistency. Finally, O’Brien and Ford (1988) suggest that surveys be repeated with the same sample of questions a few months later. Mukherjee et al. (2003) state that survey questionnaires have strengths and weaknesses, and do not replace general approaches in examining M&As, rather, they complement them and yield additional insights.

Attention should be paid to the validity of the data gathered using the survey questionnaire method. Respondent bias such as exaggerating, not understanding or pleasing the respondent is a constant source of concern. Including dummy categories
and questions, asking the same question twice may alert the researcher to validity problems. However, the best form of protection against these potential research errors is to conduct a pilot survey. Therefore, a pilot survey was conducted for this research to identify unforeseen problems in operationalisation of the survey.

It is argued that quantitative research is more reliable due to statistical data that correlates with the data of other quantitative analyses (Lincoln & Guba, 1985). PLS-SEM model assessment initially focuses on the measurement models. Examination of PLS-SEM estimates enables evaluation of the reliability and validity of the construct measures (see research framework Chapter 2, Section 2.5). Specifically, multivariate measurement involves using several variables to measure a construct (Hair et al., 2017). The research framework in this thesis is a reflective measurement model. Reflective measurement models are assessed on their internal consistency, reliability and validity.

Reliability refers to the overall consistency of a measure. The specific measures include composite reliability, convergent validity and discriminant validity. According to Hair et al. (2017), convergent validity is evaluated using average variance extracted (AVE). The discriminant validity is examined using the Fornell-Larcker criterion, cross loadings and the heterotrait-monotrait (HTMT) ratio. The research framework results for composite reliability, convergent validity and discriminant validity are discussed in Chapter 4 (see Section 4.3).

The evaluation of a questionnaire’s reliability is made possible by the use of Cronbach’s \( \alpha \) (Cronbach, 1960), which is considered to be the most important reliability indicator and is based on the number of variables/items in the questionnaire, as well as on the correlations between the variables (Nunnally, 1978). The reliability of the instrument means that its results are characterised by repeatability (Psarou & Zafiropoulos, 2004) and the results are not connected with measurement errors (Zafiropoulos, 2005).
Validity refers to the extent to which the information collected in a research study truly measures the phenomenon being studied. As argued by Veal (2005), in business research it is often difficult to control all extraneous variables that might affect the validity of a research study, and therefore researchers often need to make a trade-off between research validity and practicality (Veal, 2005). Researchers need to consider four types of validity: face validity, content validity, construct validity and criterion validity. For this thesis the most interesting type of validity is content validity as it measures how accurately an assessment or measurement tool taps into the various aspects of the specific construct in question. Content validity is measured by relying on the knowledge of researchers, literature and people who are acquainted with the construct being measured. Therefore, a pre-test of the questionnaire was performed during the interview phase of the qualitative research approach and approved by the supervisors. The pre-test was helpful regarding content validity, some changes in the layout and further evaluation of post-M&A success factors. Additional multiple items were implemented, as they were considered important to the research question.

Generalisability is a further check on the construct. According to Veal (2005) generalisability refers to the probability that the results of the research findings apply to other subjects, other groups and other conditions. However, as further argued by Veal, any research findings relate only to the subjects involved, at the time and place the research was carried out.
Chapter 4  Results

This chapter presents the details of the interviews with expert participants, followed by the results of the survey questionnaire. The final section presents the results of testing the hypotheses as developed in Chapter 2.

4.1 Expert interview results

The questions for the expert interviews are in Appendices III (English) and IV (German). Expert interviews were conducted between November 2015 and January 2016. In total 10 expert interviews were performed with four CEOs, one CTO, one CFO, two chief scientific officers (CSOs), one head of business development with several years experience in M&A processes in the specified field and region, and one participant who held a managerial position during an M&A. Seven expert interviews were conducted by telephone and three were performed in person. Some of the expert interviews were performed in English, as that was the participant’s mother language. All expert interviews were recorded and subsequently transcribed. The transcribed interview forms were imported and analysed using NVivo 10 (see Chapter 3, Section 3.3.3). All interview sheets are available as an attachment in the digital version of this thesis.

Table 18 provides an overview of the interviewees’ industry sector (pharmaceutical or biotechnology), business field, position during the M&A, type of enterprise (private, public), M&A position (buyer/seller), number of employees in the company (for the
most recent M&A process), year of most recent involvement in an M&A, and position at that time.

Table 18: Overview of expert interviewees

<table>
<thead>
<tr>
<th>Interviewee No.</th>
<th>Industry</th>
<th>Business Field</th>
<th>Type of enterprise</th>
<th>M&amp;A position</th>
<th>Number of employees</th>
<th>M&amp;A year</th>
<th>Position during M&amp;A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Biotech</td>
<td>R&amp;D</td>
<td>Public</td>
<td>Seller</td>
<td>20</td>
<td>2004</td>
<td>CEO</td>
</tr>
<tr>
<td>2</td>
<td>Biotech</td>
<td>CRO</td>
<td>Private</td>
<td>Seller</td>
<td>35</td>
<td>2010</td>
<td>CTO</td>
</tr>
<tr>
<td>3</td>
<td>Biotech</td>
<td>CMO</td>
<td>Private</td>
<td>Seller</td>
<td>35</td>
<td>2003</td>
<td>CEO</td>
</tr>
<tr>
<td>4</td>
<td>Biotech</td>
<td>R&amp;D</td>
<td>Public</td>
<td>Buyer</td>
<td>45</td>
<td>2006</td>
<td>CFO</td>
</tr>
<tr>
<td>5</td>
<td>Biotech</td>
<td>CRO</td>
<td>Private</td>
<td>Seller</td>
<td>20</td>
<td>2012</td>
<td>CEO</td>
</tr>
<tr>
<td>6</td>
<td>Pharma</td>
<td>R&amp;D</td>
<td>Private</td>
<td>Buyer</td>
<td>65</td>
<td>2010</td>
<td>CSO</td>
</tr>
<tr>
<td>7</td>
<td>Pharma</td>
<td>CMO</td>
<td>Private</td>
<td>Buyer</td>
<td>60</td>
<td>2014</td>
<td>CEO</td>
</tr>
<tr>
<td>8</td>
<td>Pharma</td>
<td>R&amp;D</td>
<td>Private</td>
<td>Buyer</td>
<td>98</td>
<td>2007</td>
<td>Manager Position with M&amp;A</td>
</tr>
<tr>
<td>9</td>
<td>Pharma</td>
<td>R&amp;D</td>
<td>Public</td>
<td>Seller</td>
<td>15</td>
<td>2008</td>
<td>CSO</td>
</tr>
<tr>
<td>10</td>
<td>Pharma</td>
<td>R&amp;D</td>
<td>Public</td>
<td>Buyer</td>
<td>40</td>
<td>2008</td>
<td>Head Business Development</td>
</tr>
</tbody>
</table>

Note: CRO = contract research organisation; R&D = research and development; CMO = contract manufacturing organisation

All had been involved in at least one M&A process. All companies were medium-sized companies (number of employees <250) during the M&A process. In total, participants from four public companies and six private companies agreed to be interviewed. Six companies represented the R&D sector of the biotechnology and pharmaceutical industry, while two were CRO businesses, which mainly perform R&D as a service provider for customers, and two represented the manufacturing field.

Following these background questions, interviewees were asked eight metrics questions (see Appendices III, English, and IV, German). The nodes formation and coding processes of the interview data yielded success factor themes and meta-themes as detailed in Sections 4.1.1–4.1.8. Each section corresponds to the corresponding interview question (i.e., Section 4.1.1 details the results of responses to Question 1).
4.1.1 Most important metrics to assess merger and acquisition value

Question 1 was: ‘What do you think are the most important metrics to assess the value of your most current M&A?’. The following details the themes of the responses.

Five of ten interview participants answered that most important metrics are successful organisation/ culture integration and a high employee retention rate post-M&A. In the context of integration, Participant 6 said: ‘A successful integration of the different company cultures (if there are any) would be a success metrics for me’, Participant 2 said: ‘At the end of such M&A it is important to have a working positive integration or synergy in the new organisation’, and Participant 3 said: ‘It is important to have a successful organisation with the right people in the right position’. In the context of efficient teamwork, Participant 9 said: ‘It is important how effectively the teams are working together’.

With regard to high employee retention rate, Participant 6 said: ‘A loss of qualified employees after the merger would be a disaster’, Participant 7 said: ‘Beside other success measures, employee retention rate was a success metrics for our M&A’, and Participant 9 said: ‘There are a lot of other things you could use to measure post-M&A success like how effectively is staff retained or does staff leave’.

Another forty per cent of the interviewees mentioned that overall economic enhancement post-M&A is a valued success metric. Participant 8 said: ‘The increase in turnover in comparison with the situation before the M&A is an important success factor’, Participant 1 said: ‘Turnover, profit and market position are relevant success factors’, Participant 5 said: ‘From my point of view it is the turnover stabilisation and increase in turnover connected with a further growth of the company’, and Participant 1 stated: ‘If I would assess a M&A, I would only go with another company which strengthens the economic side of the company’. In a similar context of economic
enhancement, two participants mentioned using the stock price post-M&A to assess the success of an M&A: ‘The highest level to measure your success you could say is the response of the share price’ (Participant 10), ‘I guess share price is one’ (Participant 9).

Further forty per cent of all interview participants stated that the most important post-M&A success factor is gaining new technology knowledge or innovations and their assimilation into the new organisation. Participant 8 said: ‘One additional success factor, at least for me, is the knowledge/ know-how, which was acquired by the buying company and integrated into the new organisation, so that the buying company could work now with the new technology, which was not possible before’ and Participant 1 stated: ‘Both parts have resulted in sum more than the parts itself, the buying company received a great new technology, so that they could start further development using this new technology’. In a similar context, Participant 2 said: ‘As a general rule such M&A shall provide relevant innovations’. Regarding the accumulation of new knowledge, Participant 6 stated: ‘The employees, which dominate the new technology or know-how, must accumulate the new technology by training further employees into the new company.’

Thirty per cent of the interviewees mentioned that the increase of products in the pipeline and the increase of patented products are important post-M&A success factors. Participant 4 said: ‘One success factor of the M&A transaction was the increase of the product pipeline while reducing the development risk of such products’ and Participant 10 said: ‘The pipeline, what you have with your development projects, are important metrics’. In the context of patent-protected products, Participant 2 said: ‘The increased amount of patent-protected products is certainly a success factor’.

Further twenty per cent of all interview participants said that project success post-M&A is an important success metric. Participants 5 and 9 said: ‘The project success is the
most important one, from my perspective’, and ‘A successful post-M&A would be that the amount of projects increase, together with the amount of employees’. Participant 5 noted in that context that: ‘We set clear goals for the fulfilment of this product pipeline, so that we hopefully gain additional projects post-M&A with the assets we sold and a further growth of the company’.

Another twenty per cent of all interviewees specifically mentioned the share price as a key post-M&A success metric. As stated in the paragraph on economic enhancement, Participants 9 and 10 said: ‘The highest level to assess your merger you could say is the response of the share price’ and ‘I guess share price is one, liquidity of stock when it is traded, people are interested by selling their stocks—the volume of traded stocks’.

Another twenty per cent of all interview participants said that their central post-M&A success factor is acquiring new clients, increasing client satisfaction and strengthening their market position. Participant 7 said: ‘For us, acquisition of new clients, beside other success factors, is very important. We measure the amount of new clients after the acquisition with the number of contracts. The satisfaction of clients has been [checked by asking] if they are happy with the relationship’, and Participant 1 said: ‘Turnover, profit and market position are relevant success factors’, and ‘We strengthened the market position of the company post-M&A’.

One participant mentioned that another success metric would be to measure the quality of production post-M&A. Participant 2 said: ‘It could be that post-M&A the quality indicators improved within a CMO, this could be used to measure M&A success’.

Another participant mentioned that their post-M&A success metric was the perished rate, meaning how many drug candidates failed in the clinical test stage. Participant 4 said: ‘In our case a low perished rate resulted in a successful M&A, while a higher perished rate would result in a negative M&A’.

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Table 19 summarises the statements from the expert interviewees regarding their post-M&A success factors for question 1.

Table 19: Summary of post-merger and acquisition success factor statements for question 1

<table>
<thead>
<tr>
<th>Post-M&amp;A success factors</th>
<th>Percentage making the statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Successful organisation/ culture integration and a high employee retention rate</td>
<td>50%</td>
</tr>
<tr>
<td>Overall economic enhancement and share price</td>
<td>40%</td>
</tr>
<tr>
<td>Gaining new technology knowledge/ or innovation and its assimilation into the new organisation</td>
<td>40%</td>
</tr>
<tr>
<td>Increase of products in the pipeline and increase of patented products</td>
<td>30%</td>
</tr>
<tr>
<td>Project success post-M&amp;A</td>
<td>20%</td>
</tr>
<tr>
<td>Share price</td>
<td>20%</td>
</tr>
<tr>
<td>To acquire new clients, increase client satisfaction and to strengthen market position</td>
<td>20%</td>
</tr>
<tr>
<td>Perished rate assessment</td>
<td>1 participant</td>
</tr>
<tr>
<td>Measuring quality post-M&amp;A</td>
<td>1 participant</td>
</tr>
</tbody>
</table>

4.1.2 **Pros and Cons of using metrics**

Question 2 was: ‘Could you please specify pros and cons of using these metrics?’ The following details the themes of the responses.

A number of interviewees mentioned the share price post-M&A success metric, suggesting that it is easy to measure M&A success using the stock price. However, it was also suggested that the share price does not reflect the true value of the new organisation. In detail, Participants 9 and 10 said: ‘In stock price and market capitalisation the pro is that it is very tangible, easily measurable, the con is that the share price can very often not reflect the true value of the organisation or it might take a long time until it is reflected in the share price. And there are a lot of outside factors that will contribute to the share price’ and ‘The disadvantage is that the share price is
dependent on other external factors. If you take a snap shot of the share price it does not necessarily reflect the true value of the company’.

Participant 6 argued, regarding the post-M&A success factor of a successful organisation/ culture integration and a high employee retention rate post-M&A, that: ‘You can’t measure the integration of different cultures, you can only measure the amount of employees post-M&A’. Participant 3 said: ‘You have a clear transparency within the new organisation, however, it might be that you make mistakes’. Participant 7 argued: ‘Well, if you have a high level of retention post-M&A then it is a demonstration that you are able to retain knowledge. A lot of know-how is embedded in the team and people, specially in the biopharma cell therapy, so if you have a high retention of employees you retain the know-how, you retain the expertise, which is in fact what you trying to buy at the end of the day. However, if your retention rate is low, you have high recruiting costs for new people, training costs and unrest in the organisation, that is what you want to avoid’. Participant 2 said: ‘For a successful integration the assessment criteria is certainly what kind of function now key person have in the new organisation, that can be checked’.

Similar arguments were noted when discussing the post-M&A success factor of gaining new technology knowledge/ know-how or innovation and their assimilation into the new organisation. Participant said: ‘You can measure the accumulated know-how in the amount of new publications, development of new products and afterwards the registration of the product at the regulatory’. Participant 7 mentioned in the context of the high retention rate of employees: ‘With a high rate the know-how will stay at the company and reduce consequential costs in case the rate is low’. Participant 6 said: ‘In case I have acquired a new technology through my M&A, then I can simply see post-M&A if the new technology is used’.

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Participant 4, who believed that the perished rate is an important success metric, argued: ‘This index is purely quantitative and says nothing about the quality. That is basically the con, which is one-dimensional and there is no qualitative statement. There is no real pro of the perished rate, it is just an approach to measure post-M&A success’.

4.1.3 **Difficulties in using success metrics**

Question 3 was: ‘What kind of difficulties do you see using this success metrics?’ The following details the themes of the responses.

Participant (7) answered: ‘The difficulty in retention of employees is that there is no direct link with the financial performance of this metrics with the financial success and that can be a disadvantage, but on the other hand what you hope is that when you are successful on those items that then the financial success will be also there’. Participant 9 said: ‘There is no perfect way of measuring M&A success and also an important factor is time frame. So if large organisations are merging, you will not see how successful the merger was after several years. It will probably be quicker for an M&A with small organisations’. Further comments included: ‘So, it is very hard to put a view on it. It is hard to make any assumption on solid criteria. There is a lot of expectation. And the estimates you [are] making, how much of the market you can get with your product and which price you can sell it, these are very untested, they can only be broad assumptions’. Participant 9 further answered that the challenge/difficulty in using the success metrics is the measuring itself. Participant 2 mentioned that a difficulty of the success factors is that the success factors are not an accepted tool to measure success like, for example, a balance sheet. In order to analyse the success of an M&A it is necessary to perform a content-related analysis, which is more complex and time consuming. Further, Participant 1 answered: ‘The difficulty is certainly to be seen in that expectations can not be fulfilled immediately. This result [is] due to different
company cultures, employee expectations, friction losses, not properly working
technologies that have been acquired and further more. In this respect, you can say that
a successful M&A is determined by a successful integration of different company
cultures and a fruitful integration process’. Another participant mentioned that the
challenge of an acquired company is to fulfil the buyer’s expectations.

4.1.4 Use of metrics given changed circumstances

Question 4 prompted interviewees for information about the use of metrics given
changed circumstances, using four sub-questions. The following details the themes of
the responses.

In relation to Sub-question (a), about an increase in company size, some interviewees
said that cost saving factors would play a more dominant role, such as Participant 7,
who said: ‘The financial framework becomes more important if your company becomes
bigger’. Participant 2 responded that they would stay with the success factors they
had already mentioned. However, a few participants mentioned that when the company
became bigger they would use more financial success factors like revenue, sales and
profit.

Regarding Sub-question (b), about changes to the business area (pharmaceutical to
biotechnology and vice versa), Participant 7 said: ‘When you enter into another field
you have the situation where you encounter fundamentally different risk and you want
to make sure you understand those risks and track them and it can be a financial risk.
The fact is that you should look more on financial measure’. Participant 6 said: ‘As
pharmaceutical companies typically use other technologies as biotech companies, I
would say that the implementation of such new technology would be my primary
success factor after the M&A’. Two participants said they would use more financial
instruments to measure post-M&A success even if the business area changed, for
example, Participant 10 said, ‘I would look on the share price if I merged with a big pharmaceutical company. The profit line is the most interesting one’.

Regarding Sub-question (c), about change in business focus, Participants 7 and 10 answered: ‘Financials are becoming more important to ensure that you can protect your downside’, ‘When you change your business focus to biosimilars, then the know-how is not that much relevant. More important is the retention rate and the companies revenues’, and ‘If you change the business focus you use other success metrics, like for biopharmaceutical companies that would be success in the pre-clinical studies, clinical studies and regulatory approval followed by market access’. Participant 6 said: ‘No I see the success factors similar to those I already mentioned, even if you change the business focus from service provider to pure manufacturing, for me the success factors are the retention rate and the implementation of the new technology’.

Regarding Sub-question (d) about change in the legal structure from public to private or vice versa, for example Aktiengesellschaft (AG, meaning joint stock company – public company) or Gesellschaft mit beschränkter Haftung (GmbH, meaning limited corporation – private company), Participants 8 and 5 said: ‘If you change the legal structure from a GmbH to AG, you cannot decide on your own anymore, since the desired profit asked by the share holders could reduce the budget for R&D and therefore I think that the profit of the company would be the primary success factor’, and, ‘If you change the legal structure from a GmbH to AG you increase the pressure for the development team to develop a blockbuster, which in the end brings an enormous return of investment’. Participant 6 said: ‘If you change to an AG, then I would use the stock price as a success measure’. Participant 5 said: ‘When you would enter into the development area you probably would not do that from the same legal entity but put that
risk into a separate entity, that is certain protection and clarification on this risk structure.’

4.1.5 Time span for measuring post-merger and acquisition success

In response to Question 5: ‘When would you measure—in years—post-M&A success measures’, four interviewees (9, 5, 1 and 2) answered that they would primarily measure the post-M&A success after one to two years. For example, Participant 9 said: ‘So if two large organisations are merging, you will not see how successful the merger was after several years. It will probably be quicker for an M&A with small organisations. Therefore for large pharmaceutical companies I would give it several years before you could measure M&A success, at least say five years, for large pharmaceutical mergers and for small biotech I think you could measure it earlier, one to two years.’ However, other participants expected it to take longer, with Participant 10 stating: ‘Pharmaceutical timelines are so long and it depends on the situation where the company is, meaning that when a pharmaceutical company is near the end of Phase 3 clinical studies, expecting the results and will be acquired by another company, than you could measure the post-M&A success after weeks, but normally two to three years. For pharmaceutical companies you can spend years to put the integration of both companies together.’ Participant 8 said: ‘At least five years, because the clinical phase takes that long, assuming that the company is acquired when the clinical phase is running’.

4.1.6 Source of opinion regarding mergers and acquisitions

Regarding Question 6: ‘What is the source of your opinion (e.g., personal experience, others’ experience, industry best practices, logical rationale), 90% said personal experience, while one, Participant 10, said logical rationale.

92
4.1.7  **Did the merger and acquisition meet expectations?**

Regarding Question 7: ‘Did this M&A meet your expectations’, 90% were positive, stating that it did. Comments from Participants 7, 9, 6 and 1 included: ‘So far the M&A was ok, because we have retained the employees, we have acquired new customers and satisfaction of new clients’, ‘From the business point of view yes, from the cultural perspective it did not meet my expectations’, ‘Yes, because we have gained a new technology and could increase the turnover over the years’, ‘Yes, the technology is preserved and the new company has increased their value; however, for the employees that was a bad deal since they had to leave the company’. One, Participant 3, said that because of the acquisition the whole company was smashed.

4.1.8  **Further important success metrics**

Question 8 asked: ‘Outside your mentioned success metrics, what are further important metrics to assess?’ Participant 7 said: ‘Integration of the team and the culture into the new organisation. We spend time here to bring the teams together on businesses and social events to ensure that the cultural differences that are always there are becoming less and that you cannot measure it hard, but that you see that people starting to believe in a joined vision, starting to believe that this is a new opportunity for them also, in terms of the ones that are being acquired, because in this case people from the acquired company become on the payroll of the buying company, is it good or bad? Different structure, different employer—what does it mean for the employees, and that trust has to build over time and this is an important part for the integration and a measure of success that that feeling of two different companies gradually disappears and that it is one company’. Participant 4 said: ‘It depends on the situation. Within a merger I would look at the employee satisfaction and the development of the organisation. In an acquisition, the question would be if the acquisition was friendly or hostile’. Participant
5 said: ‘There are some left and right soft facts like the access to specialised knowledge and experience. So you’re not alone anymore, you have a strong team behind you’.

However, most of the participants said that they would stay with the already mentioned success factors and add some monetary success factors.

4.2 Survey questionnaire results: Post-merger and acquisition

The questions used in the survey questionnaire are in Appendices VI (English) and VII (German). This questionnaire asked respondents for their post-M&A opinions.

As stated in Chapter 3, the survey questionnaire data analysis was undertaken using SPSS Statistics Version 24 and SmartPLS Version 3. In total, 384 participants from German pharmaceutical and biotechnology companies were invited via email to respond to the survey questionnaire. Unfortunately, 41 emails could not be delivered, either because the company was merged/ acquired by another company and therefore the email address was changed, or the company had been declared insolvent, or the company had changed the email address without public announcement. Therefore, in total 343 participants received requests to participate in the survey questionnaire. In order to increase the number of participants, email reminders were sent out two times with a time delay of 10–14 days. Additionally, German pharmaceutical and biotechnology companies that have been involved in an M&A process (see Appendix V) were called and asked to participate. In total, 37 participants answered the survey questionnaire in full. Six participants partially answered the questionnaire and were therefore excluded from data analysis. In total, a response rate of 10.78% was reached. The low response rate could be due to low interest of the invited respondents in the survey topic, limited time availability of the high level personnel, the length of the questionnaire, or the questionnaire’s presentation or complexity.
Out of the 37 respondents who answered all the questions, 43% had an M&A-related management function, 24% were CEOs, 11% were CTOs, 8% were CFOs or COOs and 6% were consultants or chief medical officers (see Figure 7).

![Distribution of role during M&A process](image)

**Figure 7: Summary of survey participants' role during merger and acquisition process**

All participants had an M&A-related role during the M&A process, either as a management function or as CEO, CFO or CTO/COO. Participants with an M&A-related management function were dominant in the sample, followed by CEOs and CTOs. The majority of participants, 37.8%, were involved in at least one M&A process, followed by 32.4% of participants who were involved in two M&A processes. Interestingly, 13.5% of participants were involved in more than five M&A processes, demonstrating repeated experiences with M&A processes (see Table 20).
Table 20: Frequency of merger and acquisition processes of participants

<table>
<thead>
<tr>
<th>Number of M&amp;A processes</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14</td>
<td>37.8</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>32.4</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>13.5</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>2.7</td>
</tr>
<tr>
<td>more than 5</td>
<td>5</td>
<td>13.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>37</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The staff headcount of the companies from participants before the M&A were:

- < 10 number of employees = 7 number of companies (18.9%)
- < 50 number of employees = 14 number of companies (37.8%)
- < 250 number of employees = 12 number of companies (32.4%)
- > 250 number of employees = 4 number of companies (10.8%)

and verifies the focus of this research study regarding the participation of small- and medium-sized biotechnology and pharmaceutical companies.

The oldest year of participants’ involvement in the most recent M&A was 2006 (2 participants (5.4%)) and the youngest was in 2016 (2 participants (5.4%)). Most participants, in total 8 (21.6%) were involved in M&A in 2014, followed by 2009 and 2013 with each 5 participants (13.5%) and 2008 with 4 participants (10.8%).

Representation from 13 pharmaceutical companies (35.1%), 14 biotechnology companies (37.8%) and eight biopharmaceutical companies (21.6%) indicate a good mixture (35.1% vs. 37.8%) of participants from biotechnology and pharmaceutical companies (see Figure 8). The term biopharmaceutical is used for companies that produce drugs using core technologies from the biotechnology industry and are therefore counted in the biotechnology industry in calculations.
As shown in Figure 9, most of the participants were employed at R&D companies (48.6%), followed by companies with R&D and manufacturing sections (29.7%). This means that the sample is rather R&D focused.

Figure 10 shows the ratio between buyers and sellers of biotechnology/pharmaceutical companies. In total, 22 participants (59.5%) filled out the survey questionnaire from the buyer’s perspective and 15 participants (40.5%) from the seller’s perspective.
Figure 10: Ratio between buyers and sellers of a pharmaceutical or biotechnology company

Table 21 shows what the survey participants thought was a reasonable time to measure post-M&A success factors. The majority (45.9%) suggested assessment of post-M&A performance should occur after three to five years, while 27% suggested measuring it after only one to two years, 24.3% suggested after five years, and 2.7% after 10 years.

Table 21: Suggested time period for measurement of post-merger and acquisition success

<table>
<thead>
<tr>
<th>Reasonable time period for measuring post-merger and acquisition success</th>
<th>Frequency</th>
<th>Per cent</th>
<th>Valid Per cent</th>
<th>Cumulative Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid after 1–2 years</td>
<td>10</td>
<td>27.0</td>
<td>27.0</td>
<td>27.0</td>
</tr>
<tr>
<td>after 3–5 years</td>
<td>17</td>
<td>45.9</td>
<td>45.9</td>
<td>73.0</td>
</tr>
<tr>
<td>after 5 years</td>
<td>9</td>
<td>24.3</td>
<td>24.3</td>
<td>97.3</td>
</tr>
<tr>
<td>after 10 years</td>
<td>1</td>
<td>2.7</td>
<td>2.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Table 22 illustrates the cross-tabulation of companies (amount) and their revenue pre- and post-M&A process.

Table 22: Summary of revenue correlated to pre- and post-merger and acquisition process

<table>
<thead>
<tr>
<th>Revenue within one year before the most recent M&amp;A (euros)</th>
<th>Revenue within one year after the most recent M&amp;A (euros)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2m</td>
<td>2–&lt;10m</td>
</tr>
<tr>
<td>2–&lt;10m</td>
<td>10–&lt;30m</td>
</tr>
<tr>
<td>10–&lt;30m</td>
<td>30–&lt;50m</td>
</tr>
<tr>
<td>30–&lt;50m</td>
<td>&gt;50m</td>
</tr>
<tr>
<td>&lt;2m</td>
<td>0</td>
</tr>
<tr>
<td>2–&lt;10m</td>
<td>0</td>
</tr>
<tr>
<td>10–&lt;30m</td>
<td>0</td>
</tr>
<tr>
<td>30–&lt;50m</td>
<td>0</td>
</tr>
<tr>
<td>&gt;50m</td>
<td>0</td>
</tr>
</tbody>
</table>

As illustrated by Table 23, no significant employee turnover was observed for the majority of participating companies. A small percentage of employees (1–4% from companies with <50 and >250 employees) left the company after the most recent M&A. This fluctuation is likely to be the regular turnover normally observed within a company. For small companies with <10 employees the percentage of employees who left the company after the most recent M&A was higher. This phenomenon is more valid for companies that have been merged or acquired by another company. Shibayama et al. (2008) identifies arguments for leaving a company post-M&A including anxieties and conflicts among employees and collisions of different corporate cultures.
Table 23: Cross tabulation staff headcount versus employees who left the company after the most recent merger and acquisition

<table>
<thead>
<tr>
<th>Employees [%] who left the company after the most recent M&amp;A</th>
<th>Staff headcount of company</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;10</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>60</td>
<td>1</td>
</tr>
<tr>
<td>70</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7</td>
</tr>
</tbody>
</table>

In order to address the research question regarding the use of post-M&A success factors for small- and medium-sized German biotechnology and pharmaceutical companies and to test the hypotheses, an assessment of the importance of the different success factors was performed. In doing so, for each primary post-M&A success factor (see Chapter 3, Section 3.3.4) the mean was calculated and further classified into seven categories, with 1 = very important and 7 = not at all important (similar to the Likert scale of the questionnaire). The results were compared with the category 4 (neutral) and plotted using bar charts. Furthermore, a one sample t-test against 4 was performed in order to test the results from the statistical perspective.

Beside the assessment of the different post-M&A success factors using the Likert scale, participants were asked to select the most important success factors from a list, and to prioritise them with 1 being the most important and so forth. Figure 11 presents the results.
Figure 11: Summary of ranking of post-merger and acquisition success factors

According to the results above, the post-M&A success factor new knowledge was voted most important, with a ranking between 1 and 4, with 21.6% ranking it at 2 and 16.2% at 1 and 3. Interestingly, the post-M&A success factors market share, clinical success rate, and economies of scale and economies of scope followed with high rankings and frequency. However, weakening or eliminating a competitor was ranked between 4 and 7, indicating the low importance of this success factor. Tax benefit was also ranked with low importance, with most rankings between 5 and 9. The success factor escaping bankruptcy ranked between 1 and 3; however, the frequency for this success factor was very low indicating low importance.
4.2.1 *Economies of scale*

Figure 12 summarises the subjective assessment of the post-M&A success factor economies of scale.

![Figure 12: Economies of scale results](image)

Most survey participants from the biotechnology and pharmaceutical industry (54%) considered the post-M&A success factor economies of scale as important, 37.8% as neutral and only 8.1% as not at all important. This was also verified for both industries by the one sample t-test statistical results with t-value = –5.03/ p = 0.000 and mean = 2.979 with std. deviation = 1.233. It seems survey participants from the biotechnology industry tend to consider the post-M&A success factor economies of scale more important than survey participants from the pharmaceutical industry. Only 2.7% of survey participants from the pharmaceutical industry and 5.4% from the biotechnology industry assessed the success factor in the range of not at all important. However, this result is treated as an outlier value. Figure 12 shows that both industry sectors considered economies of scale as an important post-M&A success factor. The result
supports H1a: Economies of scale is an important post-M&A success factor for pharmaceutical and biotechnology companies.

4.2.2 **Economies of scope**

Figure 13 summarises the subjective assessment of the post-M&A success factor economies of scope.

![Post-M&A success factor - Economies of Scope](image)

Figure 13: Economies of scope results

Most of the respondents from the pharmaceutical and biotechnology industry (78.3%) rated the success factor economies of scope as an important post-M&A factor, with t-value = −7.153/ p = 0.000 and mean = 2.612 with std. deviation = 1.179 (for both industries). There is a slight tendency of survey participants from the biotechnology industry assessing the post-M&A success factor economies of scope as more important than survey participants from the pharmaceutical industry. The results support H1b: Economies of scope is an important post-M&A success factor for pharmaceutical and biotechnology companies.
4.2.3 Efficient allocation of personnel and resources

Figure 14 summarises the subjective assessment of the post-M&A success factor efficient allocation of personnel and resources.

![Figure 14: Efficient allocation of personnel and resources results](chart)

Comparing both industry areas with the neutral value of 4, almost 51.3% of survey participants assessed the post-M&A success factor efficient allocation of personnel and resources as an important factor. This is also supported for the biotechnology and pharmaceutical industry by the one sample t-test with a t-value = −5.353/ p = 0.000 and mean = 3.1892 with a std. deviation = 0.9214. The results support H3, that the post-M&A success factor efficient allocation of personnel and resources is an important success factor for biotechnology and pharmaceutical companies. For biotechnology companies the success factor seems to be slightly more important than for pharmaceutical companies.
4.2.4 **Clinical success rate**

Figure 15 summarises the respondent results for the post-M&A success factor clinical success rate.

![Clinical success rate chart](image)

**Figure 15: Clinical success rate results**

Most of the biotechnology and pharmaceutical respondents (40.5%) rated the success factor clinical success rate within the neutral range (16.2% pharmaceutical; 24.3% biotechnology). Only 29.7% rated the clinical success rate as important. The ratings for the success factor are quite widespread along the Likert scale, underlining for clinical success rate being considered not important. This is also supported by the one sample t-test with t-value = –0.856/ *p* = 0.398 and mean = 3.766 with std. deviation = 1.68 for both industries. The results indicate that survey participants from the biotechnology industry assessed the success factor more in the range of not at all important than those from the pharmaceutical industry, indicating that clinical success rate does not play a role in those companies’ development strategies. In total 16.2% of respondents from the pharmaceutical industry assess the success factor in the range of important. The results from the one sample t-test of the post-M&A success factor clinical success rate does not
support hypothesis H5. The clinical success rate is not an important post-M&A success factor for pharmaceutical and biotechnology companies.

4.2.5 Market share

Figure 16 summarises the subjective assessment of the post-M&A success factor market share.

![Post-M&A success factor - Market share](image)

Figure 16: Market share results

The importance of this factor is obvious. In total, 97.3% of pharmaceutical and biotechnology survey participants rated the post-M&A success factor market share as important (Likert scale <4). This is also supported by the one sample t-test results with t-value = −16.621/ p = 0.000 and mean = 1.846 with std. deviation = 0.788 for both industries. In total, 64.8% of survey participants from the biotechnology industry assessed the post-M&A success factor market share in the range of important compared to survey participants from the pharmaceutical industry (32.4%). Only an outlier group of pharmaceutical participants (2.7%) rated the success factor in the range of not important. The results support H7: Market share is an important success factor for pharmaceutical and biotechnology companies.
4.2.6 Employee retention rate

Figure 17 summarises the subjective assessment of the post-M&A success factor employee retention rate.

![Post-M&A success factor - Employee retention rate](image)

Figure 17: Employee retention rate results

Most respondents from the pharmaceutical and biotechnology industry (48.6%) rated the post-M&A success factor employee retention rate as important. However, 18.9% of respondents rated it as not at all important. As most of the participants rated the success factor as important (<4) it is therefore argued that the respondents’ subjective assessment supports H9: The post-M&A success factor employee retention rate is an important success factor for pharmaceutical and biotechnology companies. This is also supported by the one sample t-test results with t-value = –2.586 / p = 0.014 (p < 0.05) and mean 3.415 with std. deviation 1.377 for the biotechnology and pharmaceutical industry.
4.2.7 *Weakening or eliminating a competitor*

Figure 18 illustrates the subjective assessment of the post-M&A success factor weakening or eliminating a competitor.

![Bar chart showing the assessment of the post-M&A success factor weakening or eliminating a competitor by respondents from the biotechnology and pharmaceutical industry.](chart.png)

Figure 18: Weakening or eliminating a competitor results

It is obvious that respondents from the biotechnology and pharmaceutical industry assess the post-M&A success factor weakening or eliminating a competitor with low importance. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. 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Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important. Almost 72.9% of both industries rated the factor as not at all important.
4.2.8 Patent rate

Figure 19 shows the respondents’ subjective assessment for the post-M&A success factor patent rate.

In total, 24.3% of survey participants from the pharmaceutical industry rated patent rate in the range of important compared with 35.1% of survey participants from the biotechnology industry, while 24.3% rated it in the range of neutral and 16.2% in the range of not important. The one sample t-test results support H11: The patent rate is an important post-M&A success factor for pharmaceutical and biotechnology companies, with t-value = –3.58 / p = 0.001 and mean = 3.108 with std. deviation = 1.515.
4.2.9 New knowledge

Figure 20 summarises the subjective assessment of the post-M&A success factor new knowledge.

![Post-M&A success factor - New knowledge](image)

Figure 20: New knowledge results

The post-M&A success factor new knowledge is rated by pharmaceutical and biotechnology respondents as important. In total 32.4% of the pharmaceutical respondents and 56.7% biotechnology respondents rated the success factor in the range of important. Only a small group of pharmaceutical and biotechnology respondents (10.8%) rated the post-M&A factor new knowledge in the range of neutral, and none rated it as not important. The one sample t-test results support H12: Gaining new knowledge is an important post-M&A success factor for pharmaceutical and biotechnology companies, with t-value = −15.183 / p = 0.000 and mean = 1.964 with std. deviation = 0.815.
4.2.10  Tax benefits

Figure 21 illustrates the respondents’ rating distribution for the post-M&A success factor tax benefits.

![Post-M&A success factor - Tax benefits](image)

Figure 21: Tax benefits results

Some 13.5% survey participants from the pharmaceutical industry rated tax benefits in the range of important. However, 59.4% rated it as not at all important. In contrast only 18.9% of the biotechnology survey participants rated tax benefits as important. As H13 states that the post-M&A success factor tax benefits is not an important success factor for pharmaceutical and biotechnology companies, the results and the one sample t-test, with $p < 0.05$ support the hypothesis. The statistical results are: $t$-value = 2.315 / $p = 0.026$ and mean = 4.567 with std. deviation = 1.491 for both industries.
4.2.11 Escaping bankruptcy

Figure 22 shows the survey participant results for the post-M&A success factor escaping bankruptcy.

![Diagram showing survey participant results for post-M&A success factor escaping bankruptcy for pharmaceutical and biotechnology industries.]

Figure 22: Escaping bankruptcy results

It is apparent that most survey participants from the biotechnology and pharmaceutical industry sectors rated the success factor escaping bankruptcy as not at all important. In total 83.7% survey participant rated the post-M&A success factor escaping bankruptcy in the range of not important. Only a few participants, (16.2%) rated the post-M&A factor in the range of important. This is supported by the one sample t-test with t-value = 4.042 / p = 0.000 and mean = 5.162 with std. deviation = 1.749 for both industries. Thus, H14: Escaping bankruptcy is an important post-M&A success factor for pharmaceutical and biotechnology companies, is not supported.

4.2.12 Summary post-M&A success factor assessment and hypotheses

In summary, nearly all hypotheses regarding the research question were supported by the subjective assessment of the different post-M&A success factors using one sample t-
test against 4 as the mid-point for the Likert scale as a statistical tool. Table 24 summarises the study results.

Table 24: Results post-M&A success factor assessment and summary for hypotheses

<table>
<thead>
<tr>
<th>No.</th>
<th>Hypothesis</th>
<th>Post-M&amp;A success factor</th>
<th>t-Value (p-Value)</th>
<th>Hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mean (Std. Deviation)</td>
<td></td>
</tr>
<tr>
<td>H1a</td>
<td>Economies of scale is an important post-M&amp;A success factor for pharmaceutical and biotechnology companies</td>
<td>Economies of scale</td>
<td>-5.03 (0.000)</td>
<td>Supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.979 (1.233)</td>
<td></td>
</tr>
<tr>
<td>H1b</td>
<td>Economies of scope is an important post-M&amp;A success factor for pharmaceutical and biotechnology companies</td>
<td>Economies of scope</td>
<td>-7.153 (0.000)</td>
<td>Supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.612 (1.179)</td>
<td></td>
</tr>
<tr>
<td>H3</td>
<td>Efficient allocation of personnel or resources is an important post-M&amp;A success factor for pharmaceutical and biotechnology companies</td>
<td>Efficient allocation of personnel or resources</td>
<td>-5.353 (0.000)</td>
<td>Supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.189 (0.921)</td>
<td></td>
</tr>
<tr>
<td>H5</td>
<td>The clinical success rate is an important post-M&amp;A success factor for pharmaceutical and biotechnology companies</td>
<td>Clinical success rate</td>
<td>-0.856 (0.398)</td>
<td>Not supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.763 (1.68)</td>
<td></td>
</tr>
<tr>
<td>H7</td>
<td>Market share is an important success factor for pharmaceutical and biotechnology companies</td>
<td>Market share</td>
<td>-16.621 (0.000)</td>
<td>Supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.847 (0.788)</td>
<td></td>
</tr>
<tr>
<td>H9</td>
<td>The post-M&amp;A success factor employee retention rate is an important success factor for pharmaceutical and biotechnology companies</td>
<td>Employee retention rate</td>
<td>-2.586 (0.014)</td>
<td>Supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.414 (1.377)</td>
<td></td>
</tr>
<tr>
<td>H10</td>
<td>Weakening or eliminating a competitor is an important post-M&amp;A success measure</td>
<td>Weakening or eliminating a competitor</td>
<td>3.760 (0.001)</td>
<td>Not supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.878 (1.421)</td>
<td></td>
</tr>
<tr>
<td>H11</td>
<td>The patent rate is an important post-M&amp;A success factor for pharmaceutical and biotechnology companies</td>
<td>Patent rate</td>
<td>-3.58 (0.001)</td>
<td>Supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.109 (1.515)</td>
<td></td>
</tr>
<tr>
<td>H12</td>
<td>Gaining new knowledge is an important post-M&amp;A success factor for pharmaceutical and biotechnology companies</td>
<td>Gaining new knowledge</td>
<td>-15.183 (0.000)</td>
<td>Supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.964 (0.815)</td>
<td></td>
</tr>
<tr>
<td>H13</td>
<td>The post-M&amp;A success factor tax benefits is not an important success factor for pharmaceutical and biotechnology companies</td>
<td>Tax benefits</td>
<td>2.315 (0.026)</td>
<td>Supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.567 (1.491)</td>
<td></td>
</tr>
<tr>
<td>H14</td>
<td>Escaping bankruptcy is an important post-M&amp;A success factor for pharmaceutical and biotechnology companies</td>
<td>Escaping bankruptcy</td>
<td>4.042 (0.000)</td>
<td>Not supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.162 (1.75)</td>
<td></td>
</tr>
</tbody>
</table>

A deeper analysis of post-M&A success factors depending on the industry sector was not performed because M&As between biotechnology and pharmaceutical companies
are intermixed, meaning that pharmaceutical companies merge/acquire biotechnology companies or other pharmaceutical companies. The same reason is valid for biotechnology companies. Today the scientific background of pharmaceutical or biotechnology companies is quite similar, making a clear industry separation is almost impossible. In addition, biopharmaceutical companies bias the industry field and hamper a clear industry analysis.

4.3 Structural equation modeling results

In order to evaluate the hypotheses H2, H4, H6 and H8, SEM as a multivariate analysis method was chosen as it enables researchers to incorporate unobservable variables measured indirectly by indicators variables (Hair et al., 2017). The hypotheses and the research model were tested by using PLS equation modelling as PLS-SEM works efficiently with small sample sizes and complex models, and makes practically no assumptions about the underlying data. The sample size of N = 37 is too small for the use of CB-SEM. Generally, PLS-SEM achieves high levels of statistical power with small sample sizes (see Chapter 3, Section 0 for further details). The small sample size and their robustness is discussed in research by Chin and Newsted (1999), Cassel et al. (1999), Hair et al. (2017), and Barclay et al. (1995). Furthermore, PLS-SEM makes no distributional assumptions (i.e., it is nonparametric). This is important, as the defined latent variables due to the small sample size are non-normally distributed. The most important measurement model metrics for PLS-SEM are reliability, convergent validity and discriminant validity. For the structural model, the most important evaluation metrics are R2 (explained variance), f2 (effect size), Q2 (predictive relevance) and the size and statistical significance of the structural path coefficients (Hair et al. (2017)). According to Chin, Vinzi, Henseler & Wang (2010), and Götz, Lier-Gobbers and Krafft
(2010), the overall quality of the model is derived from both measurements and a recommended two-step approach of reporting.

4.3.1 Evaluation of the measurement model

The following latent variables are operationalised as reflective constructs: post-M&A success factors economies of scale and economies of scope, market share, clinical success rate and efficient allocation of personnel and resources.

The first evaluation criterion for the reflective model is construct reliability and validity. All indicator loadings, except item EScale3 from the post-M&A success factor economies of scale (outer loading: 0.66) and item MS1 from the post-M&A success factor market share (outer loading: 0.58) are below the recommended value of 0.7, which suggests sufficient levels of indicator reliability. As further measurement model analysis showed, measures of reliability, convergent validity and discriminant validity supported the use of the EScale 3 and MS1 items models despite their low item loadings. Construct reliability was tested using composite reliability. In the measurement model, all composite reliability values (0.83–0.96) exceed the threshold of 0.7, assuring construct reliability. Internal consistency reliability was tested using Cronbach’s alpha, which provides an estimate of the reliability based on the inter-correlations of the observed indicator variables. All Cronbach’s alpha values (0.71 for post-M&A success factor efficient allocation of personnel and resources; 0.77 for post-M&A success factor market share; 0.90 for post-M&A success factor economies of scale and economies of scope and 0.95 for post-M&A success factor clinical success rate) are above the 0.7 threshold, indicating internal consistency reliability.

The convergent validity is evaluated by using the AVE. Convergent validity is the degree to which a measure correlates positively with other measures of the same construct (Hair et al., 2017). The AVE values of the measurement model are between
0.63 and 0.87 and are well above the required minimum level of 0.50. Thus, the measures of the reflective constructs have high levels of convergent validity. The assessment of the reflective measurement model also includes discriminant validity. According to Hair et al. (2017, page 115), ‘Discriminant validity is the extent to which a construct is truly distinct from other constructs by empirical standards. Establishing discriminant validity implies that a construct is unique and captures phenomena not represented by other constructs in the model’. The Fornell-Larcker criterion is used to assess discriminant validity. It compares the square root of the AVE values with the latent variable correlations (Hair et al., 2017). The square root of each construct’s AVE should be greater than its highest correlation with any other construct (Hair et al., 2017). The measurement model also fulfils these criteria as the square roots of the AVEs in Table 25, indicated as bold numbers (clinical success rate = 0.935; economies of scale and economies of scope = 0.794; efficient allocation of personnel and resources = 0.797; market share = 0.795), are all higher than the correlations of these constructs with other latent variables, thus indicating all constructs are valid measures of unique concepts.
In addition, cross loadings are used to assess discriminant validity as an alternative method. Discriminant validity is established when an indicator’s loading on its assigned construct is higher than all of its cross loadings with other constructs (Hair et al., 2017). Overall, cross-loading as well as the Fornell-Larcker criterion provided evidence for the constructs’ discriminant validity for the reflective measurement model. A more reliable criterion for the assessment of discriminant validity, the heterotrait-monotrait value (HTMT), is additionally used as the Fornell-Larcker and cross loadings are only frequently used in research (Hair et al., 2017). As can be seen in Table 26, all HTMT values are lower than the threshold value of 0.85.

### Table 25: Fornell-Lacker criterion results for the partial least squares measurement model

<table>
<thead>
<tr>
<th>Company change in revenue post-M&amp;A</th>
<th>Post-M&amp;A success factor clinical success rate</th>
<th>Post-M&amp;A success factors economies of scale and scope</th>
<th>Post-M&amp;A success factor efficient allocation of personnel and resources</th>
<th>Post-M&amp;A success factor market share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company revenue post-M&amp;A</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-M&amp;A success factor clinical success rate</td>
<td>0.450</td>
<td>0.935</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-M&amp;A success factors economies of scale and scope</td>
<td>0.307</td>
<td>-0.196</td>
<td>0.794</td>
<td></td>
</tr>
<tr>
<td>Post-M&amp;A success factor efficient allocation of personnel and resources</td>
<td>0.318</td>
<td>0.118</td>
<td>0.599</td>
<td>0.797</td>
</tr>
<tr>
<td>Post-M&amp;A success factor market share</td>
<td>0.281</td>
<td>-0.053</td>
<td>0.603</td>
<td>0.510</td>
</tr>
</tbody>
</table>
As suggested by Hair et al. (2017), the HTMT values should be tested to see whether they are significantly different from 1 in order to demonstrate discriminant validity. To do so, the bootstrapping option on SmartPLS was performed. As expected, all bootstrap confidence interval values are below the threshold of 1, demonstrating the discriminant validity of the reflective measurement.

Table 27 provides an overview of the evaluation metrics for the reflective measurement model. All model evaluation criteria, except for indicators EScale3 and MS1, have been met, providing support for the measure’s reliability and validity.
### Table 27: Summary of results for the reflective measurement model

<table>
<thead>
<tr>
<th>Latent variable</th>
<th>Convergent Validity</th>
<th>Internal Consistency</th>
<th>Discriminant Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Loadings</td>
<td>Indicator Reliability</td>
<td>AVE</td>
</tr>
<tr>
<td></td>
<td>&gt; 0.7</td>
<td>&gt; 0.5</td>
<td>&gt; 0.5</td>
</tr>
<tr>
<td>Post-M&amp;A success factor efficient allocation of personal and resources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EAoPR1</td>
<td>0.842</td>
<td>0.708</td>
<td></td>
</tr>
<tr>
<td>EAoPR2</td>
<td>0.737</td>
<td>0.543</td>
<td>0.636</td>
</tr>
<tr>
<td>EAoPR3</td>
<td>0.809</td>
<td>0.654</td>
<td></td>
</tr>
<tr>
<td>Post-M&amp;A success factor economies of scale and economies of scope</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EScale1</td>
<td>0.715</td>
<td>0.511</td>
<td></td>
</tr>
<tr>
<td>EScale2</td>
<td>0.821</td>
<td>0.674</td>
<td></td>
</tr>
<tr>
<td>EScale3</td>
<td>0.655</td>
<td>0.429</td>
<td></td>
</tr>
<tr>
<td>EScale4</td>
<td>0.882</td>
<td>0.777</td>
<td>0.631</td>
</tr>
<tr>
<td>Post-M&amp;A success factor market share</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS1</td>
<td>0.582</td>
<td>0.338</td>
<td></td>
</tr>
<tr>
<td>MS2</td>
<td>0.973</td>
<td>0.946</td>
<td>0.632</td>
</tr>
<tr>
<td>MS3</td>
<td>0.781</td>
<td>0.609</td>
<td></td>
</tr>
<tr>
<td>Post-M&amp;A success factor clinical success rate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSR1</td>
<td>0.951</td>
<td>0.904</td>
<td></td>
</tr>
<tr>
<td>CSR2</td>
<td>0.957</td>
<td>0.915</td>
<td>0.874</td>
</tr>
<tr>
<td>CSR3</td>
<td>0.914</td>
<td>0.835</td>
<td></td>
</tr>
<tr>
<td>CSR4</td>
<td>0.917</td>
<td>0.840</td>
<td></td>
</tr>
</tbody>
</table>
### 4.3.2 Evaluation of the structural model

For the evaluation of the structural model, the most important evaluation metrics are $R^2$ (explained variance), $f^2$ (effect size) and the size and statistical significance of the structural path coefficients (Hair et al., 2017). As suggested by Hair et al. (2017), the first evaluation criterion is to examine the structural model for collinearity using the threshold variance inflation factor (VIF) value of below five. As can be seen in Table 28, all VIF values of the structural model are clearly below the threshold of 5, indicating collinearity among the predictor constructs is not a critical issue.

#### Table 28: Results of variance inflation factor of the structural model

<table>
<thead>
<tr>
<th>Company change in revenue post-M&amp;A</th>
<th>Post-M&amp;A success factors economies of scale and economies of scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company revenue post-M&amp;A</td>
<td>Post-M&amp;A success factor clinical success rate</td>
</tr>
<tr>
<td>Post-M&amp;A success factor clinical success rate</td>
<td>1.0472</td>
</tr>
<tr>
<td>Post-M&amp;A success factors economies of scale and economies of scope</td>
<td>1.6424</td>
</tr>
<tr>
<td>Post-M&amp;A success factor efficient allocation of personnel and resources</td>
<td>1.0</td>
</tr>
<tr>
<td>Post-M&amp;A success factor market share</td>
<td>1.5838</td>
</tr>
</tbody>
</table>

The next step is the evaluation of the $R^2$ values of the endogenous latent variables company revenue post-M&A and post-M&A success factors economies of scale and economies of scope. The $R^2$ value of the endogenous construct on company revenue post-M&A is 0.372 and for post-M&A success factor economies of scale and economies of scope $R^2 = 0.359$ and are considered as moderate (Hair et al., 2017; Henseler, Ringle & Sarstedt, 2014). The effective sizes $f^2$ are used to determine if an omitted exogenous construct has a substantive impact on the endogenous constructs (Hair et al., 2017). The post-M&A success factor clinical success rate has a large effect
size of $f^2 = 0.419$ on company turnover post-M&A. The post-M&A success factor efficient allocation of personnel and resources has a large effect size of $f^2 = 0.560$ on the post-M&A success factor economies of scale and economies of scope, whereas, economies of scale and economies of scope has a medium effect size of $f^2 = 0.12$ on company turnover post-M&A. In contrast, the post-M&A success factor market share has no effect ($f^2 = 0.0094$) on company turnover post-M&A.

The statistical significance of the path models were tested by using the bootstrap algorithm (5,000 bootstrap samples) from SmartPLS. Results reveal a high significance of $p < 0.01$ and $\beta = 0.525$ between the post-M&A success factor clinical success rate $\rightarrow$ company turnover post-M&A; with the post-M&A success factor efficient allocation of personnel and resources $\rightarrow$ post-M&A success factor economies of scale and economies of scope ($p < 0.01$, $\beta = 0.599$); while the post-M&A success factors economies of scale and economies of scope reveals a significance of $p < 0.05$ and $\beta = 0.352$ on company turnover post-M&A. Interestingly, the direct path between post-M&A success factor market share and company turnover post-M&A is $\beta = 0.097$, indicating an insignificant path.

Based on these results, H2: Economies of scale and economies of scope are jointly positively related to the post-M&A performance measure of revenue for pharmaceutical and biotechnology companies; H4: The post-M&A success factor efficient allocation of personnel and resources positively affects the post-M&A success factors of economies of scale and economies of scope; and H6: The post-M&A success factor clinical success rate is positively related to pharmaceutical and biotechnology companies’ revenue post-M&A, are supported as being statistically significant. While hypothesis H8: An increased market share post-M&A is positively related to the company’s revenue is
refuted (see Table 29). Overall, these findings support H2, H4 and H6 used in the path model design as all estimated coefficients are positive. H8 is not supported.

Table 29: Significance testing results of the structural model path coefficients

<table>
<thead>
<tr>
<th>Path coefficients</th>
<th>t-Value</th>
<th>p-Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-M&amp;A success factor clinical success rate → Company change in revenue post-M&amp;A</td>
<td>0.525</td>
<td>4.285</td>
<td>0.000</td>
</tr>
<tr>
<td>Post-M&amp;A success factors economies of scale and scope → company change in revenue post-M&amp;A</td>
<td>0.352</td>
<td>1.7751</td>
<td>0.038</td>
</tr>
<tr>
<td>Post-M&amp;A success factor efficient allocation of personnel and resources → company change in revenue post-M&amp;A</td>
<td>0.5992</td>
<td>4.6605</td>
<td>0.000</td>
</tr>
<tr>
<td>Post-M&amp;A success factor market share → company change in revenue post-M&amp;A</td>
<td>0.097</td>
<td>0.4744</td>
<td>0.3176</td>
</tr>
</tbody>
</table>

Figure 23 summarises the PLS research framework results of the post-M&A success factors and their evaluation on the M&A performance.

Figure 23: Partial least squares analysis of research framework for merger and acquisition performance
Chapter 5  Conclusion

This concluding chapter includes an evaluation of the results and research study limitations. Furthermore, this chapter discusses implications for theory and contributions to practice. Section 5.1 consolidates the insights gleaned from the different analysis methods and offers discussion of the findings. Sections 5.2 and 5.3 discuss the implications for theory and contributions to practice. Section 5.4 describes the limitations of the research, referring to constraints of the expert interviews and the survey questionnaire. Finally, Section 5.5 presents future research discussion points.

5.1 Evaluation of results

As described in Chapter 1, Section 1.2, this research study was carried out to analyse, assess and evaluate different post-M&A success factors and their influence on the post-M&A performance for small- and medium-sized German pharmaceutical and biotechnology companies. The research question asked: ‘What are the post-M&A success factors for small- and medium-sized German pharmaceutical and biotechnology companies’ and the sub-research question asked: ‘What post-M&A success factors influence the company’s performance (revenue)’. In order to answer both questions, two research methods were used: expert interviews as a qualitative research method and survey questionnaire as a quantitative research method. The expert interviews and the survey questionnaire yielded many insights.
5.1.1 **Expert interviews**

Expert interviews provided insights from the perspective of different management levels within the organisation. Accordingly, typical interviewees were CEOs, CFOs, CTOs, CSOs and other high-level managers. In order to maximise insights into the research topic, an interview was performed with these high-level officers. The interviews were recorded, transcribed and evaluated using NVivo software tool.

The interview results were generally consistent with the survey questionnaire results where participants were asked to state and rate the importance of different post-M&A success factors. However, while expert interviewees believed that a successful organisation/ culture integration and high employee retention rate were the most important post-M&A success factors, survey participants believed that market share and gaining new knowledge were the most important. An example of agreement between the results of the survey questionnaire and expert interviews is that the post-M&A success factor gaining new knowledge was rated and suggested by both parties as an important success factor.

Overall, the following post-M&A success factors were identified during the expert interview as supportive: successful organisation/ culture integration, a high employee retention rate, overall economic enhancement, gaining new technology/ knowledge, patented new products (patent rate), success of projects post-M&A, share price, increased market position (market share) and perished rate (clinical success rate).

Expert interviewees said that successful organisation/ culture integration and a high employee retention rate are post-M&A success factors. The statements were similar to findings from Bertrand and Zuniga (2006), Shibayama et al. (2008) and Pervaaz (2010), in which positive integration of employees post-M&A enhanced innovation performance and the focus on superior innovation capability. Therefore, the post-M&A
success factor employee retention rate as a success factor is supported by expert interviews and the literature review.

Another post-M&A success factor identified during the expert interviews was overall economic enhancement and share price. Several expert interviewees said that the turnover post-M&A in comparison with the situation before the M&A and the share price post-M&A are success factors. As discussed in Chapter 1, Section 1.1, the share price has some limitations for the assessment of the success of an M&A. However, the identified post-M&A success factor of overall economic enhancement is comparable with the accounting-based performance measure discussed by Papadakis and Thanos (2010). Compared with the share price success factor the success factor of overall economic enhancement has the advantage of measuring the actual post-M&A performance and not investors’ expectations.

Further assessment of the expert interviews resulted in confirming another success factor: gaining new technology knowledge/ or innovations and their assimilation into the new organisation. Huang et al. (2010) suggest that through M&As companies transfer valuable external knowledge and synthesise it with their internal knowledge to create knowledge specialty. In the pharmaceutical and biotechnology industry, the process of acquiring knowledge through M&As is an essential strategic way of gaining knowledge in their proprietary drug discovery technology platforms, screening techniques, discovery methods, formulation structures and manufacturing processes. Therefore, the post-M&A success factor gaining new knowledge is supported by the expert interviews and the literature review.

The expert interviews revealed increased products in the pipeline and an increase in patented products (patent rate) as post-M&A success factors. Heracleous and Murray (2001) discuss such factors in a similar context, stating that as M&As with companies
with good product pipelines could increase companies’ knowledge resulting in a higher probability to market, and thus increasing the market power of a blockbuster. Pervaaz (2010) argues that gaining access to new markets by pharmaceutical and biotechnology M&As with service line extensions to their portfolios into generic and consumer products create a competitive advantage. The patent rate success factor identified by the expert interviews is similarly discussed by Al-Laham et al. (2010) as one success measure from the R&D strategy perspective. Therefore, the post-M&A success factor, patent rate, is supported by the expert interviews and the literature review.

Expert interviewees were also questioned regarding difficulties using the different success metrics and the pros and cons of such success factors. Interviewees mentioned that measuring post-M&A success using the share price is easy, but it does not necessarily reflect the true value of the company. This statement is similar to research statements from Brouthers et al. (1998) and Ingham et al. (1992) and confirms that financial indicators of performance measurement tend to undervalue the achievement of other goals, and may fail to provide an accurate picture of M&A success.

Furthermore, interviewees said that for many success factors (e.g., employee retention rate), there is no direct link with financial performance. Interviewees also said that a difficulty of the success factors is that they are not accepted tools for measuring success, unlike balance sheets for example. With respect to the question about using other success factors if the company size or the business focus changed, the majority of interviewees said they would use more financial evaluation methods.

Interestingly, the majority of expert interviewees (40%) believed that the most effective time span for measuring post-M&A success is after one to two years, while 46% of survey questionnaire participants cited a time span of three to five years. As discussed by Papadakis and Thanos (2010), researchers use different time spans for measuring
M&A success, such as days using short-term financial performance measure, to months/years using long-term financial performance measures. It is clear that the appropriate timing for measuring M&A success is not easy to assess, and the most effective time span seems to be a case-by-case decision. For post-M&A companies with an early clinical phase of a drug candidate, an effective time span for measuring post-M&A success can be years, while for post-M&A companies that are just interested in the allocation of the rights and obligations of patented products, an effective time span might be just weeks.

Regarding further important post-M&A success factors, expert interviewees said they would add monetary success factors in combination with subjective success factors to assess success. This is in line with suggestions from Papadakis and Thanos (2010), who suggest using multiple performance criteria for evaluating M&A performance.

The expert interviews did not validate the post-M&A performance framework, but rather provided insights into the discussion of post-M&A success factors. Expert interviews revealed that important success factors are: having a successful organisation, integrated cultures, and a high employee retention rate. Further post-M&A success factors, which were discussed in the expert interviews, were: gaining new technology knowledge, overall economic enhancement, increase in patent-protected products, post-M&A project success, clinical success rate (perished rate assessment) and the share price. In general, expert interviewees stated that they would use a combination of the success factors mentioned in Chapter 4, Section 4.1 and monetary tools to assess post-M&A success.

5.1.2 Survey questionnaire

The results of the survey questionnaire are revealing. As shown in Table 24 in Chapter 4, almost all hypotheses are supported; that is, post-M&A success factors economies of
scale and economies of scope (H1a, H1b), efficient allocation of personnel or resources (H3), market share (H7), employee retention rate (H9), patent rate (H11), gaining new knowledge (H12) and tax benefits (H13).

H5, about clinical success rate, is not confirmed as an important success factor as the majority of survey participants (40.5%) rated it as neutral. This is also confirmed by the one sample t-test with t-value = –0.856/ p = 0.398 and mean = 3.766 with std. deviation = 1.68. Interestingly, 13.5% of biotechnology participants rated this success factor in the range of not at all important. It is argued that the post-M&A success factor clinical success rate is an important success factor for R&D companies and/ or companies that already have drug candidates in clinical testing. Hence, pure manufacturing or diagnostic biotechnology/ pharmaceutical participants (CMOs) not interested or participating in clinical testing most probably rated the post-M&A success factor in the range of not at all important.

H10, about weakening or eliminating a competitor, is also not supported as the majority of participants rated the success factor in the range of low importance. This is also supported by the one sample t-test with t-value = 3.76 / p = 0.001. An explanation for this result could be that companies concentrate more on positive efforts to increase market share, instead on weakening or eliminating competition. Furthermore, as argued by Simonet (2002), pharmaceutical companies use more frequently licensing or partnering agreements instead of weakening or elimination arguments through an M&A. In-licensing and/ or partnering agreements have another advantage, they are cheaper and more time-efficient than M&A (Simonet, 2002). Furthermore, it is argued that only survey participants from small- and medium-sized companies participated within the survey; arguably, those companies were too small or already too weak to eliminate
competitors. Usually, big companies with a solid financial budget tend to acquire other companies just to eliminate them.

Interestingly, H14, about escaping bankruptcy, is not supported. It was assumed that for small pharmaceutical companies, M&As represent strategic decisions to escape financial troubles, enhance the marketing of product and to avoid low cash sales ratio (Divya & Arishma, 2013). However, survey questionnaire results indicate that most of the companies that participated in the survey had a solid financial basis and did not need to perform M&A due to bankruptcy reasons.

As expected H1a and H1b about economies of scale and economies of scope are supported. In total, 54% of survey participants considered economies of scale as important, and 78.3% rated economies of scope as important. This was also verified by the one sample t-test with t-value = −5.03/ p = 0.000 for economies of scale and t-value = −7.153/ p = 0.000 for economies of scope. This result supports the literature from Danzon et al. (2007), Cockburn and Henderson (2001), and Ravenscraft and Scherer (1987) who argue that M&As of pharmaceutical and biotechnology companies are often rationalised by claims of economies of scale and economies of scope. In addition, the results support the claim that in pharmaceutical and biotechnology M&As’ economies of scope can derive from businesses sharing functions, such as R&D, as the R&D survey participant group represented 48.6% of the sample. According to Sharma and Ho (2002) and Kurdas (1998), economies of scale decrease cost of production through size.

H3, about efficient allocation of personnel or resources, is also supported by the one sample t-test with a t-value = −5.353/ p = 0.000 and supports argumentation from LaMattina (2011) that reshuffling of personnel and resources after M&A will increase the output of development and manufacturing. The results clearly show that the majority
of survey participants represented by the R&D and R&D/ manufacturing group supports H3.

As expected H7 about market share is supported by 97.3% of pharmaceutical and biotechnology survey participants and the one sample t-test results with t-value = −16.621/ p = 0.000. The results indicate that biotechnology and pharmaceutical companies pursue to increase their market shares in order to strengthen their financial position or to strengthen the product pipeline of the acquirer. In addition, the result supports the literature from Danzon et al. (2007), Heracleous and Murray (2001) and Pervaaz (2010).

Both the expert interview and the survey questionnaire support H9, about employee retention rate. Most survey participants (48.6%) rated it in the range of important (t-value = −2.586 / p = 0.014). The results indicate that companies treated the post-M&A success factor of employee retention rate with caution, since a positive integration of employees of the target firm can enhance innovation performance. This is in line with arguments from Bertrand and Zuniga (2006) and Pervaaz (2010).

Interestingly, the post-M&A success factor patent rate (H11) is supported. This was expected, as the majority of survey participants were from the R&D sector, creating the expectation that increasing patent rates would be valued. This is in line with arguments from Schweizer (2012) and Al-Laham et al. (2010), as the patent rate indicates the success of an M&A as an R&D strategy.

Through M&As, companies transfer external valuable knowledge and assimilate it into their internal knowledge bases to create knowledge specialties (Huang et al. 2010). Therefore, gaining new knowledge (H12) is an important post-M&A success factor. This is in line with the survey questionnaire result revealing that in total 89.1% of respondents assessed it as important (t-value = −15.183 / p = 0.000).
H13, about tax benefits, is supported (t-value = 2.315 / p = 0.026), meaning that tax benefits within internal German specific M&A do not play a significant role. As argued by BioWorld Insight (2010), tax benefits might play an important role for pharmaceutical and biotechnology firms performing M&A with foreign companies.

Multivariate analysis SEM as a multivariate analysis method was used to evaluate the sub-question: ‘What post-M&A success factors influence the companies’ performance (revenue)’. Both the reflective measurement model and the structural model were checked for reliability and validity and passed all criteria. H2, H4, and H6 are supported and statistically significant, while H8 is refuted. The post-M&A success factors economies of scale and economies of scope, and clinical success rate are positively related to the revenue of the merged company. This is in line with arguments from Danzon et al. (2007) that economies of scale and economies of scope are claimed as important economic claims of M&A within the pharmaceutical industry. Efficient allocation of personnel or resources is an important success factor, which significantly supports the economies of scale and economies of scope. LaMattina (2011) and Danzon et al. (2007) further claim that efficient allocation of personnel or resources post-M&A reduces costs in R&D departments. The significant result (p < 0.01 and ß = 0.525) between post-M&A success factor clinical success rate and post-M&A performance measure of revenue can be explained by the fact that the value of a company, passing a specific clinical testing phase or receiving an approval for marketing for a specific drug candidate, increases. The post-M&A success factor market share was not significant using the SEM-PLS model (ß = 0.097). As argued by Divya and Arisham (2013) pharmaceutical and biotechnology companies perform M&As to increase market share and to enter the market quickly with new products. However, the not significant result of the post-M&A success factor market share can be explained by the fact, that the
largest survey participant group is the R&D group. The R&D group might focus more on own development of products rather than on products bought up by M&A.

This thesis presents a new methodology for evaluating different success factors on M&A performance. Different post-M&A success factors were identified and evaluated on M&A performance using SmartPLS. This research study recommends using the post-M&A success factors economies of scale and economies of scope, efficient allocation of personnel or resources, and clinical success rate to measure post-M&A performance of small- and medium-sized German pharmaceutical and biotechnology companies. However, future studies using other success factors might come to a new evaluation of post-M&A performance.

5.2 Implications for theory

Despite the rising tendency of pharmaceutical and biotechnology M&As, recent research studies from Papadakis (2005), Papadakis and Thanos (2010), and King et al. (2004) show that M&A success is not at all guaranteed. Several M&A deals fail due to questionable acquisition motives, problems regarding assessments, premiums paid and challenges in the post-acquisition integration process (Agrawal & Jaffe, 2000; Datta & Grant, 1990; Sirower, 1997; Schweizer, 2002). In the research summary report of Heracleous and Murray (2001), various research studies provided evidence that most mergers did not create shareholder value and that many destroyed it. There is no doubt that M&A activities will continuously occur in the future, but there are still questions about how M&As are measured and how they perform (Papadakis & Thanos, 2010). However, more recent literature shows that M&A are used to build strengths in a select number of areas (Economist, 2014). Besides asset-swapping with another big pharmaceutical or biotechnology company, the other obvious way for a drugmaker to build on its areas of strength is to buy small, innovative companies (Economist, 2014).
According to a research study by Papadakis and Thanos (2010), management scholars mostly have used financial performance measures (short-term financial performance, accounting performance, long-term financial performance) to assess M&A success. Occasionally, key respondents’ retrospective assessments of M&A performance, divestiture, integration process performance and innovation performance have been used. In any case, each performance measure has its own limitations, as discussed in Chapter 1, Section 1.1.

This thesis complements and extends existing theory by shedding light on M&A assessments and integrating the theoretical and empirical research finding into M&A performance and measurement process. This thesis contributes to key respondents’ retrospective assessments of M&A performance theory as it defines and discusses several success factors (financial, operational, non-financial aspects) as a series of goals to assess post-M&A performance. The main advantage of using multiple success factors for M&A assessment is that it allows for a composite evaluation of post-M&A performance.

This thesis further discusses and suggests several success factors for the German small- and medium-sized pharmaceutical and biotechnology companies. This evaluation has not previously been explicitly defined and empirically tested.

The analysis of the empirical data in this thesis reveals suggestions for several post-M&A success factors, such as economies of scale and economies of scope, efficient allocation of personnel or resources, market share, gaining new knowledge, tax benefits, clinical success rate and escaping bankruptcy. Therefore, the main implication for theory is to consider using multiple post-M&A success factors for performance evaluation to enhance understanding of M&A benefits and processes. Furthermore, using multiple success factors in concert with company’s revenue will overcome
limitations of previous research studies by Papadakis and Thanos (2010), Schweizer (2002), Haleblian and Finkelstein (1999), and Zollo and Meier (2007).

The results reveal that post-M&A success factors have a significant effect on post-M&A performance as discussed in Section 5.1. The post-M&A success factors—economies of scale and economies of scope, and clinical success rate—are positively related to the turnover of the merged/acquired companies. Therefore, this study presents a new methodology for evaluating post-M&A activities using multiple success factors.

5.3 Contribution to practice

M&As are commonly used business strategies. The main aim of M&As is to generate value and synergy. As reported by the Ernst and Young biotechnology report (2014), M&As are still used by the pharmaceutical and biotechnology industry as value and synergy generating tools. However, research studies provide evidence that most M&As do not increase shareholder values and, in fact, many reduce them (Heracleous & Murray, 2001; Schweizer, 2002; Thanos & Papadakis, 2012). Furthermore, research studies from Papadakis and Thanos (2010) do not provide a clear picture of how M&As perform.

As stated in Chapter 1, post-M&A success is evaluated using different approaches, such as short-term financial performance measures, accounting-based performance measures, and long-term financial performance measures (Thanos & Papadakis, 2012). However, those measures may underestimate the achievement of other longer term or less quantifiable goals, thereby painting an inaccurate picture of post-M&A success (Brouthers et al. 1998; Larson & Finkelstein, 1999; Thanos & Papadakis, 2012). Financial measures may also be strongly influenced by external variables, biased to
reflect expectations, subject to manipulation and only for publicly listed firms (Brouthers et al., 1998; Thanos & Papadakis, 2012).

By considering German pharmaceutical and biotechnology M&As, this thesis seeks to provide novel insight into the topic of post-M&A success factors as well as post-M&A performance measurement. Thus, this study provides empirical evidence for the influence of post-M&A success factors on the post-M&A performance. The implications are helpful for practice and research.

Typically, when an M&A candidate has been found, the buyer/ acquirer starts estimating their value and future growth potential. Krüger and Müller-Stewans (1994) provide a typology of acquisition fit, in which higher fit leads to higher acquisition value for the target. Such values are also expressed as synergies. Synergies (operational or financial) are a common acquisition objective as they can be a major source of value enhancement. According to Cullinan, Le Roux and Weddigen (2004) companies use a due-diligence process to carefully distinguish between different kinds of synergies and to estimate their potential value. The analysis of the empirical data of this thesis reveals suggestions of several synergy values expressed as post-M&A success factors, like economies of scale and economies of scope, efficient allocation of personnel or resources, market share, employee retention rate, weakening or eliminating a competitor, patent rate, gaining new knowledge, tax benefits, clinical success rate and escaping bankruptcy. Due-diligence analysts can assign a potential value for each post-M&A success factor and increase potential M&A value for the target. Furthermore, the identified post-M&A success factors economies of scale and economies of scope, and clinical success rate are positively related to the revenue of the merged/ acquired company, providing analysts another assessment tool for evaluation of revenue synergies post-M&A.
This set of post-M&A success factors may set new guidelines in M&A evaluation and the pre-determination of synergies using success factors for future M&A processes within the pharmaceutical and biotechnology industry. Furthermore, this thesis developed a framework for managers to assist them in M&A evaluation of German pharmaceutical and biotechnology companies.

Typically, managers consider M&As by assessing the financial, legal and product line issues. However, literature suggests that managers should consider technology issues and in particular IT issues as part of the initial motivation for an M&A (Lohrke, Frownfelter-Lohrke & Ketchen, 2016). Therefore, it is suggested to consider further post-M&As success factors like the IT system to enhance company post merger performance.

The results of this thesis may have major implications for investors, due-diligence analysts and managers in the pharmaceutical and biotechnology industry. By identifying post-M&A success factors, future valuation of M&A in the German pharmaceutical and biotechnology industry can be enhanced. In fact the results show that M&As are triggered by multiple factors and/ or synergies and that one or more of the objectives set by management are being achieved. Furthermore, managers will get a better understanding of the actual impact of M&A on the performance of the acquired firm.

5.4 Limitations

Evaluating the research questions by different methods reduces the limitations. However, in the expert interviews and the survey questionnaire, the population and the cultural context are limited to German participants. Furthermore, this study is limited to participants from small- and medium-sized biotechnology and/ or pharmaceutical companies. It is expected that expert interviews and survey questionnaires with big
pharmaceutical and biotechnology M&A companies in other countries would yield other results, which highlights the importance of adding an additional company size component and cultural component to this framework.

This study is limited to the managerial level and ignores the opinion of boards of directors and other board members of pharmaceutical and biotechnology companies. In addition, this study is limited to German pharmaceutical and biotechnology companies and does not distinguish the industry sector itself.

A more focused research on only one group of participants (biotechnology or pharmaceutical) would yield other results. However, as the number of M&As of German pharmaceutical and biotechnology companies is already very low, this additional restriction would result in an even more limited number of participants, making results evaluation more questionable.

Furthermore, the scientific background of pharmaceutical or biotechnology companies is heterogeneous, making a clear industry separation almost impossible. In addition, biopharmaceutical companies bias the field and hamper a clear industry analysis.

Assessing the post-M&A performance using only four latent variables with 37 survey participants is an additional limitation. However, as discussed by Hair et al. (2017), simulation studies indicated that PLS-SEM is a good choice when the sample size is small. A rule of thumb--10 times rule - has become established in PLS-SEM literature, saying that the minimum sample size should be 10 times the maximum number of arrowheads pointing at a latent variable in the PLS-path model (Hair et al., 2017).

Another limitation is the rather small set of papers reporting post-M&A success factors and the evaluation of the relationship with revenue. As discussed previously, many
research papers focus on M&A objectives, but not on post-M&A success of the relevant objectives.

In the expert interviews, only managing directors of German pharmaceutical and biotechnology companies were asked about the aforementioned topics, ignoring opinions of the board of directors, middle management and non-managerial employees. Additionally, the opinions of 10 experts are insufficient to represent the views on the topic of all the experts in German pharmaceutical and biotechnology M&As.

Finally, a potential limitation of the expert interview method is its reliance on managers’ recollections of the original acquisition criteria (Miller et al., 1997). However, as argued by Huber and Power (1985), the participants occupy an executive role and those participants are credited with high intellectual capabilities and thus good recall abilities. As further argued by Huber and Power (1985), M&As are major organisational events which tend to be recalled more accurately and completely.

A further research limitation is that only biotechnology and pharmaceutical companies that survived the M&A process, could participate in this thesis. Therefore, thesis results are limited to those companies that successfully overcame the post-M&A process and successfully implemented dedicated post-M&A success factors. Expert interview data and survey participant data could not be collected from companies that did not successfully overcome the post-M&A process due to the difficulty in finding these potential participants.

**5.5 Future research**

Referring to the limitations of this study in Section 5.4, there is a need for future research that may strengthen the findings and conclusions of this study. The most important recommendations for future research are summarised below.
The limited number of survey participants limited the number of latent variables used in the SEM-PLS model. Therefore, the number of survey participants must be enhanced in order to increase the number of latent variables in the model and increase the overall understanding of the effect of post-M&A success factors on post-M&A performance.

The research study was only validated in the context of the German pharmaceutical and biotechnology industry in the written survey and the expert interviews. This limits the results to German pharmaceutical and biotechnology companies. However, the healthcare industry is a global operating industry with big pharmaceutical and biotechnology companies located around the world. In order to explore cultural and intercultural differences of post-M&A success factors globally, additional research is needed.

Small- and medium-sized pharmaceutical and biotechnology companies were the focus of this research study. For this reason, research results are valid only for German small- and medium-sized M&As. M&As within big pharmaceutical and biotechnology companies could reveal other results and therefore are a prospect for future research.

Several success factors have been identified and evaluated as post-M&A success factors using a literature review. However, literature on M&A of pharmaceutical and biotechnology companies is limited and therefore further investigation could reveal other success factors. For this reason, further success factors must be researched.

The post-M&A performance evaluation was calculated using the details of the revenue before and after the most recent M&A. The revenue contains incomes and costs of different cost centres and therefore might be not the most accurate
performance measure. Therefore, future research is advised to search for more precise financial performance measures, for example in different income centres.

- Literature describes several methods to evaluate M&A performance like financial performance measures - short-term financial performance, accounting performance, long-term financial performance – (Papadakis & Thanos (2010)). It is therefore of interest for future research to compare financial post-M&A performance measures (in case financial data are available) with the results of this thesis.
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Appendices

Appendix I: Participant Information Sheet Interview

PARTICIPANT INFORMATION SHEET – INTERVIEW

Post-M&A success measures of German pharmaceutical and biotechnology companies

Post-M&A success measures of German pharmaceutical and biotechnology companies

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Invitation

You are invited to participate in a research study on post-M&A success measures of German pharmaceutical and biotechnology companies.

This research project is being completed by Damian Leschik for his DBA (Doctor of Business Administration) qualification through Charles Sturt University, Australia.

Before you decide whether or not you wish to participate in this study, it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully and discuss it with others if you wish.
1. What is the purpose of this study?
The study goal is to develop a suite of post-M&A metrics that can be useful for industry executives in determining whether the full expected values of their M&As are realised, thereby helping to improve industry best practices.

This study queries executives in the German pharmaceutical and biotechnology industry on the importance of various post-M&A success measures relating to their specific M&A experiences. This study hopefully will lead to the development of a suite of critical measures and will therefore contribute to the best practices in the industry. It is not the intention to ask or disseminate any confidential data about either you personally or the organisation for which you work.

2. Why have I been invited to participate in this study?
You have been asked to consider participation because I believe you meet the following selection criteria:
   1. you have been involved and/or are currently involved in M&A process,
   2. you have been employed and/or are currently employed in a biotechnology or pharmaceutical company in Germany, and
   3. you occupy an executive role, including CEO, CFO, COO, CBO, in a biotechnology or pharmaceutical company in Germany.

3. What does this study involve?
This phase of the study involves an interview which is anticipated to take 30 minutes, by phone or in person, during which I will ask you questions about your experiences/opinions with measuring M&A success. No preparation or follow up time is necessary.

4. Are there risks and benefits to me in taking part in this study?
There are no foreseeable risks for you in participating as no confidential information is being asked or disseminated. As benefits, you can receive the results of this study by providing your email addresses.

5. What if I don't want to take part in this study?
Participation is voluntary and you are free to decide not to participate. If you do decide to participate, you may terminate your participation in the research at any time without penalty. However, if you do decide to participate, you will not be able to retrieve your data once data analysis has begun.

6. How will my confidentiality be protected?
No personal data, such as name, age, gender, family status etc., will be gathered. You will be asked to designate the industry sector (biotechnology or pharmaceutical) in which the M&A process occurred, but company names will not be captured. Company financial data, strategic plans, proprietary information will not be requested. Individual interview data is being stored in a secure database on hard disk and used only for the purposes of this current study.

7. What will happen to the information that I give you?
Interview data will be transcribed and then subjected to a content analysis. The combined interview results will then be used to develop a suite of post-M&A metrics, about which the views of others in the industry will be sought by way of anonymous questionnaires (this will be the second phase of the research project).
The final set of metrics will be published as part of my DBA thesis. Email addresses provided by you will only be used for the distribution of the results and will be saved independently from your interview transcript.

8. **What should I do if I want to discuss this study further before I decide?**
If you would like further information please contact me – Damian Leschik - personally using the following email address: damian.leschik@hotmail.com or by phone: +49(0)241 44511914.

9. **Disclosure**
While my education background is in the biotechnology and pharmaceutical industry, please note that this project is being undertaken in my capacity as a Charles Sturt University student. It is not being undertaken as a research assignment of an biotechnology or pharmaceutical company neither as an employee of such company and only the final thesis (which will contain no identifying information) will be seen by any members of the biotechnology and pharmaceutical industry.

The Faculty of Business Ethics Committee at Charles Sturt University has approved this project. If you have any complaints or reservations about the ethical conduct of this project, they may contact the Committee through the Executive Officer: Faculty of Business FHEC Office: Wendy Smee or Michelle Westman Phone: +61 2 6338 6680 Email: bfhrec@csu.edu.au
Postal Address: Panorama Avenue Bathurst NSW 2795 Australia

Any issues you raise will be treated in confidence and investigated fully and you will be informed of the outcome.

If you are happy to participate in the project please complete the attached consent form and return it to me. I will then contact you to arrange an interview time.
Appendix II: Consent Form Interview

CONSENT FORM

Post-M&A success measures of German pharmaceutical and biotechnology companies

Researcher: Damian Leschik – DBA Student - Charles Sturt University (Panorama Avenue, Bathurst NSW 2795, Australia)

Contact details: Im Vennbahnbogen 47
D-52076 Aachen
Germany
Email: damian_leschik@hotmail.com
Phone: +49(0) 241 44521914

Study Supervisor: Dr. Robert Rossberger
Contact Details: Deggendorf University of Applied Sciences
Email: robert.rossberger@th-deg.de
Phone: +49 (0)991 36 15 460

Study Supervisor: Prof. Eddie Oczkowski
Contact Details: Charles Sturt University,
Email: EOczkowski@csu.edu.au
Phone: +61 (0)2 6933 2377

I agree to participate in the above research project and give my consent freely.

I understand that the project will be conducted as described in the Information Statement, a copy of which I have retained.

I understand I can withdraw from the project at any time and do not have to give any reason for withdrawing.

I understand that if I decide to withdraw from the project, I cannot withdraw my interview data once data analysis has commenced.

I consent to having my interview with the researcher digitally recorded.

I understand that any personal information disclosed during the interview will remain confidential to the researcher and will not be included in any publication resulting from the research.

Print Name: __________________________________________________________
Signature: ___________________________ Date: __________________________
Email (in case you are interested in receiving the results): __________________________

NOTE: The Faculty of Business Ethics Committee has approved this interview. If you have any complaints or reservations about the ethical conduct of this project, you may contact the Committee through the Executive Officer:
Faculty of Business FHEC Office:
Wendy Smee or Michelle Westman Phone: +61 2 6338 6680
Email: bfhec@csu.edu.au
Postal Address: Panorama Avenue
Bathurst NSW 2795 Australia
Any issues you raise will be treated in confidence and investigated fully and you will be informed of the outcome.

Please return this completed form to the researcher Damian Leschik – email: damian_leschik@hotmail.com, who will then contact you to negotiate an interview time.
Appendix III: Expert Interview Questionnaire English

Charles Sturt University

Interview # ____ Date: ____________

Title: Post-M&A success measures of German pharmaceutical and biotechnology companies

Interviewer: Damian Leschik, post-graduate student researcher
This interview sheet includes several questions about post-M&A success metrics for German biotechnology and pharmaceutical companies. Questions are to be answered from the interviewee’s personal experience and opinions of the topic. The interviewee may ask for a further description or clarification of the questions at any time.

Background questions:

1. Have you been involved in more that one M&A?
A: ____ Yes ____ No
If yes, how many?
A:

2. When was the M&A – year (most recent one if you have experiences more than one)?
A:

3. What was your role during the M&A process (most recent if you have experienced more than one)?
A:

4. Has the company acquired/merged another company or was the company acquired/ merged during the M&A process (the most recent one)?
A:

5. What was/ is the size (employees) of the buying company and the acquired company?
A:
6. What was/is the main business area of the buying company and the acquired company (Pharma, Biotech) and their business focus (CMO, R&D, consulting)?

A:

7. What was/is the legal structure of the buying company and the acquired company?

A:

8. What is your current role?

A:

M&A Metrics

1. What do you think are the most important metrics to assess the value of your most current M&A?

A:

2. Could you please specify pros and cons of using these metrics?

A:

3. What kind of difficulties do you see using this success metrics?

A:

4. Would you use other post-M&A success metrics, when...
   a) the size of the company would increase/ decrease
   A:
   b) the business area (pharma to biotech or vice versa) would change
   A:
   c) the business focus (CMO, R&D, consulting, virtual company) would change
   A:
   d) the legal structure would change (public, private)
   A:
5. When would you measure - in years- post-M&A success measures?
A: 

6. What is the source of your opinion (e.g., personal experience, others’ experience, industry best practices, logical rationale)?
A: 

7. Did this M&A meet your expectations? _____ Yes _____ No
A: 

8. Outside your mentioned success metrics, what are further important metrics to assess?
A: 

Are there any additional comments you would like to make?
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

Would you like me to email the results of this study?
____________________________________

Thank you for your participation
Interview Plan

Interview Nummer#: ______________ Datum: ______________

Title der Forschungsarbeit: Post-M&A success measures of German pharmaceutical and biotechnology companies
Interviewer: Damian Leschik


Allgemeine Fragen:

1. Waren Sie in mehr als einer Übernahmen/ Fusion involviert?
A: ___Ja/ ___Nein.

In wie vielen?
A:

2. In welchem Jahr erfolgte der Merger oder die Akquirierung?
A:

3. Was war Ihre Rolle/ Funktion während des M&A Prozesses (des aktuellsten M&A)?
A:

4. Hat das Unternehmen ein anderes Unternehmen akquiriert oder wurde es übernommen?
A:

5. Wie viele Mitarbeiter haben zum Zeitpunkt des M&A beim Käufer bzw. Verkäufer gearbeitet?
A:
6. In welcher Branche waren die Unternehmen (Käufer/ Verkäufer) tätig (Biotech/ Pharma) und welche Geschäftsausrichtung übten Sie aus (CMO, R&D, consulting)?

A:

7. Welche Unternehmensform weißt das Unternehmen auf, in dem Sie (zur Zeit) beschäftigt sind? Welche Unternehmensform hatte das andere Unternehmen?

A:

8. Welche Funktion/ Rolle haben Sie heute?

A:

Spezifische Fragen: M&A Metrics:

1. Was sind Ihrer Meinung nach die wichtigsten Erfolgsfaktoren zur Bewertung Ihres aktuellsten M&A (Akquisition / Merger)?

A:

2. Spezifizieren Sie bitte Vor- und Nachteile dieser Erfolgsfaktoren.

A:

3. Welche Herausforderungen sehen Sie in der Anwendung dieser Erfolgsfaktoren?

A:

4. Würden Sie andere Erfolgsfaktorine wählen, wenn...
   a) die Größe des Unternehmens sich verändern würde (größer/kleiner)?

A:

   b) sich die Branche ändern würde (Pharma zu Biotech und umgekehrt)?

A:

   c) sich die Geschäftsausrichtung ändern würde (CMO, R&D, consulting, virtual company)?

A:

   d) sich die Unternehmenform (Privat zu Öffentlich und umgekehrt) ändern würde?

A:
5. Nach wie vielen Jahren würden Sie die post-M&A Erfolgsfaktoren messen?

A:

6. Bitte geben Sie die Quelle Ihrer Erfahrungen an (persönliche Erfahrung, logische Rationale, Branchenspezifische Vorgaben)

A:

7. Hat die Übernahme/Fusion Ihre Erwartungen erfüllt?

Ja/Nein (Erklären warum)

A:

8. Welche weiteren Erfolgsfaktoren fallen Ihnen ein?

A:

Haben Sie weitere Kommentare oder Fragen?
Möchten Sie, dass ich Ihnen die Ergebnisse dieser FORSCHUNGSARBEIT per Email an Sie zuschicken? Email Adresse:

Viele Dank für Ihre Teilnahme.
Appendix V: German biotechnology and pharmaceutical M&As from 2002-2016 (data compiled from Ernst and Young Biotechnology reports and Biocom AG)

<table>
<thead>
<tr>
<th>Year</th>
<th>Buyer</th>
<th>Seller/acquired company</th>
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<tbody>
<tr>
<td>2002</td>
<td>Jerini AG</td>
<td>Chemotopix GmbH</td>
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<td></td>
<td>Curacyte</td>
<td>VityResc Biotech AG</td>
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<td>Evotec OAI</td>
<td>Genion Forschungsgesellschaft mbH</td>
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<td></td>
<td>Miltenyi Biotech</td>
<td>AmCell GmbH</td>
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<td>Mologen AG</td>
<td>SoftGene GmbH</td>
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<td>2003</td>
<td>Europroteome</td>
<td>Phase-it intelligent solutions AG</td>
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<td>Eurofins Scientific</td>
<td>GeneScan Europe AG</td>
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<td></td>
<td>Bavarian Nordi A/S</td>
<td>GTB GenTherapeutika Berlin-Buch GmbH</td>
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<td>The Genetics Company</td>
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<td>Invitrogen</td>
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<td>Aldevron US</td>
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<td>Eurofins Genomics B.V.</td>
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<td>Schwarz Pharma</td>
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<td>Year</td>
<td>Companies</td>
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<td>GPC Biotech, Agennix, Thermo Fisher (USA), Brahms AG, Beckman Coulter Genomics, Epidauros Biotechnologie AG, DSM, Biopraet GmbH, BioNTech AG, Eufets GmbH, Brahms AG, Thermo Fisher Scientific, Qiagen, Dxs Ltd., Qiagen, SABiosciences, Hyglos Invest GmbH, Profos AG, Brain AG, Enzymicals AG, Evotec AG, Develogen AG, Johnson Matthey Inc. (Great Britain), X-Zyme GmbH, Life Technologies Corp. (USA), Geneart AG, Minapharma AG (Egypt), ProBiogen AG, MorphoSys AG, Sloning GmbH, NovAliX SA (France), Graffinity GmbH, Qiagen N.V., ESE GmbH</td>
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<td>2016</td>
<td>Wuxi AppTec</td>
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</table>
Appendix VI: Survey Questionnaire English

Post-M&A success factors of German pharmaceutical and biotechnology companies
Survey Questionnaire by: Damian Leschik

Background questions:
1. How many M&As have you been involved in?
   A: 0 ☐ / 1 ☐ / 2 ☐ / 3 ☐ / 4 ☐ / 5 ☐ / more than 5 ☐

2. In what year was the most recent M&A you have been involved?
   A: Year: .......

3. What was your role during the most recent M&A process?
   A: CEO / CFO / CTO / COO / Management function M&A-related / Management function not M&A-related / Other (Please fill in: .........)

4. Please tick one of the following statements, which was valid for your most recent M&A.
   A: the company bought another company / the company was taken over by another company

5. Please indicate the staff headcount of your company before the most recent M&A:
   A: < 250 / < 50 / < 10 / Other (Please fill in):...........

6. How many employees (%) left the company within one year after the most recent M&A?
   A: Percentage of employees (%):

7. Please indicate the main industry area of the company after the most recent M&A:
   A: pharmaceutical industry / biotechnology industry / biopharmaceutical industry / Other (Please fill in): ..... 

8. Please indicate the main business focus of the company after the most recent M&A:
   A: Research & Development (R&D) / Manufacturer (CMO) / Contract Research Organisation (CRO) / R&D and Manufacturer / Other (Please fill in): .........

9. What was the company’s turnover within one year before and after the most recent M&A?

Questions regarding post-M&A success metrics:
10. What do you think are the most important success metrics to assess the value of your most recent M&A? (For more than one choice, give a ranking, with 1 being the most important)
   A: Economies of scale ☐ Ranking:
   Economies of scope ☐ Ranking:
   Efficient allocation of personal or resources ☐ Ranking:
   Improve clinical success rate ☐ Ranking:
   Gaining new knowledge ☐ Ranking:
   Increase market share ☐ Ranking:
   Weakening or eliminating a competitor ☐ Ranking:
   Tax benefits ☐ Ranking:
   Escaping bankruptcy ☐ Ranking:
   Overall financial success ☐ Ranking:
   Increase patent rate ☐ Ranking:
   Reduce employee fluctuation rate post-M&A ☐ Ranking:
   Other (Please fill in): Ranking:

11. What is a sensible time period to measure post-M&A success factors?
   A: after 1-2 years / after 3-5 years / after 5 years / after 10 years / after 15 years / Other (Please fill in): ......

12. What are further assessable important post-M&A metrics?
   A: Please fill in:
13. Below are further success factors for post-M&A evaluation. On a scale of 1 to 7, with 1 being very important and 7 being not important at all, how would you rate them for your most recent M&A (please tick):

<table>
<thead>
<tr>
<th>Post-M&amp;A success factors</th>
<th>1 = very important</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7 = not important at all</th>
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<tbody>
<tr>
<td>Increase in overall clinical success rate</td>
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<td>Enhancement of biopharmaceutical clinical testing and approval for marketing</td>
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<td>Improved number of tested and approved clinical drugs</td>
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<td>Reduction of attrition rate of clinical studies</td>
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<td>Reduce outflow of employees</td>
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<td>Increase integration success of employees</td>
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<td>Ensure high employee engagement and retention</td>
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**Thank you for your participation and your time!**
Please click on the button below to submit your completed survey.

SUBMIT BUTTON
Appendix VII: Survey Questionnaire German

Post-M&A Erfolgsfaktoren in der deutschen biotechnologischen und pharmazeutischen Industrie
Online-Umfrage von: Damian Leschik

Fragenblock I:

1. In wie vielen M&As waren Sie involviert?
   A: 0 / 1 / 2 / 3 / 4 / 5 / mehr als 5

2. In welchem Jahr wurde der jüngste M&A, in dem Sie involviert waren, durchgeführt?
   A: Bitte ausfüllen:..................

3. Welche Funktion hatten Sie zu dem Zeitpunkt des jüngsten M&As?
   A: Geschäftsführer (CEO) / Finanzchef (CFO) / Technischer Direktor (CTO) / Manager des operativen Geschäfts (COO) / Management Funktion mit M&A Bezug / Management Funktion ohne M&A Bezug / Andere Funktion (bitte eintragen): ...................

4. Bitte kreuzen Sie eine der folgenden Aussagen, die für den jüngsten M&A zutrifft, an:
   A: das Unternehmen hat ein anderes Unternehmen gekauft/ akquiriert /das Unternehmen wurde von einem anderen Unternehmen gekauft/ akquiriert

5. Wie hoch war die Mitarbeiteranzahl Ihres Unternehmens beim jüngsten M&A?
   A: < 250 / < 50 / < 10 / andere Mitarbeiterzahl:......

6. Wie viele Mitarbeiter (%) verließen das Unternehmen innerhalb eines Jahres nach dem jüngsten M&A?
   A: Mitarbeiter (%):

7. Bitte geben Sie den Industriezweig des Unternehmens nach dem jüngsten M&A an:
   A: Pharmazeutische Industrie / Biotechnologische Industrie / Biopharmazeutische Industrie / ein anderer Industriezweig (bitte ausfüllen):..................

8. Bitte geben Sie den Geschäftsschwerpunkt des Unternehmens nach dem jüngsten M&A an:
   A: Forschung und Entwicklung (F&E) / Hersteller (CMO) / Auftragsforschungsunternehmen (CRO) / F&E und Hersteller / ein anderer Geschäftsschwerpunkt

9. Wie hoch war der Umsatz Ihres Unternehmens innerhalb eines Jahres vor und nach dem jüngsten M&A?

171
A: Betriebsgrößenersparnisse Priorität: Verbundvorteile
Effiziente Ressourcenallokation (Personal und Ressourcen)
Verbesserte klinische Erfolgsrate
Gewinnung neuen Wissens
Marktanteilstiegerung
Schwächen oder Eliminierung eines Wettbewerbers
Steuervorteile
Konkurs abwenden
Finanzwirtschaftlicher Gesamterfolg
Erhöhung der Patentrate
Verringerung der Mitarbeiterfluktuationsrate post-M&A
Andere (bitte eintragen): .................

11. Nach wie vielen Jahren würden Sie post-M&A Erfolgsfaktoren messen?

12. Was wären für Sie weitere wichtige post-M&A Erfolgsfaktoren?
A: Bitte eintragen: ..............

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Vielen Dank für Ihre Teilnahmen und Ihre Zeit!
Zum Übermitteln Ihrer ausgefüllten Umfrage bitte auf “Abschicken” klicken.

Abschicken