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RESEARCH

Miriam Jacobs

Cultural Impact on Lean Six Sigma and Corporate Success

Causal Analyses Considering the Effects of National Culture and Leadership

Springer Gabler

Forum Marketing

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Die zunehmende Globalisierung führt zu einem verschärften Wettbewerb, vor allem in den Bereichen Qualität, Zeit und Kosten. Vor diesem Hintergrund werden in der Schriftenreihe aktuelle Forschungsergebnisse sowohl zu strategischen Fragen der marktorientierten Unternehmensführung als auch zur operativen Unsetzung durch konsequente Kundenorientierung präsentiert. Dazu werden innovative Konzeptionen entwickelt, theoretische Ursache-Wirkungs-Beziehungen analysiert und pragmatische Gestaltungsempfehlungen gegeben.

Miriam Jacobs

Cultural Impact on Lean Six Sigma and Corporate Success

Causal Analyses Considering the Effects of National Culture and Leadership

Foreword by Prof. Dr. Armin Töpfer

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Miriam Jacobs
Dresden, Germany

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To Jonna Lil

Foreword

The management concept Lean Six Sigma claims to improve company performance by creating zero-defect and lean processes. Its enormous popularity is based on success stories from major multinational companies which have recognized early, that Lean Management and Six Sigma do not present competing philosophies but should be combined to one single concept in order to maximize the benefits of both approaches. Many companies have attempted to copy these success stories by investing heavily in the underlying methodology for structured process management to reach a rational and disciplined organization enabling processes, products and services with a zero-defect-quality. However not all companies have been successful, as they have underestimated the possible strong impact of human attitudes and behaviors embodied by concepts like the phenomena of National Culture and the concepts of Corporate Culture and Leadership Style.

Miriam Jacobs performed an innovative scientific analysis on an advanced methodological level related to cultural and leadership aspects of Lean Six Sigma as she analyzed this area of conflicts in her research. She offers one of the first scientific approaches to understand the importance, to analyze cause-and-effects relations and to derive deeper insights into the functioning of such a comprehensive pattern of soft factors. Miriam Jacobs examines the relationships and impacts between the five variables Lean Six Sigma, Corporate Culture, National Culture, Leadership Style and Corporate Success. Conducting profound theoretical and methodological investigations lead to a consistent hypothesized model, which is tested with original data of a panel of Lean Six Sigma professionals around the globe.

The results reveal that the concepts Corporate Culture and Leadership Style have the biggest impact on successful Lean Six Sigma implementation and Corporate Success while the phenomena of National Culture turns out to

have a minor influence. The analysis is complemented by a cluster analysis, disclosing that the underlying value dimensions in the variables Corporate Culture and Leadership need to be equally balanced in order to increase competitiveness of a company.

To account for the complexity and interdependencies between the analyzed variables this research uses structural equation modeling focusing on Partial-Least-Squares (PLS) as the more advanced and innovative technique of this methodology. This is even more convincing as the hypothesized model owns characteristics which are not suitable for the more traditional covariance based approaches.

This excellent PhD thesis with a wide range of advanced recognitions related to this field of research legitimates the inclusion into our series of outstanding scientific research. We hope that this publication in English will spread the recognitions worldwide and will advertise the results to a broad audience of professionals in the field of Lean Six Sigma. Practical insights of behavior and management approaches can be derived from the scientific concept and findings on this high level of management. The assessment of opportunities and risks of actions for managers in certain situations give hands-on guidance and inseminate further research about the cultural impacts in quality management.

Prof. Dr. Armin Töpfer

Acknowledgements

The idea for this thesis was born during my international assignment in a multinational pharmaceutical company, when I witnessed the implementation of Lean Six Sigma on a global level in affiliates around the world. I was involved in the first projects implemented in Germany in 2005, with tremendous effects on productivity and a huge engagement of the majority of employees.

Later on, as a certified Green Belt and Black Belt, I had the chance to lead several projects in a phase, where the decreased popularity of the Lean Six Sigma concept had lost many promoters in the company, and people tried to escape from being involved in any project work around it. Exchanging the experience with colleagues in other countries my first impression was that Lean Six Sigma adoption and implementation success depended on the country or the leadership involved. Having the chance to dive deeper into the dynamics of Corporate Culture and Lean Six Sigma through my Master thesis in 2007, my interest in further research around Lean Six Sigma grew, sharpening the topic of this research.

I would like to thank Prof. Dr. Armin Töpfer, who has supported me since my MBA in Health Care Management at the Dresden International University and has encouraged me for my research from the beginning on. Without his confidence in me managing such a complex topic, without his guidance, motivation and the insightful discussions the results of this research would have not been possible. I would also like to thank the whole Research Group of Corporate Management and Marketing, including Martina Voß, Anne Maertins, Patricia Leffler and Silke Schäfer for their addressability and advice in many formal aspects around my dissertation project. Special thanks go to my research fellow Steffen Silbermann for his good advice, encouragement and the profitable discussions.

I also thank Prof. Dr. Udo Broll for being the second reviewer of my thesis, Prof. Dr. Bernhard Schipp for taking the chair of examination board, and Prof. Dr. Marcel Thum for taking the role as second examiner.

Many more persons have supported me during my thesis work. First, I would like to thank my little four year old daughter Jonna Lil, who was not even born when I started. The literature review would have not been possible without her natural favor for sleeping and the finalization not without her understanding and happiness discovering the world on her own. I thank Jonna's father Frank Stache for his support and for taking care of Jonna all the time when I spent long hours on this research. I also thank my friend Mareike Paul for her flexibility and dedication in being the second mom for Jonna. Special thanks go to my husband Mario for being my solid rock in turbulent waters and for standing behind me in the end-phase of my project. His enthusiasm, patience and understanding gave my research the final touch. Last but not least I thank my family, my mom and dad, my sister Anne and my brother Momme and all my friends and great colleagues for their constant belief in me and their support.

This work has given me the chance to get to know many bright people and research fellows and I have learned many new methods and approaches. But overall, I have grown personally in a way which I would have never expected before. It has increased my self-confidence that my passion and ambition will help to reach many more milestones in life.

I dedicate this work to my daughter and to all other ambitious women, who face the same challenges and expect the same rewards.

Miriam Jacobs

Overview

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Glossary

6S	Six Sigma
B2B	Business to business
BB	Black Belt
CBSEM	Covariance-Based Structural Equation Modeling
CEO	Chief Executive Officer
CFM	Cross-functional management
CI	Continuous improvement
CorpCult	Corporate Culture
CSF	Critical success factor
CTQ	Critical to customer requirements
CVF	Competing values framework
DMAICR	Process steps of Six Sigma: Define, Measure, Analyze, Improve, Control and Reporting
DMP	Dynamic multi-dimensional performance framework
DPMO	Defects per million opportunities
EBIT	Earnings before interest and taxes
EMEA	Europe/Middle East/Africa
GE	General Electric Company
GLOBE	Global Leadership and Organizational Behavior Effectiveness Research Program
HLM	Hierarchical Linear Model
HR	Human Resources

JIT	Just In Time
L6S	Lean Six Sigma
MBB	Master Black Belt
MBNQA	Malcolm Baldrige National Quality Award
MCS	Management control system
MIT	Massachusetts Institute of Technology
MNC	Multinational Company
NatCult	National Culture
NPD	New product development
OLC	Organizational Learning Culture
OrgCult	Organizational Culture
PDCA	Process steps of the Deming cycle: Plan, Do, Check, Act
PDM	Participation in decision-making
PLS	Partial Least Squares
QM	Quality Management
ROA	Return on assets
ROI	Return on investment
ROS	Return on sales
SCP	Structure-conduct-performance paradigm
SEM	Structural Equation Model
SOO	Survey of Organizations
TPS	Toyota Production System
TQM	Total Quality Management
WVS	World Values Survey

1

Introduction

1.1 Overview and Problem Statement

Corporate Culture and its impact on Corporate Success has been the focus of many research projects across various academic disciplines (for an overview of empirical studies see the meta-analysis by Baetge et al. [2007]). Early observations have led to the awareness that Corporate Culture—although it often exerts an unconscious influence and the impact is not immediately recognized (see the three levels model by Schein [1984])—has a profound effect on any (strategic) management initiative.[1] A number of authors believe that due to this very invisibility, the managerial or leadership influence on Corporate Culture and change management processes is very restricted (see for example Sackmann [2004], pg. 27).

The research programs by Hofstede and the GLOBE (Global Leadership and Organizational Behavior Effectiveness) team (Hofstede [1980b]; House et al. [2004]) in particular have delved deeper into the complex dynamics and interdependencies between leadership and organizational cultures[2] around the globe. They have delivered a broad view on functional chains and effects generated by organizational culture and present one of the few current gold standards in research for this field.

Lean Six Sigma (L6S) is characterized as a holistic management philosophy that is

[1] Whether this effect is positive or negative is not fully understood and seems to depend on the situation and circumstances (see the interpretation by Baetge et al. [2007]).

[2] The majority of publications use the term organizational culture. This research however focuses on the term Corporate Culture (however, for simplicity, the term used by the author cited will be used as well). A detailed explanation and differentiation of the two concepts is provided in chapter 2.

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presently the most popular transformation initiative in the field of quality management, with a phenomenal potential to change any organization independent of its size or the industry it belongs to. Leaders in almost every sector have integrated Lean Six Sigma in their daily toolkit, finding it to be the most promising booster for monetary indicators like profit. This belief is connected with a great enthusiasm based on visible success stories of large multinational companies, e.g., General Electric Company (see Henderson and Evans [2000]).

With roots in lean and total quality management (for a more detailed decoding see for example Arnheiter and Maleyeff [2005]; Brady and Allen [2006]; Drew et al. [2004]; Linderman et al. [2003]; Springer and Schulz [2007]), Lean Six Sigma is popular for its rigorous methodological approaches and tools for project and process management (e.g., see [Maleyeff et al., 2012, p. 543]. It enables an organization to act in such a disciplined way that zero defect quality is reached. Consequently this optimal quality level is believed to best serve customer needs and increase customer satisfaction. The key aim of the concept is the active steering and shaping of organizational culture with process-driven methods in order to influence the thinking and acting of all employees toward this pursuit of perfection and customer focus. The intention is to lift the full organizational potential and gain organizational value faster than any competitor in the marketplace. The CEO of Eli Lilly and Company summarizes this ambition as "Six Sigma is to help us transform this company in our inexorable movement toward a bright and secure future" (see Lilly [2007]).

Despite a flood of practical guides about obvious methods and process techniques of Lean Management and Six Sigma ("task side" (Wong [2007], pg. 419)), current academic research in the field of Lean Management and Six Sigma, more specifically in combination with Corporate Culture, has been restricted to the description of individual organizational cultures or the comparison of few cases (Wong [2007], pg. 413f.; see also Breyfogle [1999]; Harry and Schroeder [2000]; Linderman et al. [2003, 2004]; Pande et al. [2000]; Schroeder et al. [2008] and [Brady and Allen, 2006, p. 26]). Despite the vast visibility and circulation of obvious success stories, there is a lack of science-based knowledge about the drivers of a successful Lean Six Sigma implementation. No research project has been initiated to verify that Corporate Success can actually be driven by the implementation of Lean Six Sigma (or if, for example, Corporate Success develops independently of the introduction of Lean Six Sigma) or to investigate to what

extent successful implementation is based on certain cultural or leadership components. Information on common barriers and implementation issues of Lean Six Sigma has not been collected and structured in a way that an academic understanding of the interdependencies between Lean Six Sigma and Corporate Culture, and their effect on Corporate Success could be reached. No detailed empirical research about the influence of Corporate Culture on Lean Six Sigma ("human side") and Corporate Success exists within in a single research framework.

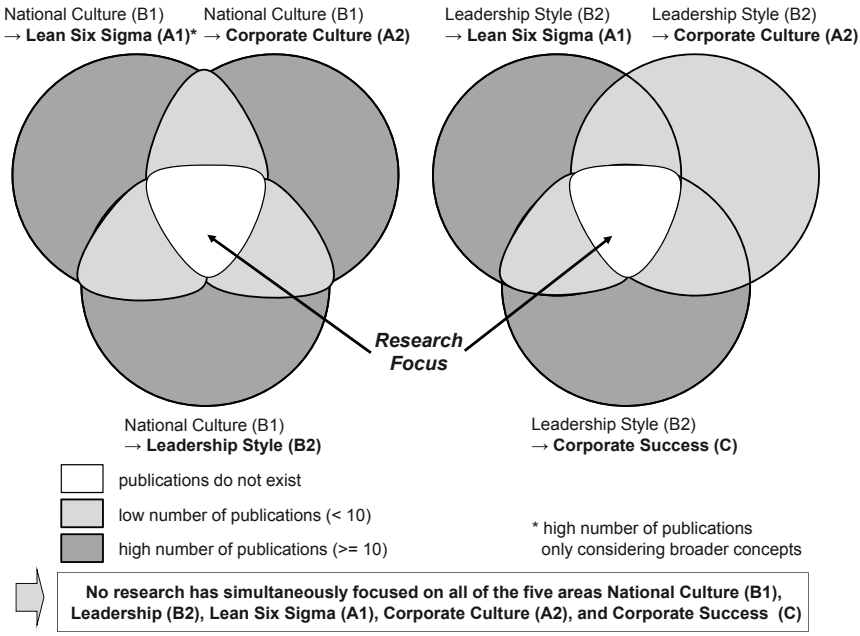

Figure 1.1: Relevant Research Fields - Existing literature on research focus (Source: own analysis)

Figure 1.1 illustrates the five relevant research fields National Culture (B1), Leadership Style (B2), Lean Six Sigma (A1), Corporate Culture (A2), and Corporate Success (C) and which relationships between them have been partly analyzed.[1] For a better

[1]The grey shadings indicate the number of publications available per field. The darker the color, the more attention has been dedicated to the combination of the overlapping variables (own analysis based on sources that will be used in chapters 2 and 3.

overview each of the five areas is given a unique identifier (e.g., A1 for Lean Six Sigma).

While a high number of publication exists for the investigation of two areas (e.g., National Culture (B1) in combination with Corporate Culture (A2) and Leadership Style (B2)) a low number of publications can be found covering more than two fields (e.g., Leadership Style (B2), Lean Six Sigma (A1) and Corporate Success (C)). No publication can be found covering all five areas simultaneously.

Figure 1.1 highlights that it might not be suitable to look at the five components individually because they might partly overlap, depending on the perspective taken. It could be argued that Lean Six Sigma is part of leadership and possesses the same characteristics as any other leadership instrument—and therefore should not be viewed in isolation.

The purpose of figure 1.1 is to provide an abstract and overview. It merely summarizes the relevant research priorities found in literature without presenting any content or detailed evaluation (this will be done in chapters 2 and 3). The conclusions on possible relationships between the research topics (see the overlapping ellipses in figure 1.1) set the ground for the overall purpose and research questions of this thesis, itemized in the next section (1.2).

1.2 Purpose and Research Questions

In line with the problem statement, the fundamental purpose of this research is to examine the effects of Corporate Culture on a successful implementation of Lean Six Sigma and—simultaneously or consecutively—on Corporate Success. The approach to reach this objective is to uncover the causal relationships between the three concepts Corporate Culture, Lean Six Sigma, and Corporate Success, while considering the surrounding setting of national culture and leadership style (e.g., it could be assumed that these two factors cannot be actively shaped or steered but can be consciously taken into account).

This research can be summarized in the following four underlying research questions (R1–R4):

1. **In which way does Lean Six Sigma increase Corporate Success (R1)?**
   First of all, this question will address how Lean Six Sigma and Corporate Success

are defined. Extensive literature review will list the documented efforts of operationalization, uncover essential features, and lead to a decision for the definitions to be used in this thesis. The second step will be to determine whether Lean Six Sigma directly influences Corporate Success (see figure 1.2). In conjunction with research question R4 (see below), the third step will be to analyze how much value Lean Six Sigma can add to Corporate Success in different countries, i.e., settings of national culture and leadership style.

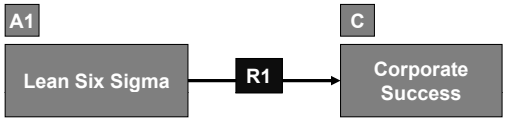

Figure 1.2: Research Question R1 - Relationship between Lean Six Sigma and Corporate Success (Source: own figure)

2. **In which form does Corporate Culture lead to Corporate Success (R2)?** As was the case for the first question (R1), the first task will be to find an adequate definition of Corporate Culture. As the importance of Corporate Culture for Leadership and Transformation Initiatives has been analyzed from different angles in literature, all relevant classifications and theories will be evaluated and discussed to reach a transparent (hierarchical) classification of terms. The aim is to give answers to three questions: whether Corporate Culture has a direct influence on Corporate Success as depicted in figure 1.3, how the impact of Corporate Culture on Corporate Success can be measured (i.e., how a valuable cultural profile for an organization can be identified) and if Corporate Culture is manageable or cannot be directly molded towards the influence on Corporate Success.

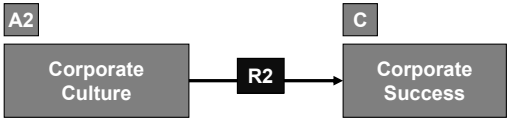

Figure 1.3: Research Question R2 - Relationship between Corporate Culture and Corporate Success (Source: own figure)

3. **How does Corporate Culture affect the relationship between Lean Six Sigma and Corporate Success (R3)?**
   As a fundamental hypothesis, the assumption is that only a certain form of Corporate Culture can enable Lean Six Sigma to lead to Corporate Success, i.e., only a key combination of the two factors will create value for a company. This question will therefore bring to light the interdependencies between Corporate Culture and Lean Six Sigma. These interdependencies can differ according to the nature of relationships, e.g., a mediating or moderating influence of Corporate Culture (see Müller [2007]). Figure 1.4 illustrates all possible relationship types. Which combination of Lean Six Sigma and Corporate Culture increases Lean Six Sigma's contribution to Corporate Success the most? Integrated with the outcome of the first two research questions, critical combinations will be identified.

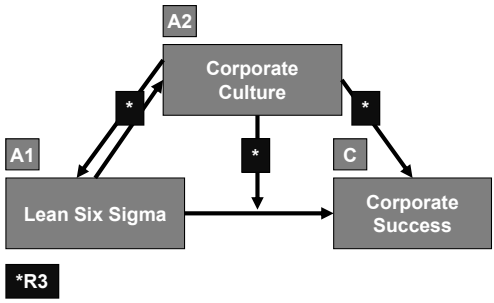

Figure 1.4: Research Question R3 - Impact of Corporate Culture on Lean Six Sigma and Corporate Success (Source: own figure)

4. **In which form does the surrounding setting of National Culture and Leadership Style positively affect the relationship between Corporate Culture, Lean Six Sigma, and Corporate Success (R4)?**
   This fourth research questions is even more complex. The first challenge is to find suitable definitions for National Culture and Leadership Style. If, by definition, given settings of national culture and leadership culture, which have evolved over a long time in different regions, cannot be directly shaped, it is to analyze if and how these country specific circumstances have a profound influence on the manageable factors (Lean Six Sigma, Corporate Culture, and consequently Corporate

Success). Figure 1.5 depicts a selected spectrum of possible effects[1].

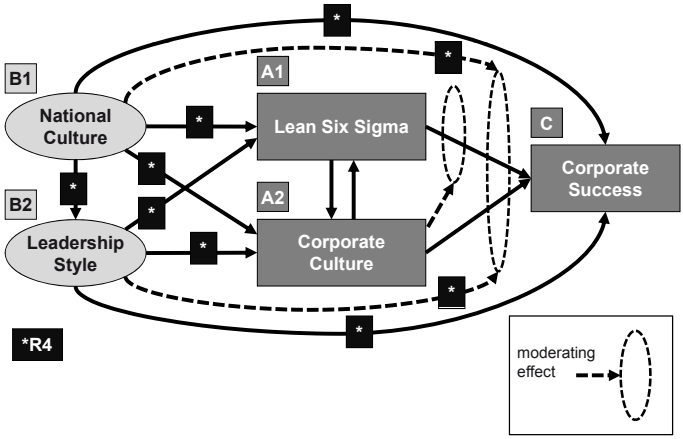

Figure 1.5: Research Question R4 - Impact of National Culture and Leadership Style (Source: own figure)

Overall, mediating and moderating influences and a variety of different relationships between the variables can be assumed. This means, that in theory all possible relationship types between the five variables could be outlined.

To summarize, the key claim for this research will be to obtain a multi-factored decision matrix as a systematic framework. Companies will be able to take the decision to introduce Lean Six Sigma more consciously, based on valuable scientific data. Which level of benefits can be reached if Corporate Culture and Lean Six Sigma implementation are shaped in a certain way with a combination of critical components or determinants in a positive setting of national culture and leadership style? Organizations who believe they are already confronted with failures of Lean Six Sigma implementations can learn from these constellations as well. The outcomes of this research will provide them deep insight as to where key issues come from, i.e., how defects in their Corporate Culture or a mismatch between their societal values, history,

[1] To illustrate the complexity but at the same time keep the overview, not all possible relationships are shown in figure 1.5, e.g., moderating effects of National Culture and Leadership Style on the relationship between Lean Six Sigma and Corporate Culture are not included.

and Lean Six Sigma has prevented the full potential of corporate performance from unfolding.

The way and methodological flow to address the research questions is presented in the following section.

1.3 Conceptual Framework and Methodology

Based on the conceptual design idea of Jais [2007], this research follows a logical path that is divided into six sequent parts (see figure 1.6).

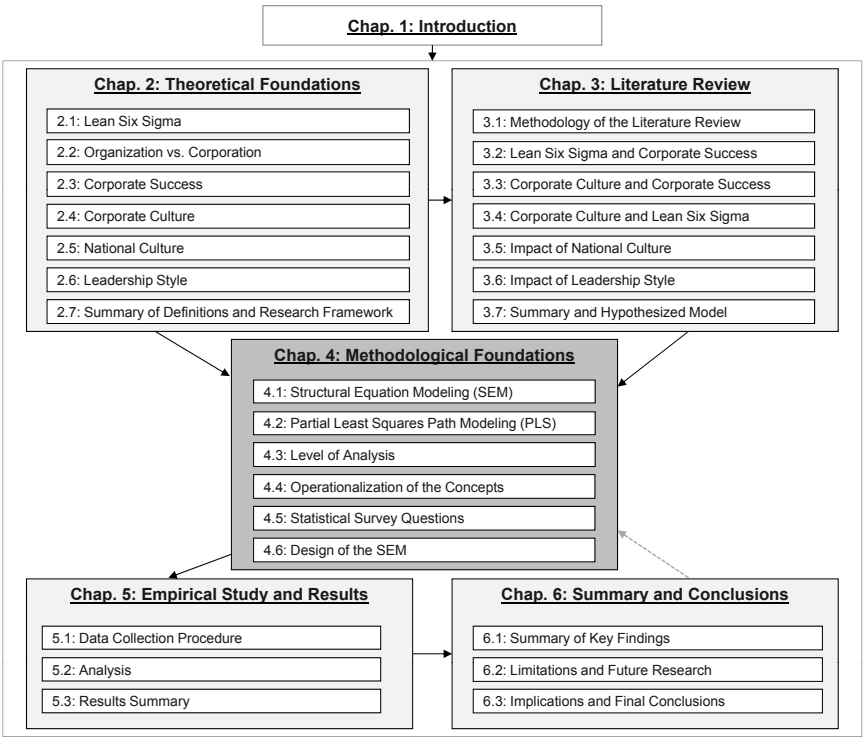

Figure 1.6: Flow of the Research - Overview of analysis procedure (Source: own figure)

This introduction serves as the starting point for chapter 2. Each of the five research

areas (Lean Six Sigma, Corporate Success, Corporate Culture, National Culture, and Leadership Style) will be unlocked with the same approach: after a comprehensive description of key terms, historical milestones, and prevailing operationalizations and instruments found in relevant sources, the collected knowledge will be reviewed and evaluated to reach a common understanding and definition of the constructs examined. The approach for the evaluation and systematic categorization of findings follows a three step process: reviewed literature will be summarized, evaluated and categorized according to the value in answering the research questions. As most definitions are blurry and contradictory and used for multiple research purposes, reaching a precise nomenclature is the key challenge. The first nomenclature will be summarized in section 2.7 (Summary of Definitions and Research Framework). It needs to be emphasized, that all definitions derived in section 2.7 still leave room for interpretation. On purpose they provide an introduction and definitions will be sharpened in chapter 3, when they are put into context with other variables and their value in answering the research questions will be assessed.

As depicted in figure 1.6 following the theoretical foundation of chapter 2, chapter 3 not only sharpens the conceptual definitions, but also answers the research questions (R1–R4) more precisely. The literature review is more extensive and complex, as sources covering more than one concept are examined (for an overview see the illustration provided in figure 1.1 in section 1.1). This is the reason why the chapter is named "Literature Review" and why it is divided into seven subsections again. After a short introduction into the methodology of the literature review (section 3.1), the review starts with the studies which have embraced the relationships between Lean Six Sigma and Corporate Success (R1, section 3.2). Subsequently reviewed studies explore the connections between Corporate Culture and Corporate Success (R2, section 3.3), cover cause-and-effect chains between Corporate Culture and Lean Six Sigma (R3, section 3.4), and examine the impact of National Culture and Leadership Style on the three former aspects (R4, sections 3.5 and 3.6). The chapter closes with an intensive summary of the relationships that were discovered and with whether and how they should be incorporated into the final hypothesized model to form the empirical study of this research (section 3.7).

The fourth chapter is dedicated to the methodology used in the empirical study. After an introduction into Structural Equation Modeling (section 4.1) and into the

method of choice Partial Least Squares path modeling (section 4.2), the five research concepts are operationalized (section 4.4). They are each refined individually (in the same order as in chapter 2: Lean Six Sigma followed by Corporate Success, Corporate Culture, National Culture, and Leadership style). After a short description of the statistical survey questions (section 4.5) the operationalized research concepts are consolidated in a final design of a Structural Equation Model (to be empirically tested, section 4.6).

The empirical study and its results are presented in chapter five. The description of the data collection procedure (section 5.1) is followed by an extensive data analysis (split into a descriptive and a core causal analysis part) and a summary, in which each hypothesis is evaluated (section 5.2). The findings are compared and classified with the existing literature to obtain a concentrated view as a summary of results (section 5.3).

The research closes with a comprehensive assessment of all results (section 6.1) and with an appraisal of the limitations of the findings and directions for future research (section 6.2). A condensed view is provided to give guidance on practical implications and to reach final conclusions (section 6.3).

In terms of dramaturgy the flow of research follows a path as presented in figure 1.7. The levels of analysis are based on systematic scientific research as summarized by [Töpfer, 2009a, p. 58 ff.]. The six sequent analysis steps define the flow of this research (indicated by the numbered boxes in grey shading on the bottom of each research insight listed in the first column of figure 1.7). The identification of the research questions in this chapter serve as the starting point for the high level definitions of the five research concepts and the creation of the research framework in chapter 2. With these definitions, studies covering more than one concept are evaluated in detail in chapter 3, leading to revised, final definitions and a complete hypothesized model based on evaluated studies. Chapter 4 will translate the hypothesized model into a measurement model, followed by chapter 5 testing and revising the measurement model according to empirical data. At the very end, chapter 6 concludes the findings and practical implications.

The connections between conceptual framework, hypothesized model, measurement model and practical implications are summarized in figure 1.8. The hypothesized model reflects the core element in defining what this research will exactly explain. As depicted in figure 1.7 the findings of each preceding chapter will serve as a filter for the following

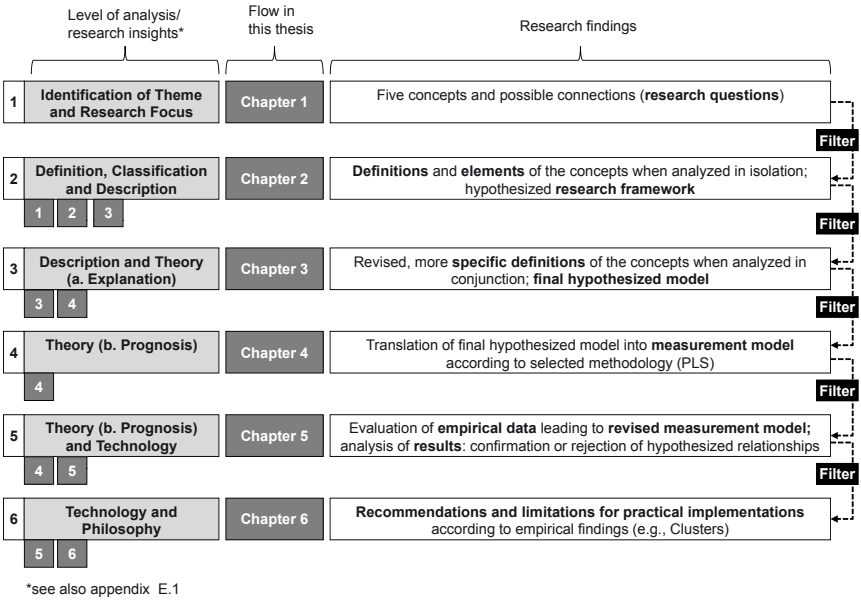

Figure 1.7: Dramaturgy of the Research - Research findings per level of analysis (Source: own figure)

step, e.g., the research questions formulated in chapter 1 and the high level definitions and high level research framework in chapter 2 set the ground for the detailed analysis and final hypothesized model in chapter 3.

For a better visualization of the chronological order of analysis steps throughout this research, figure 1.9 summarizes the levels of analysis per chapter. As the transition from one insight level to the next is fluent, most levels of analysis span more than one chapter. Throughout the text, results of each analysis level will be clearly highlighted, to present the quintessence in each chapter towards the detailed outcome directory in appendix E.1[1]. Overall, figure 1.9 illustrates the order of analytical levels taken in order to reach the four key research milestones depicted in figure 1.8.

[1]The table in appendix E.1 presents the detailed reference for figures 1.7, 1.8 and 1.9 and may serve as a guide for the reader to keep track of the research flow on a more detailed level (based on the approach of systematic scientific research by Töpfer [2009a]).

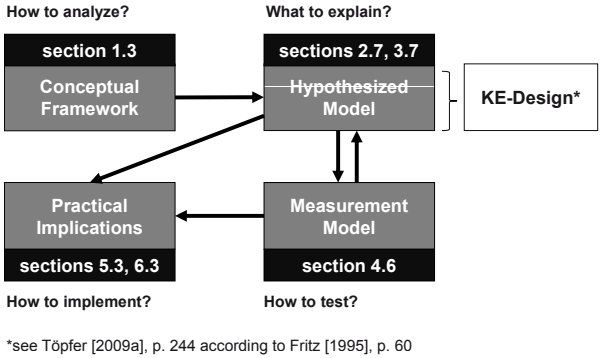

Figure 1.8: Levels of Research Design - Position of Hypothesized Model (Source: see [Töpfer, 2009a, p. 121])

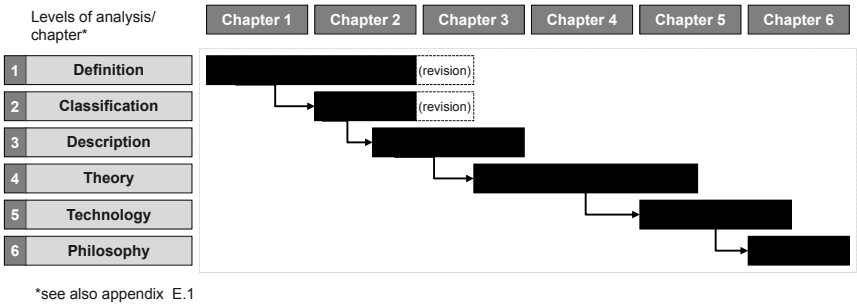

Figure 1.9: Chronological Flow of the Research - Levels of analysis per chapter (Source: see [Töpfer, 2009a, p. 59])

2

Theoretical Foundations

2.1 The Concept of Lean Six Sigma

2.1.1 Roots and Definition of Lean Management

In the early nineteenth century, Taylor [1911] initiated lean management with his work "The Principles of Scientific Management" and a description of mass production techniques employed by Henri Ford to manufacture his Model T. Due to accelerated progress and globalization[1] the rational organization for mass production he described led to significant disadvantages in terms of effectiveness, speed and flexibility (see [Hummels and de Leede, 2000, p. 75])—not only in the automobile industry. Ever since, increased competitiveness in the marketplace has necessitated the transformation to more effective forms of organization to speed up the customer order fulfillment cycle (see for example Knuf [2000]; Levy [1997]). It has made more sense to utilize the brain power of all workers (see [Dahlgaard and Dahlgaard-Park, 2006, p. 268]), to focus on core competencies, and to improve the whole value chain by extending the order fulfillment mapping to customers and suppliers (see Bhasin and Burcher [2006] and Comm and Mathaisel [2000]; Hines and Taylor [2000]; Liker [2004]; Weiss [2001]).

The Japanese engineers Taiichi Ohno and Shigeo Shingo took Henry Ford's high throughput and low inventories as a role model for the overall reduction of waste (see [Arnheiter and Maleyeff, 2005, p. 9], Inman [1999] and [Emiliani, 2006, p. 168]).

[1] Globalization can be defined as the increasing international integration of business, driven by technology and leading to the emergence of global markets. In other words, customers' desires have been homogenized globally with increased expectations, demanding a much higher quality standard of finished goods (see Levitt [1983]).

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Waste was defined as "anything other than the minimum amount of equipment, materials, parts, space and time which are absolutely essential to add value to the product" ([Russell and Taylor, 2000, p. 737]). Their company Toyota was the first to embrace lean thinking and the principle of using less of everything with its Toyota Production System (TPS) in the 1950s. Toyota, striving for perfection in their organization (see [Arnheiter and Maleyeff, 2005, p. 10]) and thereby revolutionizing the automobile industry, systematically identified seven different kinds of waste to streamline their processes (see [Töpfer, 2009b, p. 28], Drew et al. [2004] and [Pepper and Spedding, 2010, p. 139]): over-production, defects, unnecessary inventory, inappropriate processing, excessive transportation, waiting, and unnecessary motion.

Improved processes removed three types of barriers: waste, variability, and inflexibility (see [Drew et al., 2004, p. 36]). During the 1980s, when Just-In-Time (JIT) programs[1] followed in the Anglo-Saxon world, Toyota was the main reference for successful productivity increase. Critics have pointed out that conditions differ in other industries, so that applying the pioneering work of the automobile industry could be misleading (see Bhasin and Burcher [2006] and Adler and Cole [1993]; Norman et al. [2002]). On the other hand, case studies have proven that this argument can also be interpreted as one of the key misconceptions about lean management (see [Arnheiter and Maleyeff, 2005, p. 11f.]).

Linking back to the first research question, the lean part of Lean Six Sigma already contains corporate success factors. They way of thinking in lean management is very much productivity and goal driven.

In terms of waste reduction, Lean management's key element for the elimination of all non-value-added activities is the use of performance measurements. Employees are enabled to observe and improve their own working steps on a decentralized level (see for example Lantelme and Formoso [1999]) through repeated actions and control (see Bhasin and Burcher [2006] and Vasilash [2001]) on a daily basis (see Bhasin and Burcher [2006] and Ohno [1988]) and at the lowest level (see Bhasin and Burcher [2006] and Hines and Taylor [2000]). Therefore lean also stands for increased and continuous individual learning on the operational floor, making the organization competent for not just one-time change but the continuous change demanded by the business environment.

[1] JIT is an adaption of the TPS, according to the International Motor Vehicle Program (IMVP) benchmarking study and the work of Womack et al. [1990] (see [Pepper and Spedding, 2010, p. 138]).

As the TPS developed through sequential steps over a time horizon of over 30 years, the lean philosophy is characterized as a long-term journey (see [Bhasin and Burcher, 2006, p. 64] according to Turfa [2003]; Vasilash [2000]).

The success of lean management is based on performance and outcomes of individual employees. The motivation and ambition of individuals and the willingness and flexibility for continuous change therefore determine the long-term success of a company.

In their benchmarking study, Womack and Jones [1996] analyzed the superiority of the Japanese TPS over the dominant system of mass production in the Western automotive industry (see [Töpfer, 2009b, p. 30]). Identifying a significant performance gap through the analysis of 52 plants in 14 countries over a five year period (see [Bhasin and Burcher, 2006, p. 57]), they asked for more discipline and focus in lean implementation (see AberdeenGroup [2006a]) by following five principles (see [Töpfer, 2009b, p. 30] according to Womack and Jones [1996]). As a reaction to the fast circulation of the great rhetorical presentation of Womack and Jones [1996], some authors, like Kieser [1996], immediately referred to Lean Production as a short-dated trend with a bell-shaped curve that is already beyond its peak and out of fashion. Newman and Chaharbaghi [1998] even argue that Japanese manufacturing culture had been invented by Western observers who, blind to the weaknesses of lean production and their own strength, created a false model of cause and effect (see [Newman and Chaharbaghi, 1998, p. 514]). But the widespread implementation of lean fundamentals in organizations has disproved this criticism: in not only North America but also Europe many companies have continued to adopt the lean principles, with substantial increase in their performance (e.g., see [Töpfer, 2009b, p. 30] and AberdeenGroup [2006a]).

The exact level and quality of lean implementation (impacting Organizational Success and Organizational Culture) has not been broadly studied or defined yet. In terms of Organizational Success, lean does not necessarily result in improved financial performance (see Bhasin and Burcher [2006] and Lewis [2000]). A statistically significant relationship between profitability and lean production could not be proven (see [Bhasin and Burcher, 2006, p. 60] and Oliver and Hunter [1998]). And with conditions of high and stable domestic demands in the Japanese economy at the time of the study of Womack and Jones [1996], the role model of productivity is questionable in the first place (see [Bhasin and Burcher, 2006, p. 60] and Katayama and Bennett [1996]).

Although no statistically significant relationship between lean production and financial profit could be proven, performance increases have been observed in mainly North American and European companies adopting lean principles.

Throughout its history, Lean has suffered from various definitions that deviate from the origins described above and serve different authors' understandings and publication purposes (see Koskela [2004]). Independent of the discussion how to operationalize and differentiate between Lean thinking and Lean production, the basic idea and ambition to eliminate waste (Japanese: Muda) in order to streamline all processes throughout an organization and to obtain competitive advantages is more popular than ever (see Töpfer and Günther [2009]). Today the Lean philosophy is believed to have become a mindset (see [Bhasin and Burcher, 2006, p. 64] according to Elliott [2001]) and visible mainstream (see AberdeenGroup [2006a]). That Womack et al. [1990] never intended to build a profound theory based on their MIT study (see the interpretation by Koskela [2004]) should not be accepted as an excuse for the missing disclosure of measures and methodological details that prove the superiority of the Japanese automobile production (see [Minssen, 1993, p. 37] and [Bhasin and Burcher, 2006, p. 63]). It needs to be emphasized that the breakthrough of Lean thinking or Lean production as a popular management instrument has been based less on precise data and objective facts than on belief (see [Minssen, 1993, p. 37]) and on convincing and powerful rhetoricians. They have argued that Lean is a key factor in reshaping old-fashioned organizational structure (see [Hegner, 1994, p. 300]) and will solve the current business challenges (see [Kieser, 1996, p. 23f.]). To design the production systems in a way that products and services are delivered to the customer with minimal waste and maximal value sounds rather simple (see [Knuf, 2000, p. 58]. The underlying complexity in the complete realignment of all organizational systems and in how to specifically measure the improvements in multiple dimensions[1] is completely ignored. This criticism seems disappointing given that Lean has been widely recognized and analyzed across various academic disciplines and underlines the obscure nature of the topic (see [Emiliani, 2006, p. 169]). Lean is a concept that stresses performance measurement as a critical

[1] For example, through the differentiation between the three underlying elements philosophy, culture, and technical tools or processes (see Bhasin and Burcher [2006] according to Convis [2001]; Pullin [2002]).

success factor (see Lantelme and Formoso [1999]) in improving communication and coordination and creating a lifelong community of loyal workers (see [Minssen, 1993, p. 38] and [Bhasin and Burcher, 2006, p. 65] according to Allen [1997]). But it was not originally described and evaluated as such by Womack and Jones [1996] through clear and reliable data.

To summarize, no published recipe exists disclosing the complexity and specific steps a company needs to consider and take in order to reach certain improvements in performance with lean management.

The complexity of lean management implementation, especially obstacles through a misuse of the concept or people management failures (which could also include traits of leadership or cultural barriers) is neither described nor accounted for in practice.

The impact of culture[1] has been spotlighted as well. For example, differences in national cultures could limit the application of the Japanese mentality to the Western industry (see [Wong, 2007, p. 415]). This becomes even more important as numerous authors state that corporate culture and the alignment between thinking and behaving lean are crucial to reach the potential organizational benefits (see Bhasin and Burcher [2006] according to Bartezzagni [1999]; McNabb and Sepic [1995]; Schonberger [1996]; Utley et al. [1997]).

In order to increase performance with lean management, the corporate culture needs to support or align with lean thinking.

To highlight the true nature of how lean is implemented in practice, lean management seems to be as exhausting as losing weight is for a human being (see [Springer and Schulz, 2007, p. 68]). In the Western industry, lean implementation has focused on improvement and management has tended to concentrate on tools and practices (see [Pepper and Spedding, 2010, p. 142]). Adequate attention has not been paid to the human element or people management in particular (see [Emiliani, 2006, p. 169] and Bhasin and Burcher [2006] according to Bidanda et al. [2005]; Chung [1996]; Lathin and Mitchell [2001a,b]; Prabhu [1992]; Siekman [2000]), leading to severe problems in the organizational culture.[2] Possible consequences may include visible downsizing symptoms hypothesized by [Weiss and Udris, 2001, p. 105]:

[1] For a detailed definition and conceptualization of the term culture and its differentiation into multiple layers (national, organizational, corporate), see section 2.4, The Concept of Corporate Culture.

[2] Again, for a detailed definition of Organizational Culture and its differentiation from Corporate Culture, see section 2.4, The Concept of Corporate Culture.

- Headcount reductions and job cuts lead to insecurity among employees and anxiety about the future.
- Increased pressure on working performance and increased competitiveness among employees lead to loss of solidarity and to mobbing.

Adverse effects on morale, increasing levels of worker unhappiness and withdrawal, ultimately lead to operational failures (see [Pepper and Spedding, 2010, p. 141] according to Hines et al. [2004]). Intensified work pace and demands through lean production can even cause adverse health effects (see Landsbergis et al. [1999]). With these consequences, however, the basic ideas of lean management seem to have been misunderstood, as no layoff of an employee could take place unless absolutely necessary (see [Arnheiter and Maleyeff, 2005, p. 11] according to Emiliani [2001]). **Employees are seen as knowledgeable assets to a company, and their layoff risks being counterproductive.** In successful lean operations, co-workers are more friends than predators. The company has much interest in retaining their employees all their lives and respect for people is a key value (see for example [Emiliani, 2006, p. 169]) rather than something that is just paid lip service (see Bhasin and Burcher [2006] according to Norman et al. [2002]). Increased competitiveness and hostile activities would contradict the community and togetherness of loyal workers. Therefore lean implementation in the Western world is mainly about cultural change in the organization (see Bhasin and Burcher [2006]; Sawhney and Chason [2005]) without drastic cuts in its shape.

It becomes clear that Lean Management itself has to be considered precisely and from different angles in order to understand the true and sustainable effects on Corporate Culture and Corporate Success.

In essence, **Lean Management is described to have positive effects on Corporate Success, but only if the influencing factors (Culture, Leadership) support the mind set of Lean Management in the right direction (focus on empowered people as the core asset of a company)**.

The next section will explore the roots of Six Sigma to be able to integrate it with Lean Management and to define the character of Lean Six Sigma as a whole. In preparation for chapter 3 (Literature Review) further forces impacting Corporate Culture and Corporate Success will be identified and summarized.

2.1.2 Roots and Definition of Six Sigma

Built on principles of Deming's Total Quality Management (see Brady and Allen [2006]), at first glance Six Sigma looks strikingly similar (see [Schroeder et al., 2008, p. 536] according to Clifford [2001]). The underlying philosophy, tools, and techniques are in fact very similar (see [Schroeder et al., 2008, p. 537]). For example, Six Sigma's process improvement methodology, the DMAICR cycle, is comparable to Deming's PDCA cycle (see [Senapati, 2004, p. 684] and [Kumar et al., 2008, p. 458] according to Bertels [2003] and [Pepper and Spedding, 2010, p. 142] according to Andersson et al. [2006]; Pande et al. [2000]). Differences are seen in following aspects: The innovation of Six Sigma lies in the organizational implementation (deployment approach and emergent structure, see [Schroeder et al., 2008, p. 548]) and the emphasis on the scientific approach (see [Pepper and Spedding, 2010, p. 144]). On the other hand, TQM's focus on behavior and investment in people proves a broader focus for transformation of organizational culture (see [Senapati, 2004, p. 688]), shifting toward the core element "All One Team" (see [Pepper and Spedding, 2010, p. 143]). Based on the Joiner Triangle, Six Sigma and TQM can be depicted as skewed triangles (see figure 2.1, simplified according to [Pepper and Spedding, 2010, p. 143]), each approach somewhat failing to provide a coherent system philosophy, aiming for equal growth on each side of the triangle (see [Pepper and Spedding, 2010, p. 143f.]).

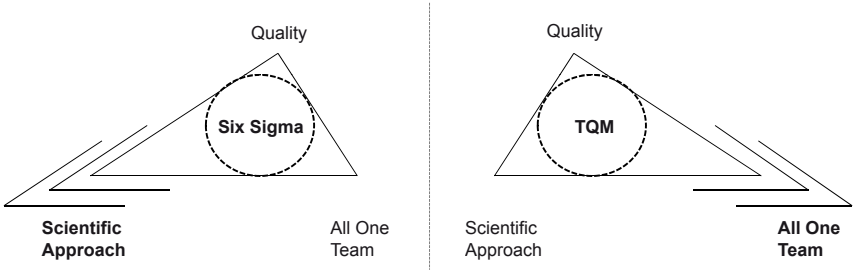

Figure 2.1: Focus of Six Sigma vs. TQM - Skewed Joiner Triangles (Source: [Pepper and Spedding, 2010, p. 143])

In the end, **Six Sigma has emerged as a strategy that includes TQM, a stronger customer focus, additional data analysis tools, financial results,**

and project management to meet customer needs (see [Kumar et al., 2008, p. 458] according to Kwak and Anbari [2006]). However, Six Sigma may still mean different things to different people: depending on the organizational level at which the individual resides, the concept can be interpreted as either **a metric, a philosophy, or a methodology for quality improvement** (see [Mitra, 2004, p. 293f.]). There is no single definition for Six Sigma: as for Lean Management the attempt to operationalize differs by author and publication purpose. The following description of the historical foundations will reconstruct the road that perceptions of Six Sigma have taken over the years.

The name Six Sigma stems from the goal to have not more than 3.4 defects per million opportunities (DPMO) (see for example [Linderman et al., 2003, p. 193] and [Brady and Allen, 2006, p. 3]). Alternatively, based on the Gaussian normal distribution, Six Sigma aims at a quality level of 99.99966% for all process and product attributes (see [Töpfer, 2007c, p. 3] and [Günther, 2010, p. 6]). Invented by William Bill Smith and first implemented by Motorola in 1987, Six Sigma originally served as a method to reduce manufacturing defects (see Kumar et al. [2008]; Senapati [2004] and Schroeder et al. [2008] according to Barney [2002]; Folaron [2003]).

Six Sigma's popularity has been boosted by the development and promotion of Six Sigma at GE (General Electric Company). In 1996, GE's CEO Jack Welsh declared Six Sigma as GE's corporate strategy for improving quality and competitiveness (Dahlgaard and Dahlgaard-Park [2006] according to Park [2003]). The top-down initiative is deployed in terms of projects, each with clear objectives, time frame, and results, with the gains expressed financially where possible (see [Goh and Xie, 2004, p. 237]). Carried out by designated personnel trained as champions, master black belts, black belts, green belts, etc., the projects follow a logical sequence (see [Goh and Xie, 2004, p. 237]), each using a selection of instruments from the Six Sigma toolkit that are suitable for the specific context.

To summarize, Six Sigma aims to achieve specifically defined objectives in a certain time with a structured project management method and dedicated improvement specialists.

Despite initial scepticism and hesitancy, over time Six Sigma has turned into the only quality improvement initiative with much application outside manufacturing, even reaching service industries and health care management (e.g., see [Kumar et al., 2008,

p. 457f.] listing Antony [2004]; Antony and Fergusson [2004]; Frings and Grant [2005]; Krupar [2003]; Moorman [2005] and Kwak and Anbari [2006]; Sehwail and DeYoung [2003]; Töpfer [2007b]). Recently published case studies have focused on small and medium enterprises (SMEs) (see Kumar et al. [2006]; Wessel and Burcher [2004]), technology-based manufacturing (see Motwani et al. [2004]), and the food sector (see Knowles et al. [2004]).

It becomes clear why the name Six Sigma does not solely stand for an error rate or a process improvement tool in the manufacturing industry anymore. The concept has evolved into a management philosophy,[1] spread over different industries. Six Sigma combines established elements of quality management in an intelligent way to transform the whole value chain of an organization at a rapid pace, i.e., includes them as a critical part of successful corporate management to increase organizational performance (see [Töpfer, 2007c, p. 7f.] and [Brady and Allen, 2006, p. 3]).

Like Lean Management, Six Sigma has gained momentum in industry but lacks academic research (see Linderman et al. [2003]; Schroeder et al. [2008]). Schroeder et al. [2008] employ a definition to explain Six Sigma by using field observation, the (foremost practitioner) literature, and pure thought. To avoid the mistakes of previous authors who were too general in their definitions, they focus on obtaining a scientific definition of Six Sigma, including both the "what" (the elements of Six Sigma) and the "how" (relationships between these elements) (see [Schroeder et al., 2008, p. 537]). In line with the characterization above, the resulting definition of Six Sigma suggests four relevant elements that are hypothesized to be linked in a five factor mediation model as shown in figure 2.2 ([Schroeder et al., 2008, p. 543]): parallel-meso structure, improvement specialists, structured method, and performance metrics.

These factors constitute Six Sigma's structured project management approach, leading to a high impact on organizational performance and a correction of the preconception Six Sigma is "old wine in new skin" to Six Sigma is "better wine in old skin" (see Masing [2004]; Töpfer [2007c]). To define Six Sigma's nature even further, Six Sigma has also been evaluated through a **goal-theoretic perspective** (see Linderman et al. [2006, 2003]). By setting explicit goals in improvement projects, Six Sigma enables behavioral change of organizational members, e.g., by creating perceptions

[1] Management philosophy is defined as the thinking and acting stimulated by the leadership of an organization (see [Simon, 2000, p. 80]).

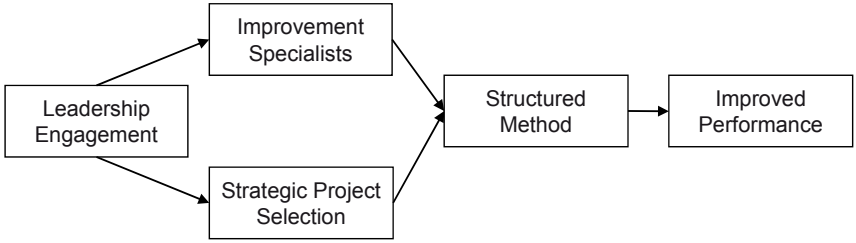

Figure 2.2: Six Sigma Framework - Mediation Model with five variables (Source: [Schroeder et al., 2008, p. 543])

about how much change is possible (see Linderman et al. [2003]). **In contrast to Lean Management, Six Sigma sets the pace in a more structured, scientific way: goals and change options are given to rather than created by individual employees.** Conversely, too ambitious goals lead to lower commitment levels and decreased performance, emphasizing the behavioral insight needed—next to the technical understanding—for a successful Six Sigma implementation. Compared to the framework shown in figure 2.2, the version presented in figure 2.3 has been expanded to reflect the goal-theoretic impacts (own integrated version, based on [Linderman et al., 2003, p. 197, 200] and [Linderman et al., 2006, p. 781]).

Instead of the two factors improvement specialists (known at the most rigorous level as "Black Belts", see [Mitra, 2004, p. 294]) and strategic project selection, the three components effort, persistence, and direction act as mediating variables between explicit and challenging Six Sigma goals and improved organizational performance. In parallel, the task complexity, Six Sigma training, and goal commitment also influence the relationship between goals and performance. The breakdown into variables facilitates learning more about the drivers of successful Six Sigma implementation.

Critics of Six Sigma remain (see Benner [2005]; Flott [2000]; Hammer and Goding [2001]) and numerous surveyors have noted that a significant number of companies have failed to achieve the intended benefits with Six Sigma (see Byrne [2003]; Kumar et al. [2008]); the constructs presented above set the ground for identifying the reasons for failure more specifically.

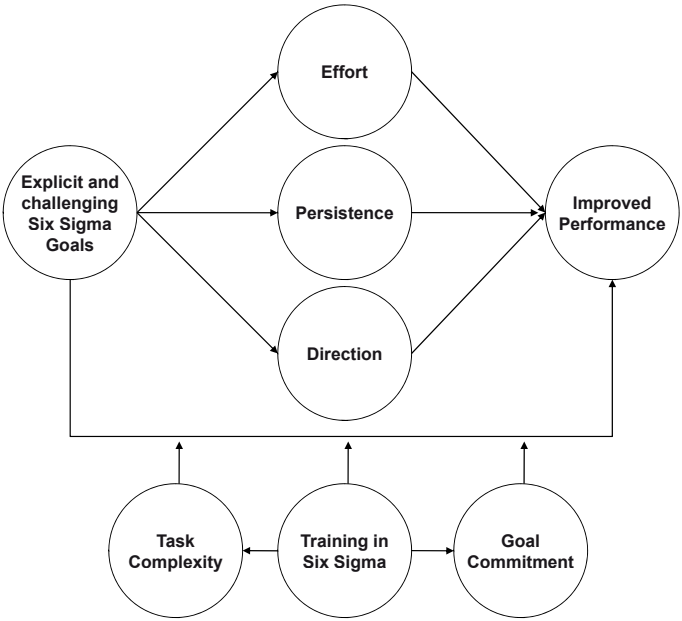

Figure 2.3: Expanded Six Sigma Framework - Mediation Model with eight variables (Source: [Linderman et al., 2003, p. 197, 200], see also [Linderman et al., 2006, p. 781])

2.1.3 The Character of Lean Six Sigma

Little literature is available on the integration of Lean Management and Six Sigma (see [Pepper and Spedding, 2010, p. 145f.]), especially regarding the search for a "common model, theoretical compatibility, or mutual content or method" ([Bendell, 2006, p. 259]). The two concepts stem from different roots, but they both aim at perfection. The implementation of either of the two systems alone may fail to achieve perfect quality (see [Arnheiter and Maleyeff, 2005, p. 5] and Töpfer and Günther [2009]), as the weaknesses of the two concepts are not compensated: Lean Management lacks a scientific approach, waste being eliminated on the basis of intuition rather than relevant data, facts, and measurements contained in the Six Sigma concept (see [Arnheiter and Maleyeff, 2005, p. 13]). Through the absence of measurement and prioritization the focus can drift to non-relevant strategic activities (see [Breyfogle and Forest, 2003,

p. 857]), which can be useful for the customer but increases cost. In turn Six Sigma can mean zero defect quality for a high price, i.e., quality measures can also be reached without eliminating wasteful activities on the operational process level or satisfying the customers' needs (see [Arnheiter and Maleyeff, 2005, p. 16]). "Lean Sigma combines the variability reduction tools and techniques from Six Sigma with the waste and non-value-added elimination tools and techniques from Lean Manufacturing to generate savings to the bottom-line of an organization" ([Kumar et al., 2006, p. 407]).

The Lean principles present the starting point for process improvement (see [Töpfer and Günther, 2009, p. 6]). Lean, error-free, and profitable processes build the organizational quality. As a second step, Six Sigma is used in maintaining this process quality, e.g., offering powerful solutions to chronic problems (see [Kumar et al., 2006, p. 408]). **After Lean has improved all the internal processes of an organization, Six Sigma focuses on the external view, selects only the most valuable processes** according to CTQs (Critical Customer Requirements), and solves problems in these processes through the DMAIC(R)-cycle (see [Töpfer and Günther, 2009, p. 5f.]. Both concepts have internal and external effects: internal process improvements (Lean Management) eventually provide a better delivery time to the external customer, and to deliver better quality to the customer (Six Sigma) internal processes are streamlined.

"By looking at projects through both the lean and Six Sigma lenses, you have the precision, actionable tools needed to find hidden problems while making sure you don't forget the obvious" ([Smith, 2003, p. 38]). In other words the application of lean tools and techniques identifies key areas that can be leveraged by Six Sigma techniques (see [Pepper and Spedding, 2010, p. 148]). The combination of common sense and systematic analysis ensures that both the obvious and the hidden problems are solved to enhance organizational performance even further. "The two initiatives work together, achieving results consistently superior to what either system could achieve alone" ([Smith, 2003, p. 37]). Figure 2.4 summarizes the greater potential of Lean Six Sigma compared to either of Lean Management or Six Sigma alone, in relation to strategic intent (simplified reproduction based on [Töpfer and Günther, 2009, p. 9]).

Dahlgaard and Dahlgaard-Park [2006] do not explicitly deny that Lean Management and Six Sigma have different roots. But they emphasize that the two concepts

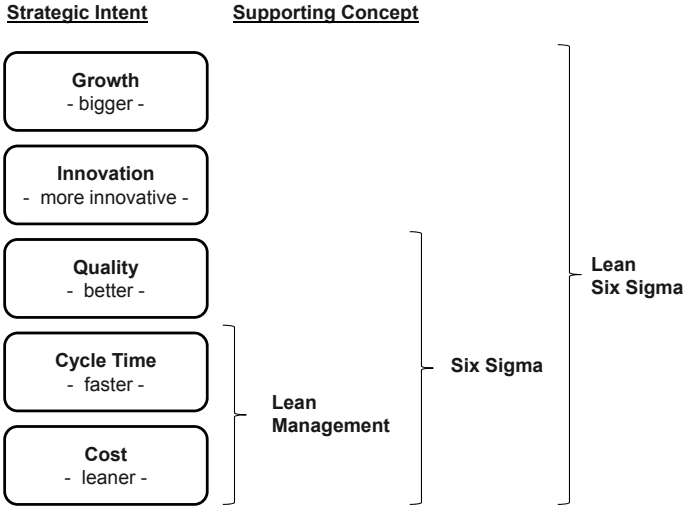

Figure 2.4: Strategic Intent of Lean Six Sigma - Combining the power of Lean Management and Six Sigma (Source: [Töpfer and Günther, 2009, p. 9])

both have the same origin: the Japanese quality evolution (also referred to as company wide quality control or TQM (Total Quality Management) practices) (see [Dahlgaard and Dahlgaard-Park, 2006, p. 272f.]). Further they believe in TQM as the greater of the above management philosophies, inferring that the essence of all three is the human factor, represented by leadership, efficient CFM,[1] empowerment, and partnerships (see [Dahlgaard and Dahlgaard-Park, 2006, p. 272f.]). As aspired by practitioners of Lean Six Sigma, these core competencies contribute to a proactive teamwork environment, nourished by genuine trust and respect (see [Dahlgaard and Dahlgaard-Park, 2006, p. 274] according to Dahlgaard and Dahlgaard-Park [1999]), and can only be implemented by understanding the psychology—especially the emotional competencies—behind them (see [Dahlgaard and Dahlgaard-Park, 2006, p. 276]).

As a key implication, continuing the discussion of section 2.1.2, Lean Six Sigma can be seen as a better roadmap of TQM (see [Dahlgaard and Dahlgaard-Park, 2006,

[1] CFM stands for cross-functional management and "means that all employees, across departments and functions, share common goals and the responsibility for reaching them." (Dahlgaard and Dahlgaard-Park [2006]; Dahlgaard et al. [1994])

p. 279]). The Lean Six Sigma formula for sustainable increase of organizational value can be summarized as illustrated in figure 2.5 (simplified representation according to [Lunau et al., 2007, p. 5]).

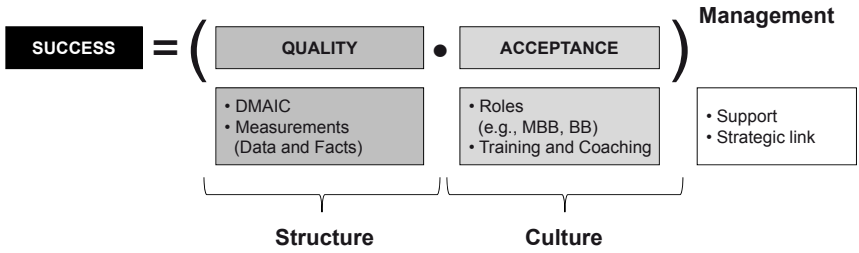

Figure 2.5: Formula of Successful Lean Six Sigma Implementation - Combining the technical with the soft skills (Source: [Lunau et al., 2007, p. 5])

Proficiency in the tools and instruments of Lean Six Sigma (for an overview see the detailed illustration by [Kumar et al., 2006, p. 409], figure 1), especially competence in the DMAICR-cycle and its various measurements, are just as important as building acceptance in the organization through coaching and training of defined roles and responsibilities. Leadership is presented as the exponentiation of the formula and enables the multiplication of the hard and soft skills (i.e., technical or intellectual competencies with emotional competencies (see also [Dahlgaard and Dahlgaard-Park, 2006, p. 276f.])). As enrooted in Lean Management the constant pursuit of perfection can only be attained through the collaboration of three elements: technical system and operating procedure, management infrastructure (organizational structure and process guidelines supporting the operating procedure), and the attitude and behavior of all employees (see [Drew et al., 2004, p. 37f.]). This last element is also referred to as Organizational or Corporate Culture.[1]

As postulated in research questions R2 and R3 **Leadership Style and Corporate Culture are closely linked to Lean Six Sigma and present integral components of a successful Lean Six Sigma implementation**.

Most recent research has confirmed the importance of Organizational Culture for Lean Six Sigma adoption and deployment. As soon as Lean Management and Six

[1]For further explanation see the definition in section 2.4 (The Concept of Corporate Culture).

Sigma are implemented in isolation (see [Smith, 2003, p. 40]), two different subcultures emerge, causing conflicts of interest (see [Bendell, 2006, p. 255]) and a drain on resources (see [Smith, 2003, p. 41]). This issue serves as a starting point for the deeper discussion in chapter 3, and more specifically in section 3.4 (The Relationship between Corporate Culture and Lean Six Sigma).

2.2 Definition of Organization and Corporation

The term organization is used for multiple purposes across academic disciplines. For example, a central theme and widely used in biology, its meaning is already fuzzy in this discipline, as it is used to describe a state, a process, or both (see [Atlan, 1974, p. 296]). More relevantly for this research, views about organizations in social sciences have changed over time, e.g., from traditional to bureaucratic, human organizations and the organizational system (see Bogart [1973]; Ouchi and Price [1978]). All views have in common that they describe **organizations being goal directed social entities, which are designed as deliberately structured and coordinated activity systems, linked to the external environment** (see [Daft, 2009, p. 11]). In the social research arena, organizations are one of four distinct levels of human association—next to institutions, groups, and aggregates (see [Caplow, 1953, p. 1]). Different structural and contextual dimensions (e.g., hierarchy of authority and size) are added to this generic characterization to define a certain view of an organization (see [Daft, 2009, p. 17]). An organization can be analyzed by focusing on the individuals within it (organizational behavior; roots in psychology), by analyzing it as a whole unit (organization theory; roots in sociology), or integrating these two levels (meso theory) (see [Daft, 2009, p. 36]). Most current publications state that organizations are more than aggregated behaviors of individuals or instantiations of their environment: they conceptualize an organization as a social actor (see [King et al., 2010, p. 292]). Figure 2.6 illustrates the position of organizations related to other social actors in society (taken from [King et al., 2010, p. 297]).

This positioning of organizations is fundamental for this research because it delimits the unit of analysis. There are **different types of organizations**: from large, multinational corporations to small, family-owned businesses, nonprofit organizations and

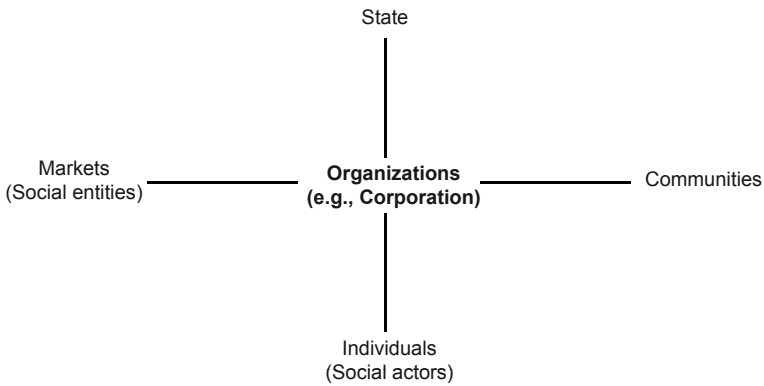

Figure 2.6: The Social Landscape of Organizations - A conglomerate of social actors (Source: [King et al., 2010, p. 297])

governmental agencies (see [Daft, 2009, p. 11]). Therefore, the term corporation[1]—a research object of this thesis—is a special form of organization. It is an entity or institution, i.e., a community of individuals recognized as having its own legal existence with its own powers, duties and liabilities (see http://www.thefreedictionary.com/corporation). More specifically, business organizations having different legal forms, a **corporation is defined as a public company**.

This research focuses on the Culture and Success of such firms, therefore the term corporation is favored over organization to describe and analyze the dynamics of these concepts. Sections 2.3 and 2.4 will reveal how this choice contributes to a more precise and transparent conceptualization.

2.3 The Concept of Corporate Success

2.3.1 Definition of Corporate Success

Performance measurement and identifying the right data to track organizational effectiveness have been major research topics over the last thirty years (see [Maltz et al.,

[1]The term corporation stems from the Latin word corpus, which means body (e.g., see http://de.wikipedia.org/wiki/Corporation), i.e., a group of people acting as one body.

2003, p. 188]). Although Corporate Success has been characterized much more consistently than Corporate Culture (see [Baetge et al., 2007, p. 191] and the definition of Corporate Culture described in section 2.4), various terms and definitions have been used for the underlying concept.

Reviewing the literature shows that three terms are used to describe the same thing: Organizational Success, Organizational Performance, and Organizational Effectiveness. Reasons for using one term instead of the other are not so obvious, and meanings overlap, as social scientists, economists and psychologists all have an interest in organizational efficiency that is not mutually exclusive (see [Becker and Stafford, 1967, p. 511]). In essence, all three terms intend to identify and describe the outcome or value created by both tangible and intangible elements in an organization (e.g., see Carmeli and Tishler [2004]). The terms just have different relevance to achieving Corporate Success as a maximization of corporate value (see figure 2.7, own illustration).

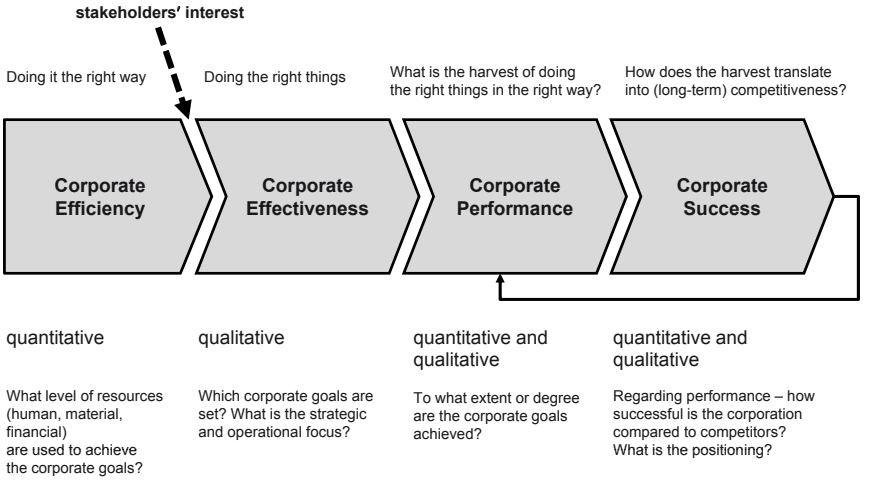

Figure 2.7: The Chain to Corporate Success - Stepwise process to maximize Corporate Value (Source: own figure)

Structural[1] and contextual[2] dimensions (see the overview of [Daft, 2009, p. 15f.])

[1]Internal characteristics of an organization (see [Daft, 2009, p. 15])

[2]The whole organizational setting, which influences and shapes the structural dimension (see [Daft, 2009, p. 15])

of an organization (in this case, a corporation) are adjusted to most efficiently and effectively transform inputs into outputs and provide value (see [Daft, 2009, p. 20]). In this connection, **efficiency refers to the amount of resources used to achieve the organization's goals, while effectiveness as a broader term means the degree to which an organization achieves its goals** (see [Daft, 2009, p. 20] and [Bachmann, 2007, p. 90]). Efficiency has been viewed and operationalized in terms of productivity, including soft facts like morale, commitment, and satisfaction of corporate members (see [Georgopoulos and Tannenbaum, 1957, p. 534]). Traditionally viewed as the ratio of output to input, efficiency is introspective and bears no relationship to demands from outside (see [Mendelow, 1983, p. 70]). In contrast, effectiveness is outward looking and described as the extent an organization is able to meet the outside demands (see [Mendelow, 1983, p. 70]). In figure 2.7 Corporate Efficiency is therefore the first step on the way to Corporate Success. Three fundamental theoretical approaches have evolved, to measure organizational effectiveness: **the goal-based approach** (evaluation in terms of goals set by the organization itself), **the systems approach** (multiple, generic aspects, i.e., goals independent of organizational intention and awareness (see [Yuchtman and Seashore, 1967, p. 892])), and **the multiple constituency approach** (satisfaction of various stakeholders) (see [Murphy et al., 1996, p. 15f.]). The last approach is the most integrated, as it goes beyond financial performance measures and considers multiple interests in the firm. Various stakeholders intervene between the two terms efficiency and effectiveness, which challenges managers to carefully balance their needs and interests in order to reach organizational effectiveness (see figure 2.7 and the explanation by [Daft, 2009, p. 20]). If a company has the right priorities, i.e., formulates an appropriate strategy and translates this into meaningful operational activities, it is effective and performs. Although the meanings of effectiveness and performance are interchanged in literature, they should be differentiated as outlined in figure 2.7. While effectiveness is a rather qualitative measure (Is the corporation focusing on the right things?), performance is measured both qualitatively and quantitatively (What is the harvest of efficiency and effectiveness?). Corporate goals function as the yardsticks of performance measurement. Again, various stakeholders and their characteristics may act as barriers to achieving Corporate Success shown in figure 2.7 as the ultimate measure of success at the end of the chain. E.g., the environmental setting, the organizational structure, management skills, and empowerment of employees

all influence the central organizational culture, assumption or psyches, central theme of morale performance (see [Kilmann, 1989, p. 10]).

In the majority of literature, the broader term Organization is favored over Corporation, e.g., Organizational Effectiveness instead of Corporate Effectiveness. Because the term corporation defines the research subject more precisely (see argumentation in section 2.2), figure 2.7 concentrates on this term.

Corporate Success gives a company the positioning in the marketplace and ensures sustainability, on the other hand performance is due to this positioning and competitive abilities (see Barnett et al. [1994]). In figure 2.7 an arrow is shown to account for this loop. Success can be distinguished by three equally essential criteria (see [Caplow, 1953, p. 3]):

- Performance of objective functions (measured by institutionally imposed standards, which range from simple bookkeeping devices to complex and sensitive judgments)
- Minimization of spontaneous and unregulated internal conflict (which threaten the existence of the whole)
- Maximization of satisfaction for individuals (assuring their continued membership in the organization)

The meaning and understanding of "success" is therefore ambiguous and not clearly defined, as there is no agreement on the use of such criteria (see [Gronhaug and Falkenberg, 1990, p. 267]). The next section will explore how to operationalize success further by defining adequate measures for this research.

2.3.2 Measurement of Corporate Success

Organizational or corporate value, which can be reflected through multi-dimensional performance measures, results in short-, mid- or long-term organizational capabilities—depending on the operationalization and perspective taken. The challenge lies in developing and using meaningful criteria instead of imposing arbitrary or subjective values (see [Caplow, 1953, p. 4] and Gronhaug and Falkenberg [1990]).

The portfolio of measures for organizational success range from static, short-term, financial indicators to dynamic, long-term, intangible human criteria (see Gronhaug and Falkenberg [1990]; Maltz et al. [2003]) and they differ

across companies and industries. Theoretically speaking, three competing measurement approaches can be distinguished (see [Baetge et al., 2007, p. 189f.] according to Böing [2001]; Evanschitzky [2003]; Ford and Schellenberg [1982]): **the goal approach** (see Etzioni [1964]), **the constituency approach** (see Thompson [1967]), and **the systems resource approach** (see Yuchtman and Seashore [1967]). For the goal approach, organizations are measured according to their achievement of set objectives (see [Baetge et al., 2007, p. 190] according to [Raffee and Fritz, 1990, p. 8]). The constituency approach focuses on measuring the satisfaction of multiple internal and external stakeholders, e.g., employees, leadership, customers, suppliers, and shareholders (see [Baetge et al., 2007, p. 190] according to [Böing, 2001, p. 43]). The systems resource approach defines organizational success as the ability to sustain and looks at the relationships between the organization and its environment (see [Baetge et al., 2007, p. 190] according to [Böing, 2001, p. 42]). The goal approach is plausibly the easiest one to collect data on and measure and is therefore more commonly used (see [Baetge et al., 2007, p. 190] according to Haerdrich and Jenner [1996]; Wilderom et al. [2000]). Murphy et al. [1996] published a meta-analysis on how frequently accounting performance measures have been used to determine organizational success in start-up companies. The dimensions efficiency, growth, and profit with the measures return on investment and sales growth present the most commonly used financial measures (see Baetge et al. [2007] and Maltz et al. [2003] according to Murphy et al. [1996]).

This example might not be valid across companies and industries, e.g., an established corporation might emphasize additional economical measures that do not apply to start-ups (see [Baetge et al., 2007, p. 191]). Financial accounting measures are also limited to providing a retrospective view on historical performance (see [Maltz et al., 2003, p. 189] according to Chakravarthy [1986]; Peters and Waterman [1982]) and lack an adequate outlook on potential development, one of the key evaluation purposes of organizational success (see [Gronhaug and Falkenberg, 1990, p. 270]). As organizational success obviously has more facets and various stakeholders are interested in how the organization will evolve over time, Maltz et al. [2003] developed a dynamic multi-dimensional performance framework (DMP) applicable to different firms and firm types (see Maltz et al. [2003]). The DMP intends to eliminate the limitations of the widespread performance measurement systems Balanced Scorecard and Success Dimensions model (see Kaplan and Norton [1992]; Maltz et al. [2003]; Shenhar and Dvir

[1996]). While the Balanced Scorecard does not integrate the organizational contributions of customers, suppliers, employees, and other stakeholders (see [Maltz et al., 2003, p. 190] according to Atkinson et al. [1997] and Smith [1998]) and omits very long-term measures, the Success Dimension model only provides fuzzy dimensions without specific operational measures and lacks empirical verification at the corporate level (see [Maltz et al., 2003, p. 190]). Both concepts do not focus on the company's human resources dimension and are therefore not people-oriented enough (see [Maltz et al., 2003, p. 190]), especially in the context of Lean Six Sigma.

In a model of employee behavior, Atkinson et al. [1997] suggest to integrate people management and link profit as a financial measure to the first and second level objectives employee satisfaction and organizational culture (see figure 2.8, modified illustration according to [Atkinson et al., 1997, p. 29]).

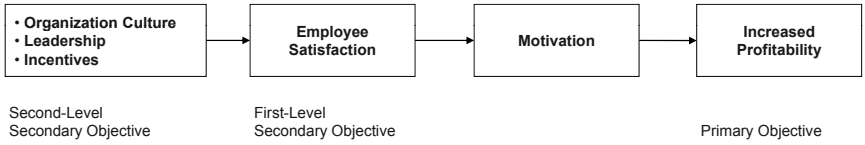

Figure 2.8: Performance Evaluation of Human Resources - A Model of Employee Behavior (Source: [Atkinson et al., 1997, p. 29])

The DMP integrates the Model of Employee Behavior. The framework is based on the Balanced Scorecard and Success Dimensions models, but avoids their pitfalls. It provides a dynamic measurement system spanning five performance dimensions (see table 2.1 (modified according to [Maltz et al., 2003, p. 196])[1]).

Depending on the nature of the company, the measures of the DMP can be applied selectively. As conditions differ, **each individual organization can have its own set of performance measures**, adding complexity and limiting cross-company measurement and comparisons (see [Parhizgari and Gilbert, 2004, p. 222]). However **for this research all five dimensions outlined in table 2.1 are considered to be relevant and valuable**.

Corporate Success is not based on global success criteria or fixed metrics but needs to be constructed in order to be explanatory (see [Gronhaug and Falkenberg, 1990, p.

[1]For a more detailed explanation of the presented measures see Maltz et al. [2003].

Dimension	Metrics
1. Financial	Sales, Profit Margin, Revenue growth
2. Market/Customer	Customer Satisfaction Index, Customer Retention rate, Service quality
3. Process	Time to market with new products/services, Quality of NPD & PM processes
4. People Development	Retention of top employees, Quality of leadership development
5. Preparing for the Future	Depth and quality of strategic planning, Anticipating/preparing for unexpected changes in external environment

Table 2.1: The Dynamic Multi-dimensional Performance Model - Facets of Organizational Success in five dimensions (Source: [Maltz et al., 2003, p. 196])

273]). As corporations with strong performance measurement systems and balanced and diverse data sources are believed to more likely outperform their competitors (see Bernthal et al. [2010]), an accurate identification and analysis of critical success factors[1] seems indispensable.

In summary **Corporate Success as defined in this research reflects the end-point of performance and a company's ability to be sustainable and competitive long-term. Measures depend on the nature of the company, however should span the five dimensions of the DMP to be as dynamic, complete and valuable as possible**.

2.4 The Concept of Corporate Culture

2.4.1 Definitions of the Underlying Concept Organizational Culture

As "different people think of different slices of reality when they talk about culture" ([Sathe, 1983, p. 6]), lots of different perceptions and definitions of organizational culture exist in research. Krulis-Randa [1990] already found over 250 terms and definitions of the word "culture" (see [Baetge et al., 2007, p. 185] according to [Krulis-Randa, 1990, p. 7]); one critical review in the field of anthropology listed 164 unique definitions (see [Sathe, 1983, p. 6] and [Jung et al., 2007, p. 42] according to Kroeber and Kluckhohn [1963]).

[1] Critical success factors can be characterized as variables influenced by management or criteria for prediction of success. For a more detailed explanation and broader definition see [Gronhaug and Falkenberg, 1990, p. 272].

In comparison to Six Sigma, the body of literature about Organizational Culture did not originate with consultancy-based guidelines written for managers in the practical world (like Baker [1980]; Deal and Kennedy [1982]; Sathe [1983]), and studies have included the theoretical efforts of scholars ever since (like Frost et al. [1985]; Pondy [1983], see [Alvesson, 1989, p. 123]). That academics and practitioners have been attracted to the topic simultaneously was already recognized in the 1980s (see [Deshpandé and Parasuraman, 1986, p. 28]), the advent of the "corporate-culture boom" (see [Jung et al., 2007, p. 41]). Since the 1970s, literature in the field of Organizational Culture has grown tremendously (see [Alvesson, 1989, p. 123]). From the birth of Lean thinking (see section 2.1.1 above), organizations have been recognized as cultures rather than as machines, this recognition drawing on anthropology to provide definitional frames (see [Hawkins, 1997, p. 418] and [Jung et al., 2007, p. 39]). Definitions have been so broad and heterogeneous that when Robert J. House started the GLOBE study, he consciously avoided a meta-analysis and waived an exhaustive literature review (see [House et al., 2004, p. xxi]). Consequently, this international research project (GLOBE stands for "The Global Leadership and Organizational Behavior Effectiveness Research Program"), the largest that aims to increase knowledge relevant to cross-cultural interactions (see [House, 2004, p. 3]), decided to **define and examine culture in two ways: as practices and as values** (see [House et al., 2004, p. xv]). Culture is thereby analyzed concerning "the way things are done" (practices) and "the way things should be done" (values). They refer to the anthropologist Redfield [1948], who defines culture as "shared understandings made manifest in act and artifacts" and almost offers a preview of the three level model by Schein [1984], one of the most respected publications in the field.

Schein [1984] introduced a model with a differentiation into sequent levels in order to reflect the visible and invisible aspects of culture (see figure 2.9, based on [Schein, 1984, p. 4] and [McCarthy, 1998, p. 157] according to [Herskovitz, 1955, p. 153]). Hatch [1993] provided an extension to Schein's approach, adding symbols as the fourth dimension and describing the relationship between the cultural elements as dynamic processes, which are circular and recursive. Alternatively depicted in the form of a water lily diagram with five levels (see [Hawkins, 1997, p. 426]), only the artefacts and behavior of Organizational Culture are visible above the surface. The mindset,

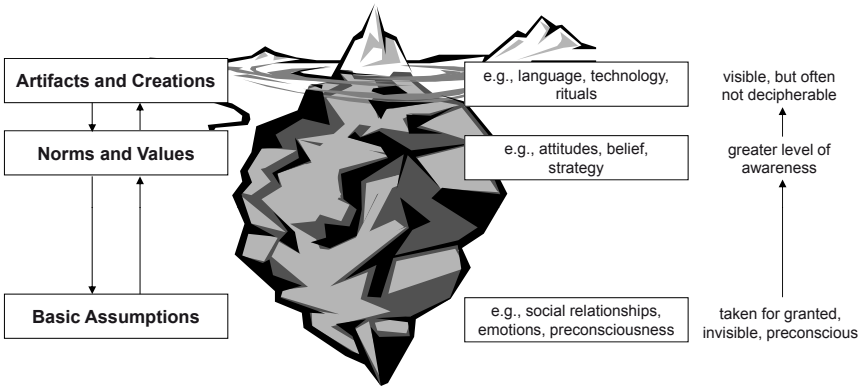

Figure 2.9: The Three Levels of Culture - Visible and invisible interactions (Source: see [Schein, 1984, p. 4])

emotional grounds and motivational roots are hidden beneath the surface and present the roots and reasons for observed creations (see also [Jung et al., 2007, p. 45]).

Overall, **Organizational Cultures exhibit certain features**, that have been observed and presented by not only Schein [1984] but the majority of academic publications ([McCarthy, 1998, p. 168] and Jung et al. [2007] according to [Hofstede, 2001, p. 179] and Lundberg [1990]):

- holistic
- historically determined
- relating to anthropological concepts
- socially constructed, soft, and difficult to change

Diving deeper into the literature of Organizational Culture, the myriad of definitions across research disciplines and the complexity of the concept becomes vivid. For illustration, table 2.2 gives a chronological abstract of the key definitions of Organizational Culture. The focus is on writers across different disciplines (anthropology, sociology, psychology, management), which have been cited and referenced numerous times and are considered to be most influential in their field.[1]

[1]This selection is the result of extensive literature review, including major (electronic) databases (e.g., ScienceDirect, Science Citation Index). The approach chosen is similar to [Jung et al., 2009, p. 1088]. No impact factor based evaluation has been performed due to the disadvantages of this methodol-

Author	Definition
Tylor [1871]	That complex whole which includes knowledge, belief, art, morals, laws, customs and any other capabilities and habits acquired by man as a member of society
Redfield [1948]	Shared understandings made manifest in act and artifact
Kluckhohn [1951]	Patterned ways of thinking, feeling and reacting, acquired and transmitted mainly by symbols, constituting the distinctive achievements of human groups, including their embodiments in artifacts; the essential core ... consists of traditional ... ideas and especially their attached values
Kroeber and Parsons [1958]	Transmitted and created content and patterns of values, ideas, and other symbolic-meaningful systems as factors in the shaping of human behavior and the artifacts produced through behavior
Triandis [1972]	An individual's characteristic way of perceiving the man-made part of one's environment. It involves the perception of rules, norms, roles, and values, is influenced by various levels of culture such as language, gender, race, religion, place of residence, and occupation, and it influences interpersonal behavior
Deal and Kennedy [1982]	The way we do things around here
Turnstall [1983]	A general constellation of beliefs, mores, values, systems, behavioral norms and ways of changing business that are unique to each corporation
Sathe [1983]	Set of important understandings (often unstated) that members of a community share in common
Schein [1984]	Pattern of basic assumptions that a given group has invented, discovered, or developed in learning to cope with its problems of external adaptation and internal integration, and that have worked well enough to be considered valid, and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems
Kilmann et al. [1986]	Shared philosophies, ideologies, values, assumptions, beliefs, expectations, attitudes and norms that knit a community together
Deshpandé and Webster Jr. [1989]	Pattern of shared values and beliefs that help individuals understand organizational functioning and thus provide them norms for behavior in the organization
Denison [1990]	Underlying values, beliefs and principles that serve as a foundation for an organization's management system as well as the set of management practices and behaviors that both exemplify and reinforce those basic principles
Hofstede [2001]	The collective programming of the mind that distinguishes the members of one group or category of people from each other
House et al. [2004]	Shared motives, values, beliefs, identities, and interpretations of meanings of significant events that result from common experiences of members of collectives and are transmitted across age generations

Table 2.2: Definitions for Organizational Culture - Selected extract of heterogeneous operationalizations (Source: as stated, own compilation)

ogy, mentioned by Greenwood [2007]; Hakansson [2005]; Opthof [1997]; Pislyakov [2009]; Seglen [1997]; Simons [2008]; West [2006].

To provide practical guidelines, numerous authors have not only supplied the broad landscape of different definitions (see table 2.2) but also developed typologies to classify organizational cultures according to common characteristics. As **culture is recognized as a multi-dimensional, complex concept, which continuously changes over time**, the interest in creating such usable concepts risks the danger of false simplification, reducing the depth and richness of Organizational Culture with an evangelical taxonomy (see [Hawkins, 1997, p. 420]). Bearing this limitation in mind[1] these typologies present useful analysis frameworks. Table 2.3 shows the different typologies that have been published over time (adapted according to Hawkins [1997]; Hynes [2009]; Jung et al. [2007]; Zu et al. [2010]).

Author and Year	Names of Cultural Clusters
Harrison [1972] (Handy [1976])	Power (Zeus), Role (Appollo), Task, Person (Dionysus)
Quinn and Rohrbaugh [1981][2]	Group, Developmental, Hierarchical, Rational; also described as Market/Adhocracy (external) vs. Clan/Hierarchy (internal)
Ouchi [1980, 1981]	Clan, Bureaucratic, Market, Theory Z
Deal and Kennedy [1982]	Tough-Guy Macho, Work Hard Play Hard, Bet Your Company, Process
Peters and Waterman [1982]	Eight distinct cultural traits
Wallach [1983]	Bureaucratic, Innovative, Supportive
O'Toole [1985]	Meritocracy, Egalitarian, Humanism, Behaviorism
Hirsh [1985]	Intuition Thinking (NT), Sensation Feeling (SF), Intuition Feeling (NF), Sensation Thinking (ST)
Bennis and Nanus [1985]	Collegial, Personalistic, Formalistic
Schneider [1994]	Competence, Collaboration, Cultivation, Control

Table 2.3: Typologies of Organizational Culture - Development of cultural clusters in chronological order (Source: own compilation based on Hawkins [1997]; Hynes [2009]; Jung et al. [2007]; Zu et al. [2010])

The listed definitions and typologies of Organizational Culture emphasize "the plethora of dimensions and multitude of cultural levels" and stress the need for a clear conceptualization and methodological approach for this research (see [Jung et al., 2007, p. 43]). That Organizational Culture is "the social glue, holding the company

[1] False simplification applies to many concepts in business research. For example, see [Sullivan and Daniels, 2008, p. 1087], who describe the oversimplification of dynamic models and endorse a multiparadigmatic perspective which integrates scientific and humanist paradigms with that of chaos theory.

[2] For a detailed definition and description of the so called "Competing Values Framework" (CVF) see also Quinn [1988]; Quinn and Kimberly [1984]; Quinn and McGrath [1982, 1985]; Quinn and Rohrbaugh [1983]; Quinn and Spreitzer [1991].

together" ([Baker, 1980, p. 8]) is one of many metaphors that attempt to summarize the true nature of the concept (see also the illustration by [Schwartz and Stanley, 1981, p. 34]). Social relations have multiple facets and are complex and dynamic, which is why **only a part of Organizational Culture can be directly observed and studied. Even if these parts can be successfully measured, room for interpretation always remains** (see [Baetge et al., 2007, p. 187]). This premise also applies to Corporate and National Culture—two cultural layers whose characteristics overlap with those of Organizational Culture and which are outlined below.

2.4.2 Definition of Corporate Culture

Despite the diversity in definitions of Organizational Culture, it is also often described under the synonym "corporate culture" (see [Baetge et al., 2007, p. 186]) or referred to as company and workplace (see [Jung et al., 2007, p. 39] according to Linstead and Grafton-Small [1992]). A default classification or clear distinction between Organizational Culture and Corporate Culture cannot be found. As investigated in section 2.3.1, a distinction has to be made because the use of the terms "organization" and "corporation" depends on the choice of perspective with respect to the dimensional layers (e.g., see [Jung et al., 2007, p. 43]).

Figure 2.10 illustrates how different levels of culture, like organizational and corporate culture, are interrelated (adapted according to [Jung et al., 2007, p. 46] and [Karahanna et al., 2005, p. 6]). As indicated by overlapping and nested ellipses, the relationship across levels of culture is not necessarily hierarchical from the more general (supranational) to the least general (group) (see [Karahanna et al., 2005, p. 4]), e.g., groups may span several organizations and organizations may span national or professional cultures. Individual behavior, as the base, is not a separate cultural layer but a product of all of the others, i.e., **employees' behavior at their workplace is a function of all the different cultures simultaneously** (see Karahanna et al. [2005]). Not reflected in figure 2.10, is a layer accounting for the role of neuroscience, as cultural research in combination with this science is scant (see [Duchmann, 2011, p. 382]) and would go far beyond the scope of this research.

This research considers Corporate Culture as public company culture that can be actively shaped toward increased efficiency, effectiveness, performance, and success of the corporation (see section 2.3.1, figure 2.7). Although

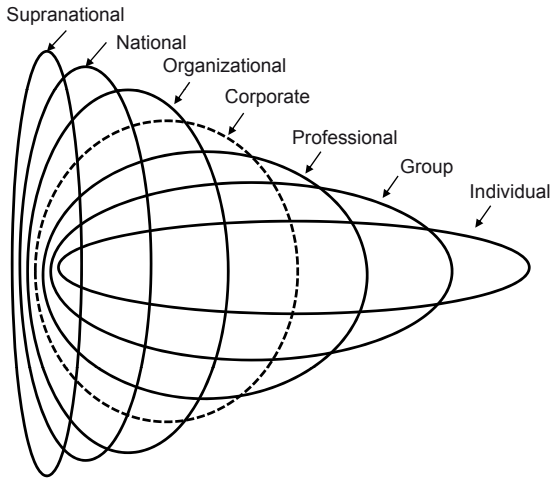

Figure 2.10: Levels of Culture - Interrelations of hierarchical layers (Source: see [Jung et al., 2007, p. 46] and [Karahanna et al., 2005, p. 6])

this cause-and-effect chain can be influenced by the other cultural layers (e.g., in the organizational view by the role of the environment), it is assumed that **Corporate Culture tends to be comparatively open for active configuration**. The shared understanding of the corporation's employees about the beliefs, values, norms, and corporate philosophies is molded by expected standards of behavior, speech, presentation of self, and "shoulds" (see [Wallach, 1983, p. 29]). Even if their personality and style is also formed by culture on the national and supranational[1] level, **employees need to adapt their behavior in order to "fit in" and be successful in the corporation they work for**.

As indicated above, identifying and measuring Corporate Culture as an extract or piece of the broader framework with multiple cultural layers is complex, if not impossible. **Corporate culture can only be expressed as an approximate model**, and will always involve the development of complex explanations if the intended result is a correct model of cause and effect rather than a largely rhetorical concept without a

[1] Cultural differences across national borders, or which exist in more than one nation are supranational. These include regional, ethnic, religious, and linguistic affiliations and they constitute the highest level in the hierarchy (see [Karahanna et al., 2005, p. 4] after Hofstede [1991]).

useful purpose (see [Newman and Chaharbaghi, 1998, p. 514f.]). **The approximate model or construct for measuring Corporate Culture needs to be carefully chosen** (see the final choice for the CVF by Quinn and Rohrbaugh [1981], as derived in section 3.3.3.)

2.5 The Concept of National Culture

2.5.1 Definition and Values of National Culture

In his attempt to define national culture, Jais' insight into the roots of cultural research correspond to the characterization of organizational culture delivered above (see [Jais, 2007, p. 27f.]). He points out that **most efforts to conceptualize national culture take a value-based approach** and reviews the research efforts and cultural definitions of Hofstede [2001]; House et al. [2004]; Kluckhohn [1951]; Kroeber and Parsons [1958]; Redfield [1948]; Triandis [1972]; Tylor [1871]. A detailed analysis of the seven underlying definitions suggests that the authors did not specifically intend to limit their definitions to national culture; in fact it seems reasonable to assume they also aimed to define the concept Organizational Culture. Considering the cultural layers presented in section 2.4.2, national culture surrounds and supplements organizational culture. By definition, nations contain multiple organizations; therefore values are definitely (but not only) formed on this broader level. How are values defined? Consistent with the multiple research approaches for culture, the study of values has been approached from different angles: societal values have been studied in the fields of sociology and anthropology, and individual values have been studied in the field of psychology (see [Jais, 2007, p. 29] according to [Berry et al., 1992, p. 51]). The evaluation of many value definitions resulted in the following most frequently attributed characteristics (see [Jais, 2007, p. 30] according to Smith and Schwartz [1997]):

- Values are beliefs, but they are not objective.
- Values refer to desirable goals and to modes of conduct that promote these goals.
- Values transcend specific actions and situations.
- Values serve as standards to guide selection of, and to evaluate, people's behavior.
- Values form a system of priorities, as they can be ranked by importance.

Values are feelings which have been learned early in life (see [Jais, 2007, p. 30f.]). Schwartz defines values as "desirable, transsituational goals, varying in importance, that serve as guiding principles in people's lives" (see [Schwartz and Bardi, 2001, p. 269] according to Schwartz [1992]). They can be measured at the individual level (i.e., the psychological dynamics of conflict or compatibility) or as an average at the societal level (study of shared values) to reach an abstraction and allow for generalization of findings (see [Jais, 2007, p. 31f.] according to [Smith and Schwartz, 1997, p. 80f.]). The latter is of importance for this research and has been used by major frameworks presented in the following section. In contrast to Corporate Culture as defined in the previous section, **National Culture is defined as an aggregation of societal values, which have been learned early in life and surround and span other cultural layers like Corporate Culture**.

2.5.2 Value Based Frameworks Exploring National Culture

Four studies have been recognized for their cross-national research efforts identifying and summarizing sets of values in classification systems or frameworks that are useful in describing (national) cultures (e.g., see Jais [2007]; Terlutter et al. [2006]): the studies by Hofstede (Hofstede [1980a, 2001]), Schwartz (Schwartz [1992, 1994, 1999]; Schwartz and Bardi [1997]; Schwartz and Ros [1995]), Inglehart's World Values Survey (WVS by Inglehart and Welzel [2005]) and the GLOBE study (House et al. [2004]). Table 2.4 summarizes the key characteristics of the four studies.

2.5.2.1 Hofstede's Cultural Dimensions

Hofstede [1980a] has been by far the most influential author. His work has been recognized as "more than a super classic" (see [Baskersville, 2003, p. 3]), as it has been extensively applied for over 25 years, with over 1,100 citations in one decade (1987–1997) (see [Terlutter et al., 2006, p. 423] according to Sivakumar and Nakata [2001]) and an average of 94 citations per year between the publishing date 1980 and 1998 (see [Jais, 2007, p. 36] according to [Baskersville, 2003, p. 3]). That the five dimensions he identified even served as a model and foundation for the GLOBE study (see [Hofstede, 2006, p. 883]) only emphasizes that **Hofstede's conceptualization of National Culture is the most widely used in management accounting and information system research** (see [Jais, 2007, p. 36] according to [Baskersville, 2003, p. 1],

Author and Year	Data Sample	Names of Dimensions
Hofstede [1980a]	88,000 respondents in 72 nations, IBM employees, between 1968 and 1972	(1) Power Distance, (2) Uncertainty Avoidance, (3) Individualism, (4) Masculinity, (5) Long-term orientation
Schwartz [1992]	35,000 respondents in 49 nations, teachers and students, between 1988 and 1992	(1) Conservatism, (2) Intellectual Autonomy, (3) Affective Autonomy, (4) Hierarchy, (5) Egalitarism, (6) Mastery, (7) Harmony
House et al. [2004]	17,300 respondents in 62 nations, middle managers of 3 industries (financial services, food processing, telecommunications), since 1994	(1) Assertiveness, (2) Uncertainty Avoidance, (3) Power Distance, (4) Collectivism I, (5) Collectivism II, (6) Gender Egalitarianism, (7) Future Orientation, (8) Performance Orientation, (9) Humane Orientation
Inglehart and Welzel [2005]	(representative) adult population samples in 81 nations, between 1981 and 2001	(1) survival vs. well-being, (2) traditional vs. secular-rational values

Table 2.4: National Culture Frameworks - Four major approaches (Source: own analysis and depiction, based on sources as stated)

[Chenhall, 2003, p. 153], [Chow et al., 1999, p. 443] and Myers and Tan [2002]). His retrospective analysis of industrial data of the IBM corporation helped to empirically derive a discrete set of dimensions (see [Hofstede, 2006, p. 883]):

1. **Power Distance** represents the societal desire for hierarchy or egalitarianism, i.e., the way societies handle inequalities between people or employees (see [Terlutter et al., 2006, p. 423] and [Jais, 2007, p. 34] according to [Hofstede, 2001, p. 79,82]).
2. **Uncertainty Avoidance** describes a culture's tolerance for uncertainty or the extent to which a culture's members feel threatened by ambiguous situations (see [Hofstede, 2001, p. 161]). Countries with a high uncertainty avoidance ranking have a low tolerance for unstructured situations and create rules, laws, and religion as a counterbalance. On the other hand, countries with a low uncer-

tainty avoidance index are less rule-oriented, more accepting of change, and more risk-taking.

3. **Individualism** stands for a society's preference for an individual rather than a group orientation. This dimension describes an individual's emphasis on self-interests as opposed to the interests of a larger group (see [Jais, 2007, p. 34]). Countries with high individualism value independence, while countries with a low individualism ranking have a collectivist nature with strong emotional bindings in groups like extended families and companies (see [Jais, 2007, p. 35]).
4. **Masculinity** presents a sex-role dimension and deals with the duality of sexes and gender roles in society (see [Terlutter et al., 2006, p. 423] and [Jais, 2007, p. 35]). This dimension determines the society's application of the traditional masculine work role model and values of control and power (e.g., by material things, earnings, and promotions, see [Jais, 2007, p. 35]).
5. **Long term orientation** is only relevant for comparing Western and Asian countries (see [Jais, 2007, p. 36] according to [Leidner et al., 1999, p. 636]) and determines whether a country values long-term commitments and respects tradition. This dimension is independent of the other four dimensions and is a result of later research, a joint project between Hofstede and Bond (see Chinese Culture Connection [1987]).

Each of the five dimensions is measured on an index scale, indicating relative differences between countries (see [Terlutter et al., 2006, p. 423]). The combination of five scores determines the position of people and organizations in various countries. To prove the reliability and validity of this innovative "dimensions" paradigm (see [Hofstede, 2006, p. 883]), Hofstede's cultural dimensions have been studied through subsequent replications (see [Jais, 2007, p. 36] according to [Hofstede, 2001, p. 67]). The findings could be largely confirmed and still remain **the most influential work in social psychology** (see [Jais, 2007, p. 36] according to [Hofstede, 2001, p. 66] and Ronen and Shenkar [1985]).

2.5.2.2 Schwartz's Cultural Values

Conducting a survey of individual values recognized across cultures, Schwartz developed a broad theoretical framework of cultural values on both individual and societal level

(see [Terlutter et al., 2006, p. 425] and [Jais, 2007, p. 39]). Three societal issues are distinguished on the national (or societal) level:

- The relationship between the individual and the group
- Assuring responsible social behavior
- The role of humans in the natural and social world

He framed seven national-cultural domains which are responsible for resolving each of these three issues and for differentiating nations (for a listing of the seven dimensions see table 2.4). The seven dimensions can be summarized in three bipolar value dimensions (see [Terlutter et al., 2006, p. 425f.] and [Jais, 2007, p. 39]):

Conservatism vs. Autonomy: The cultural emphasis on maintenance of the status quo vs. the right of independent individuals to have their own ideas and intellectual directions (*Intellectual Autonomy*) and the right to independently pursue affectively positive experience (*Affective Autonomy*).

Hierarchy vs. Egalitarism: Legitimacy of an unequal distribution of power, roles, and resources vs. transcendence of selfish interests in favor of voluntary commitment for welfare of others.

Mastery vs. Harmony: Seeking to actively master and change the world vs. accepting the world as it is.

Although the validity and reliability of Schwartz's typology of national culture values has been shown empirically, it has been **less widely accepted than the work of Hofstede [1980a]** (see [Jais, 2007, p. 39] and [Terlutter et al., 2006, p. 428]). At first glance, his approach has had no major impact in management sciences.

2.5.2.3 The World Values Survey

Providing a standardized cross-cultural measure of people's values and goals concerning politics, economics, religion, sexual behavior, gender roles, family values and ecological concern, the World Values Survey is a worldwide effort of social scientists (see [Terlutter et al., 2006, p. 428f.]). Two dimensions are derived from the analysis of representative samples of 81 societies:

- *Survival vs. well-being values*: characterizes the industrial state of a nation and whether a society values scarcity norms like hard work and self denial or has reached post-modern values with an emphasis on quality of life, emancipation and self-expression.

- *Traditional vs. secular-rational values*: reflects whether a nation is obedient to traditional authority (like religion, family, norms of sharing) or emphasizes individual and economic achievements—a secular world view with rational-legal norms.

Countries are plotted on a two-dimensional map. Positions are much determined and predicted by status of industrialization: with a shift from the agrarian to the industrial sector, societies favor secular-rational over traditional values; with a shift from the industrial to the service sector, well-being values are more relevant than survival values (see [Inglehart and Welzel, 2005, p. 6]).

2.5.2.4 The GLOBE Study

A body of over 150 scientists from organizational and management science form the GLOBE project, designed to analyze the relationship between societal (or national) values and practices, and leadership effectiveness (see [Terlutter et al., 2006, p. 431] and [Jais, 2007, p. 41]). As a multi-phase, multi-method project (see [House et al., 2001, p. 491]), the meta-goal of the study is "to develop an empirically based theory to describe, understand, and predict the impact of specific cultural variables on leadership and organizational processes and the effectiveness of these processes" ([House et al., 2001, p. 492]). The whole program consists of four phases (see [House et al., 2001, p. 493f.]):

Phase 1 was devoted to the development of the research instruments.

Phase 2 assessed nine dimensions of societal and organizational culture and tested hypotheses of relevant relationships.

Phase 3 investigated (a) the impact and effectiveness of specific leader behaviors and styles on subordinates' attitudes and job performance and on leader effectiveness and (b) identified culture-specific leadership aspects and organizational practices, and their (longitudinal) impact on organizational effectiveness.

Phase 4 is under way and will employ experiments to confirm, establish causality and extend previous findings.

Table 2.5 lists the nine cultural dimensions studied by GLOBE, a short description what they mean, and their origin, i.e., from which other author they have been derived from (taken from [House et al., 2001, p. 495f.] and House and Javidan [2004]).

GLOBE Dimension (Origin)	Meaning
Uncertainty Avoidance (Hofstede [1980a])	The extent to which a society, organization, or group relies on social norms, rules and procedures to alleviate unpredictability of future events.
Power Distance (Hofstede [1980a])	The degree to which members of a collective expect power to be distributed equally.
Collectivism I (Societal) (Hofstede [1980a], Individualism)	The degree to which organizational and societal institutional practices encourage and reward collective distribution of resources and collective action.
Collectivism II (In-Group) (Hofstede [1980a], Individualism)	The degree to which individuals express pride, loyalty, and cohesiveness in their organizations or families.
Gender Egalitarianism (Hofstede [1980a], Masculinity)	The degree to which a collective minimizes gender inequality.
Assertiveness (Hofstede [1980a], Masculinity)	The degree to which individuals are assertive, confrontational, and aggressive in their relationships with others.
Future Orientation (Kluckhohn and Strodtbeck [1961], Temporal Mode of Society)	The extent to which individuals engage in future-oriented behaviors such as delaying gratification, planning, and investing in the future.
Performance Orientation (McClelland [1985], Need for Achievement)	The degree to which a collective encourages and rewards group members for performance improvement and excellence.
Humane Orientation (e.g., Kluckhohn and Strodtbeck [1961], Human Nature and McClelland [1985], Affiliate Motive)	The degree to which a collective encourages and rewards individuals for being fair, altruistic, generous, caring, and kind to others.

Table 2.5: Cultural Dimensions Studied by GLOBE - Nine factors and their origin (Source: see [House et al., 2001, p. 495f.] and House and Javidan [2004])

Questionnaire items for these nine core dimension are written as "quartets," i.e., having isomorphic structures across the two levels of analysis, societal and organizational, and across the two culture manifestations, As Is (Practices) and Should Be (Values) (see [House et al., 2001, p. 496]). GLOBE is based on an integration of four different theories (for a detailed explanation see [House and Javidan, 2004, p. 17]), the integrated theory being illustrated through a system diagram or Theoretical Model (see [House and Javidan, 2004, p. 18]).

2.5.2.5 Other National Culture Frameworks

Besides the four major approaches presented above, other frameworks of national culture exist, especially with respect to societal values (for a comprehensive overview see [Berry et al., 1992, pp. 51-56]). Because they have been cited numerous times and continue to appear in current studies involving the concept of national culture, two of them will be briefly covered with a short explanation why they are not considered for this research.

Drawing samples from five groups in the southeast US, Kluckhohn and Strodtbeck [1961] performed one of the most renowned comparative survey studies of societal values. Examining the five different cultural groups Texan, Mormon, Hispanic, Zuni, and Navaho, they used five dimensions for classification:

1. Man-nature orientation (attitude toward the environment: mastery, subjugation or harmony)
2. Time orientation (past, present, or future)
3. Activity orientation (being, becoming, or doing)
4. Relational orientation (individualism, collateral or linear relations)
5. Nature of man (good, bad, or neither; mutable or immutable)

Respondents were confronted with short stories and were asked to indicate which alternative solution they prefer the most. The empirical testing is restricted to cultural subgroups in the US, so transferring the resulting characterizations into other contexts (national culture) seems unsophisticated.[1] As **no empirical examination has been performed** to confirm the appropriateness and cross-cultural measurement equivalence of the dimensions (see [Smith and Schwartz, 1997, p. 96]), the framework by Kluckhohn and Strodtbeck [1961] will not be further considered.

On the basis of his doctoral dissertation and review of the sociological literature, Trompenaars [1993] suggests a model of seven dimensions of national culture. Five of them cover relationships between human beings (see [Trompenaars and Hampden-Turner, 1994, p. 8f.]), rooted in the "General Theory of Action" by Parsons and Shils [1951]: universalism vs. particularism, individualism vs. communitarinism (collectivism), neutral vs. emotional, specific vs. diffuse, and achievement vs. ascription. The remaining two dimensions reflect attitudes toward time and environment, two

[1] Berry et al. [1992] discusses problematic "overgeneralizations" ([Berry et al., 1992, p. 52]).

of five value orientations developed by Kluckhohn and Strodtbeck [1961]. Collecting 30,000 responses from 55 countries (see [Trompenaars and Hampden-Turner, 1994, p. 245]), his goal was to derive preferred ways of management in different countries. There are **serious methodological concerns** with Trompenaars' approach (see [Jais, 2007, p. 40]), which can be summarized into four major points. First, the validity of the seven dimensions (although they are taken from preconceived notions of American sociologists and anthropologists of the 1950s and 1960s) has not been assessed by empirical analyses (see [Smith and Schwartz, 1997, p. 101]), either in his dissertation or in later publications, compiling more data (see [Hofstede, 1996, p. 196]). Second, the quality of the underlying questionnaire is questionable. The seven dimensions were presented by 79 items, including long questions or descriptions of dilemma situations (several are based on Stouffer and Toby [1951]) with multiple-choice answers (see [Trompenaars and Hampden-Turner, 1994, p. 243] and [Hofstede, 1996, p. 190]), threatening internal validity and contradicting good practice for quantitative surveys (e.g., see [Van der Stede et al., 2005, p. 670]). Third, in comparison to Hofstede and Schwartz he did not match the demographic profiles of his samples, masking if the cultural dimensions are influenced by sample differences on demographic variables (see [Smith and Schwartz, 1997, p. 102]). Hofstede [1996] confirms the evident lack of content validity[1] and raises concerns that the theory in Trompenaars' book is not supported by the database. Evaluating Trompenaars' data, Hofstede can only find limited support for Trompenaars' seven-dimensional model (see [Hofstede, 1996, p. 193]). Fourth, Trompenaars' work seems to be influenced by commercial intentions, leading to biased messages: controversial issues central to cultural conflicts are not addressed, e.g., power struggle, aggression, and anxiety (see [Hofstede, 1996, p. 198]). Although his framework has been used by some scholars examining the impact of national culture on quality management (see Mathews et al. [2001] and Schön [2006]), Trompenaars' approach will not be considered in this research. The weaknesses of his research would lead to a **"fast food approach to intercultural diversity and communication"** ([Hofstede, 1996, p. 198]), not sufficient for the explanation of complex causal relationships.

[1] "The extent to which an instrument covers the universe of relevant aspects of the phenomenon studied, in our case national culture." ([Hofstede, 1996, p. 197])

2.5.3 Evaluation of the National Culture Frameworks

Comparing the four major approaches for analyzing culture on the national level (see table 2.4), similarities and differences can be identified to evaluate advantages and disadvantages for further cross-cultural research studies. Which paradigm offers the most convincing background and instrument that is suitable for this research?

The different approaches differ in methodological strength (see [Smith and Schwartz, 1997, p. 102]).

First of all, the many iterations and reviews of **Hofstede's** conceptualization have not only proven the dimensions to be valid and reliable, but they also provide a large basis of comparison. On the other hand Hofstede has earned extensive criticism of his approach (summarized according to [Jais, 2007, p. 37f.] and [Terlutter et al., 2006, p. 425]):

- Surveys are not a suitable way to measure cultural differences on a national level.
- Countries or nations are not the best units with which to study cultures.
- Generalizing from work related behaviors of only one company (in this instance, subsidiaries of IBM corporation) to entire national cultures is speculative.
- Data is old and outdated, as measurement took place in the early 1970s.
- Insufficient number of dimensions (important dimensions missing).
- Weak framework: values and behaviors (practices) are confused.

His analyses were revolutionary in their time but do not meet today's standards (see [Fischer et al., 2010, p. 138]). Similarity of value structures across levels (national vs. individual level) has still not been tested and the lengthy steps of Hofstede's analysis emphasize the need for cross-validation (see [Fischer et al., 2010, p. 138]).

Schwartz's cultural values offer potential advantages over Hofstede's dimensions, such as

- derivation: Schwartz's values are based on a strong theoretical foundation (see [Ng et al., 2007, p. 166] and [Terlutter et al., 2006, p. 428] according to Steenkamp [2001]);
- data: values have been tested with more recent data (data collection between 1988 and 1992), with a sample from more diverse regions (including former Eastern European bloc countries, see [Ng et al., 2007, p. 166]);

- levels of analysis: Schwartz has considered cultural values both on the societal (or national) and individual level separately in order to explain values as psychological attributes of individuals belonging to a nation or population (see [Fischer et al., 2010, p. 136]).

The fact that the approach has been less widely accepted is probably due to the scattered publication across different journals (see [Terlutter et al., 2006, p. 428]). However, recent efforts to advance research in cultural values tend to draw on his approach and combine or compare it with Hofstede's paradigm (see Fischer et al. [2010]; Ng et al. [2007]; Smith et al. [2002]; Steenkamp [2001]).

The World Values Survey exhibits an impressive magnitude of empirical data, a theoretical foundation based on social and political science, and longitudinal analysis (see Inglehart and Welzel [2005] and [Terlutter et al., 2006, p. 430]). Unfortunately, it has been least often applied, as the two basic dimensions are quite broad (see [Terlutter et al., 2006, p. 430]). Cultural differences between countries on the two dimensions are low, where other frameworks demonstrate significant distinctions through their detailed split into more value categories. The explanatory power of the World Values Survey is therefore limited and needs to be supported by a more detailed description of nations in order to provide meaningful insight.

In comparison to Hofstede, Schwartz, and the World Values Survey, **GLOBE** attempts to integrate their best features: the study outlines the largest number of dimensions, i.e., up to nine (see table 2.4); uses relatively current data of multiple industries, examines a large number of countries (62 societies); and provides a broad theoretical foundation by drawing on cross-cultural researchers deemed most important in the literature (see [Terlutter et al., 2006, p. 434]). The methodology, instruments, and results are made transparent through one comprehensive publication (see House et al. [2004]) and a central website (see http://www.thunderbird.edu/sites/globe/). In recognition of multiple cultural layers GLOBE differentiates Organizational and National Culture by asking the survey questions at two levels: values and practices. However, it is not clear if the different labeling is successfully distinguishing the national from the organizational level or if this approach is just misleading (see [Hofstede, 2006, p. 885]). Individual values and practices are not reflected and analyzed (see [Terlutter et al., 2006, p. 434]). Further downsides of the study include the great length of the questionnaire, a relatively small sample size per nation (an average of 250 subjects per culture),

and the limitation to middle managers (their answers only reflect the opinion of one hierarchical layer, and it is questionable if these can be representative for whole societies; see [Terlutter et al., 2006, p. 434]). The representation of a nation and the transfer of the findings to other groups remain speculative. Although the GLOBE study has been trying to build upon and improve Hofstede's effort, Hofstede himself raises major concerns about GLOBE (see Hofstede [2006]):

- *Confusing operationalization*: the questionnaire items may not capture what the researchers intended to measure (see [Hofstede, 2006, p. 885]).
- *Survey length*: nine dimension multiplied by two surpass the respondent's capacity for processing information (see [Hofstede, 2006, p. 895] according to Miller [1956]); answering the questionnaire is obviously tiring, and this might lead to more bias or increased early termination and a low response rate (e.g., see [Mayntz et al., 1978, p. 111] and Van der Stede et al. [2005]).
- *Lack of correlation*: although the GLOBE project was designed as a replication and elaboration (see [Hofstede, 2006, p. 893]), the results of important dimensions do not correlate, e.g., with respect to the Masculinity dimension, the GLOBE data fails to correlate with the results of hundreds of other studies (see [Hofstede, 2006, p. 894]).

The **main problem of the evaluated approaches** is the missing integration of different layers of culture, discussed in section 2.4.2. The demand to apply culture at smaller levels of analysis than the country level has become louder (see [Blodgett et al., 2008, p. 339] according to [Craig and Douglas, 2006, p. 336]).

Despite the disadvantages and the criticism discussed above, and in accordance with the choice of Jais [2007] (see [Jais, 2007, p. 42]), **this research will adopt Hofstede's methodology for the analysis of the concept National Culture**. Table 2.6 summarizes the assessment above on the basis of nine criteria.

Although according to table 2.6 the GLOBE study by House et al. [2004] would score better overall in comparison to the other frameworks, Hofstede [1980a] offers the best framework to be embedded into the context of this research, as reliability and validity have been proven by multiple iterations and it offers the highest flexibility to be embedded into a customized SEM.

Framework	Hofstede [1980a]	Schwartz [1992]	House et al. [2004]	Inglehart and Welzel [2005]
Operationalization of studied dimensions*	+	++	++	+
Sufficient number of dimensions*	–	+	++	– –
Cross-sectional empirical data*	– –	– –	+	n/a**
Age of empirical data*	–	+	++	+
Iterations/ replications of study*	++	–	–	– –
Flexibility to be integrated into customized SEM*	+	n/a**	– –	– –
Differentiation and integration of National and Corporate Culture*	–	+	+	– –
Survey length*	+	n/a**	– –	n/a**
Operationalization of questionnaire items*	+	n/a**	–	n/a**

* assessed on a four point scale from ++ (high value) to – – (low value) (own analysis)
** n/a where assessment is not possible, or data for assessment is not available

Table 2.6: Assessment of National Culture Frameworks - Evaluation of key metrics (Source: own analysis)

Section 3.5 (The Impact of National Culture) will further convey why Hofstede's concept is the most suitable, and sections 4.4.4 (Operationalization of National Culture) and 4.6 (Design of the Structural Equation Model) will show how it will be embedded in the larger research framework, defining a valid structural equation model for this research.

2.6 The Role and Concept of Leadership Style

2.6.1 Definition and Behaviors of Leadership Style

In line with the multitude of definitions for the four concepts Lean Six Sigma, Corporate Success and Corporate and National Culture, **there are just as many definitions of leadership as researchers who attempt to define the concept** (see [Stogdill, 1974, p. 7] and [Dickson et al., 2003, p. 731]). As emphasized in the cross-cultural field, values and behavior orientation also play a major role in leadership studies (see [Szabo et al., 2001, p. 220]). Values-based leadership presents one of the major domains in the attempt to understand and explain leadership and followers' behavior (see [Daft, 2009, p. 394]), although a direct and linear relationship between a specific set of behaviors and a particular set of values is not given (see [Szabo et al., 2001, p. 221]). Just as corporate norms and values (Corporate Culture) are embedded into the values of the national or

societal surrounding (National Culture), the way managers or leaders coordinate and control a firm depends on these two cultural layers (see [Daft, 2009, p. 233]). Figure 2.11 illustrates how different concepts of leadership studies are located (adapted according to [Szabo et al., 2001, p. 222]), and how they are linked in the broader context of situational factors (including developments in Lean Six Sigma), corporate contingencies (including Corporate Culture), and external environmental factors (including National Culture). The drawing links the five research concepts (Lean Six Sigma (A1), Corporate Culture (A2), National Culture (B1), Leadership Style (B2), and Corporate Success (C)), revealing the possible impact of A1, A2, and B1 on B2 and the impact of B2 on C as a preview of section 3.6 (The Impact of Leadership Style).

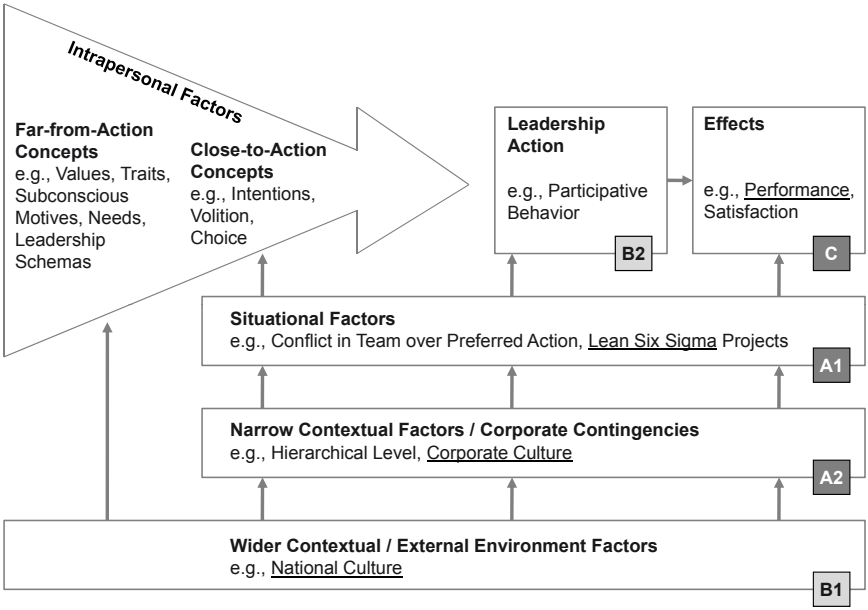

Figure 2.11: Orientation in Leadership Studies - From far-from-action to close-to-action (Source: see [Szabo et al., 2001, p. 222])

Based on this arrangement, **leadership style in this research will be investigated from the behavioral perspective**. The focus will be on specific types of leadership actions that occur in the setting of a particular corporate culture at a par-

ticular time or phase of Lean Six Sigma implementation (according to the definition of [Smith and Bond, 1998, p. 65]). Rosenstiel [2006] provides a similar framework for the illustration of personnel leadership (see figure 2.12, own simplified and modified presentation based on [Rosenstiel, 2006, p. 147], Wegge and Rosenstiel [2004] and [Rosenstiel, 2009, p. 8]). Simple, monocausal theories which argue that specific leadership traits or styles lead to leadership success (see Neuberger [1976]; Steinle [1978]) fall too short and have been empirically falsified (summarized by Gebert and Rosenstiel [2002]; Steinle [1987, 1995]). As shown in figure 2.12 at least four variables, whose content depends on the analysis context, are necessary to consider the complex dynamics of personnel leadership: the Leadership Situation, the Leader's Personality, Leadership Behavior, and Leadership Success (see [Rosenstiel, 2006, p. 147]). Leadership Success can be further differentiated into the reaction of employees (human success) and results (economic success) (see [Rosenstiel, 2009, p. 8]).

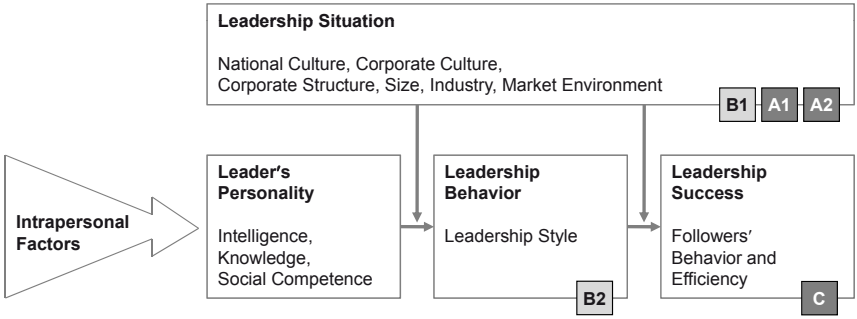

Figure 2.12: A Framework of Personnel Leadership - The impact of leadership situation and personality on behavior and performance (Source: see [Rosenstiel, 2006, p. 147])

Both figures (figure 2.11 and figure 2.12) emphasize that leadership actions in general are explained and influenced by two dimensions: intrapersonal factors of leaders that are characterized as being far-from-action or close-to-action (see Locke and Latham [1990]), and the specific leadership situation (see [Rosenstiel, 2009, p. 9]). Both dimensions involve very different theoretical concepts that help to understand the dynamics between thinking and acting of leaders. Important elements of the leadership situation have been explained in the previous sections on National and Corporate Culture. For

the intrapersonal factors, the two fundamentally different research approaches far-from-action and close-to-action are outlined below (for a detailed description see Szabo et al. [2001]).

Far-from-action concepts tie in with the very core of an individual's personality (see [Szabo et al., 2001, p. 222]) and include a large pool of different concepts (see [Szabo et al., 2001, p. 222]). The diminishing arrow in figure 2.11, presenting the stabilization or socialization process of individual leaders from wider contextual factors (far-from-action) to narrow contextual and situational factors (close-to-action), emphasizes the broader scope of far-from-action concepts (see [Szabo et al., 2001, p. 222]). Values, traits, and leadership ideals present common subtopics in this area. These are defined as:

- **Values** are "universalistic statements about what we think is desirable or attractive" (see [Smith and Bond, 1998, p. 65]) or "the way things should be done" (see House et al. [2004]) (for more definitions see sections 2.4.1 and 2.5.1).
- **Traits** refer to "individual attributes, including aspects of personality, temperament, needs, motives and values" (see [Yukl, 1998, p. 234]).
- **Leadership ideals** are attributions/schemas that serve as broad guidelines for leadership behavior (see [Szabo et al., 2001, p. 223]).

Table 2.7 lists selected studies dedicated to the far-from-action concept. In comparison to the close-to-action concepts, their predictive power for leadership behavior is restricted (see [Szabo et al., 2001, p. 223]). Ajzen [1982] admits that "[t]here is, by definition, no expectation that a measure of a personality trait will correlate with any particular action" ([Ajzen, 1982, p. 7]). However, far-from-action concepts provide good insight into the influences of a person's preferences, perception, and choice (see [Yukl, 1998, p. 234]).

In contrast to the far-from-action concepts, at first glance the **close-to-action concepts** seem to be more clearly defined and possess a high predictive power for leadership behavior (see [Szabo et al., 2001, p. 224]), e.g., goals are seen as immediate regulators of human behavior (see Locke and Latham [1984]). Research in this area has a long tradition (e.g., Lewin [1926]) and includes concepts such as goals, volition, and intention as near steps toward leadership action and behavior (see table 2.8).

Author and Year	Topic
Maslow [1943]	Need Hierarchy Theory
Eden and Leviatan [1975]	Implicit Leadership Theory, Leadership Ideals
Jago [1982]	Leadership traits and behavioral styles
Heckhausen [1989]	Motivation and Action
Lord and Maher [1991]	Leadership Categorization Theory
Smith and Bond [1998]	Values
Yukl [1998]	Values and Traits
House et al. [2004, 1999]	Culturally Endorsed implicit Leadership Theory

Table 2.7: Far-from-action Concepts - Selected leadership studies (Source: own compilation)

The explanatory power of the close-to-action concepts lies in the consideration of the leadership situation as an important element of leadership, i.e., different situations require different leadership personalities and leadership behavior to reach leadership success (see [Rosenstiel, 2009, p. 13f.]).

Author and Year	Topic
Lewin [1926]	Intent, Volition, and Need
Fleishman [1973]; Stogdill and Coors [1957]	Ohio State Model
Georgopoulos et al. [1957]	Path-Goal Hypothesis
Brehm and Cohen [1962]	Volition
Vroom [1964]	Motivation
Atkinson [1966]	Motivation (risk-taking behavior)
Fiedler [1967]	Contingency Model / Situational leadership
Locke [1968, 1978, 1991]	Goal-Setting Theory
House [1971]	Path Goal Theory
Vroom and Yetton [1973]	Normative Decision Style Model
Ajzen and Fishbein [1980]; Fishbein and Ajzen [1975]	Theory of Reasoned Action
Hersey and Blanchard [1977]	Contingency Model / Situational leadership
Conger [1989]; Conger and Kanungo [1987, 1994]; Conger et al. [2000]; House [1977]; Shamir et al. [1993]	Charismatic Leadership
Ajzen [1985, 1991]; Ajzen and Madden [1986]	Theory of Planned Behavior
Bass and Avolio [1990]; Bass [1985, 1995]	Transformational Leadership
Avolio and Gardner [2005]; Gardner et al. [2005a,b]; Luthans and Avolio [2003]	Authentic Leadership
Fry [2003]	Spiritual Leadership

Table 2.8: Close-to-action Concepts - Selected leadership studies (Source: own compilation)

From the listed concepts in table 2.8, three approaches are especially notable (grey shading): Fiedler [1967] is the oldest multiple-level approach with multi-source data and a strong historical influence; the approach by Hersey and Blanchard [1977] has

been very popular in management practice; and the approach by Vroom and Yetton [1973] has been empirically validated and proven beneficial in leadership trainings (see [Rosenstiel, 2009, p. 14f.] and [Yammarino et al., 2005, p. 893f.]).

In sum, there is a broad range of classifications of leadership action into common behavioral patterns, which stem from a broad landscape of different overarching concepts (both from the far-from-action and close-to-action schools). It needs to be emphasized that **the deluge of leadership theories dealing with the different behavioral patterns and leadership styles are far from being convincingly integrated and the optimal sequence of behaviors is seldom considered** (see [Moss et al., 2009, p. 162]). Different measurement instruments lead to multiple levels-of-analysis issues, i.e., theories, definitions of constructs, and operationalizations of measures depend on the choice of analysis (see [Yammarino et al., 2005, p. 880]). Empirical tests in leadership research may span over individuals, dyads, groups, and organizations.

Detailed descriptions of all concepts shown in table 2.7 and 2.8 are consciously waived. The theories that are seen as **most relevant for this research are charismatic and transformational leadership**.[1] Recently, in attempts to explain the dynamics of Corporate Performance and Culture, increased attention has been devoted to charismatic and transformational leadership (e.g., see Den Hartog et al. [1999]; Ensari and Murphy [2003]; Mumford et al. [2008]; Shamir and Howell [1999]) as the new leadership genres (see [Yammarino et al., 2005, p. 896]). The concepts of charismatic and transformational leadership focus on explaining leadership success through complex causal analysis and emphasize the functional role of leadership, an approach receiving increased criticism (see [Rosenstiel, 2009, p. 22]). The following section will reveal further why these two leadership styles are considered most relevant for this thesis.

2.6.2 Charismatic and Transformational Leadership

In comparison to the rather functional behavioral influence of leadership (reflected by the two metacategories relations-oriented behavior and task-oriented behavior, e.g., through dimensions like supporting, monitoring, planning, encouraging (see Yukl et al. [2002])), the main focus in leadership research shifted toward emotional concepts and

[1] The more generic concept of authentic leadership is not considered as relevant, as authentic leaders are perceived to have different traits than charismatic and/or transformational leaders (see [Avolio and Gardner, 2005, p. 329f.]).

inspirational leadership in the late 1980s (see [Geyer and Steyrer, 1998, p. 378]). Charismatic and transformational leaders represent this new idea. They seek to achieve their followers' trust and commitment through emotional influence and values-based behavior and are able to act as change-agents.

Values-based leaders are ethical role models (see [Daft, 2009, p. 394]); they "walk the talk" and are ready to earn the trust of their subordinates by what they do rather what they say. This standard especially applies to charismatic and transformational leaders. Evidence indicates that **a leader's ability to be a role model of exemplary behavior, together with the articulation of a clear vision, is positively related to multiple corporate outcome variables** (see [Mumford et al., 2008, p. 145] and [Yammarino et al., 2005, p. 896]). Results include trust, respect, devotion, loyalty, unquestioned obedience, commitment, identification, and confidence (see Conger and Kanungo [1987]; House [1977]; Shamir et al. [1993])—positive effects probably desired for any top-down Lean Six Sigma implementation. Although charismatic and transformational leadership are often compared and used interchangeably, they have a different focus on the leadership phenomenon (see [Rowold and Heinitz, 2007, p. 129]). Each concept is measured with its own instrument, based on its own conceptualization (see [Rowold and Heinitz, 2007, p. 122]). Charismatic leadership is measured by the Conger-Kanungo Scales (CKS, Conger and Kanungo [1987]), while the measurement of transformational leadership is based on the so called MLQ-5X (Bass [1985]). The underlying factors of each approach are different at first glance, but reveal similar facets of leadership at second sight (see tables 2.9 and 2.10, taken from [Rowold and Heinitz, 2007, p. 123]).

The MLQ uses nine factors to measure transformational leadership, including transactional and non-leadership and accesses leadership behavior at a single point in time (see [Rowold and Heinitz, 2007, p. 123]). In contrast, the CKS views leadership as a process of three distinct stages over time, reflected by five subscales (for a detailed description see [Rowold and Heinitz, 2007, p. 123]). Due to strong emotional ties between

[1] Dimensions belong to the subcategories Transformational leadership (Tf), Transactional leadership (Ta), or Nonleadership (Nl), e.g., all items for Transactional leadership are also part of Transformational leadership (see also figure 2.13).

[2] Dimensions belong to three distinct stages of the leadership process: assessment (1), formulation of a strategic vision (2), and demonstration of being a role model (3), e.g., the sensitivity for the environment and the members' needs belong to stage 1 (see also [Rowold and Heinitz, 2007, p. 123]).

Dimension[1]	Description
Inspirational motivation (Tf)	Articulation and representation of a vision, leader's optimism and enthusiasm
Idealized influence attributed (Tf)	Instilling pride in and respect for the leader, identification of the followers with the leader
Idealized influence behavior (Tf)	Representation of a trustworthy and energetic role model for the follower
Intellectual stimulation (Tf)	Followers are encouraged to question established ways of solving problems
Individualized consideration (Tf)	Understanding the needs and abilities of each follower, developing and empowering the individual follower
Contingent reward (Tf, Ta)	Defining the exchanges between what is expected from the follower and what the follower will receive in return
Active management-by-exception (Tf, Ta)	In order to maintain current performance status the focus is on detecting and correcting errors, problems, and complaints
Management-by-exception passive (Tf, Ta)	Addressing problems only after they have become serious
Laissez-faire (Nl)	Absence of leadership behavior

Table 2.9: Multifactor Leadership Questionnaire (MLQ) - Dimensions of the measurement instrument (Source: [Rowold and Heinitz, 2007, p. 123])

Dimension[2]	Description
Sensitivity to the environment (1)	The leader assesses the environment for growth opportunities for his or her respective organization, criticizes the status quo, and proposes radical changes in order to achieve organizational goals
Sensitivity to members' needs (1)	The leader carefully evaluates his or her followers' needs
Strategic vision and articulation (2)	The leader formulates a strategic vision for the respective organization. It is constantly presented to followers in an inspiring way
Personal risk (3)	Presenting self-confidence, demonstrating belief in the potential outcome of the vision
Unconventional behavior (3)	Leaders build trust and commitment in followers; Leaders provide a role model for followers

Table 2.10: Conger–Kanungo Scales (CKS) - Dimensions of the measurement instrument (Source: [Rowold and Heinitz, 2007, p. 123])

the leader and her or his followers, transformational and charismatic leaders are agents of change, accelerating change and adaptation of values and performance standards in an organization for performance beyond expectations (see [Rowold and Heinitz, 2007, p. 122]). Few authors argue against this standpoint, e.g., that charismatic leaders are not invariably proponents of change (see Levay [2010]).

Bass [1985] suggested charisma to be the main component of transformational leadership (see [Rowold and Heinitz, 2007, p. 122]). Figure 2.13 illustrates how charisma is embedded in the transformational leadership concept and how performance or success beyond expectations is derived through transformational leadership (modified according to [Rosenstiel, 2006, p. 152]).

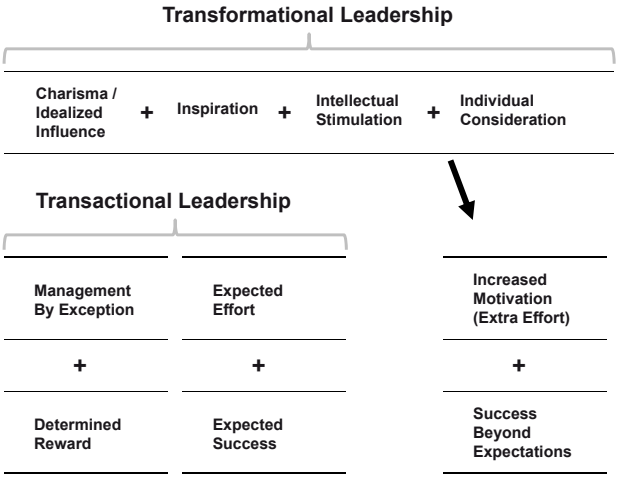

Figure 2.13: Interaction between Transformational and Transactional Leadership - Reaching success beyond expectations (Source: [Rosenstiel, 2006, p. 152])

While transactional leadership is based on the market principle and presents the mere exchange between effort (e.g., increased productivity) and expectation (e.g., freedom of action), transformational leadership does not follow this rational thinking (see [Rosenstiel, 2009, p. 24]. In fact, charismatic influence, inspiration, intellectual stimulation, and individual consideration lead to an altruistic behavior and "extra" effort of an employee (see figure 2.13).

The effect of **transformational leadership has been evaluated to be especially strong in uncertain situation** (where traditional, rational reward processes obviously fail) like organizational change processes (see [Rosenstiel, 2006, p. 152] according to Neuberger [2002]; Yukl [1998]), motivating employees and giving them the orientation and security they need (see Gebert and Rosenstiel [2002]; Geyer and Steyrer [1998]; Tracey and Hinkin [1998]). The concept therefore **promises good insight for the understanding of leadership impact on Lean Six Sigma implementation, Corporate Culture, and Corporate Success**. The corresponding relationships will be further investigated in section 3.6.

2.7 Summary of Definitions and Research Framework

This chapter has explored a multitude of definitions for the five concepts Lean Six Sigma, Corporate Success, Corporate and National Culture, and Leadership Style, which in turn rely on circumstantial concepts and definitions, adding even more complexity to the attempt at clear conceptualizations. To avoid vagueness and ambiguity, relevant superordinate concepts and subtopics have been identified and differentiated to reach a transparent classification of the research constructs (see [Töpfer, 2009a, p. 60] according to [Schweitzer, 2000, p. 67f.] and [Friedrichs, 1990, p. 87f.]). Table 2.11 lists the central findings and definitions used in this research.

With its statistical engineering heritage (see [AberdeenGroup, 2006b, p. i]) **Lean Six Sigma can be characterized as an instrumental management philosophy, relying on "hard" facts and scientific project management tools**. The definition of Lean Six Sigma shown in table 2.11 builds upon the definition of Six Sigma by Schroeder et al. [2008] (see [Schroeder et al., 2008, p. 540]) by incorporating the character of Lean Management described by Töpfer and Günther [2009], and builds upon the definition of Lean Six Sigma by Kumar et al. [2006] (see [Kumar et al., 2006, p. 407]). For a detailed clarification of the definition's elements, see these sources and the previous explanations in section 2.1 (The Concept of Lean Six Sigma).

(Especially in the context of quality management) **Corporate and National Culture reflect the "soft" accumulation of human desires and actions**, with complex underlying and unconscious dimensions that are hard to unlock. As already mentioned, an employees' behavior at their workplace is a function of different cultures

Research Concept	Definition
Lean Six Sigma (A1)	Lean Six Sigma is an organized, parallel-meso structure to (a) eliminate waste and streamline all organizational processes (on the basis of Lean Management) and (b) reduce variation in critical organizational processes (on the basis of Six Sigma) by using improvement specialists, a structured method (project management), and performance metrics with the aim of achieving strategic objectives and generating savings to the bottom line of an organization.
Corporate Culture (A2)	Corporate Culture is a public company's culture, the aggregated employees' attitudes and behavior that can be actively shaped toward the increased efficiency, effectiveness, performance, and success of their corporation. It presents one layer of a broader cultural context and can only be expressed as an approximate model or construct.
National Culture (B1)	National Cultures are societal values, aggregated desirable goals of individuals, which have been learned early in life and serve as guidance to a given population. These values reflect an average of multiple individuals in one national society and can differ from a personal value of one individual within it.
Leadership Style (B2)	Leadership Style is the ability and methods of an individual to influence, motivate, and enable others to contribute toward increased efficiency, effectiveness, performance, and success of a corporation by actively shaping the values, beliefs, and goals of the influenced individuals.
Corporate Success (C)	Corporate Success is a public company's sustainable positioning in the marketplace, defined by satisfaction of all relevant stakeholders (simultaneously). It is the result and end-point of a company's achieved efficiency, effectiveness, and performance.

Table 2.11: Conceptualization of the Five Research Concepts - Explicit definitions for this research (Source: own table)

simultaneously (see Karahanna et al. [2005]) and is defined in this research as the product of Corporate and National Culture. The proportional contribution of the two to an employee's thinking and acting is just as complex to analyze. The definition of Corporate Culture builds upon the understanding that an aggregation of attitudes and beliefs of employees belonging to a public company can be actively shaped towards Corporate Success. In contrast, National Culture reflects societal values, which have shaped the personality of individuals very early in life and interrelate with the Corporate Culture layer (see also section 2.4.2).

As described in detail above, the different scopes of Leadership Style have been vividly traced by Szabo et al. [2001]. Building on the concept of Leadership Action as a result of far-from-action to close-to-action leadership concepts, this research examines a particular leadership behavior that influences the values of the leader's subordinates or followers to achieve a certain effect (the endpoint being Corporate Success) in a corporation (see figure 2.11).

Corporate Success is characterized as the ultimate end goal of a corporation: reaching sustainable long-term competitiveness. Elements leading to Corporate Success are efficiency, effectiveness, and performance—each answering a different question on the way to a corporation's positioning in the marketplace (see figure 2.7).

The Concept definitions serve as a base understanding for this research, to simplify and guide the following literature review. To prevent a premature restriction of the concepts, **the definitions are consciously kept on a rather universal level**. The key challenge for the next chapter will be to determine the use of the five concepts in research efforts integrating more than one of the topics. It will be crucial to evaluate if definitions are modified in different contexts, demanding an adaptation or further specification of the definitions presented in table 2.11.

As an other key outcome of this chapter, figure 2.14 arranges the five research concepts in one selected framework, including identifiers for the underlying research questions. The arrows in the framework present the types of relationships which could be identified and will be investigated. Lean Six Sigma, Corporate Culture and Corporate Success are connected through a second framework in the background (own design combining the ideas and approaches of Baetge et al. [2007]; Jais [2007]; McColl-Kennedy and Anderson [2002]) with the variables national culture and leadership style

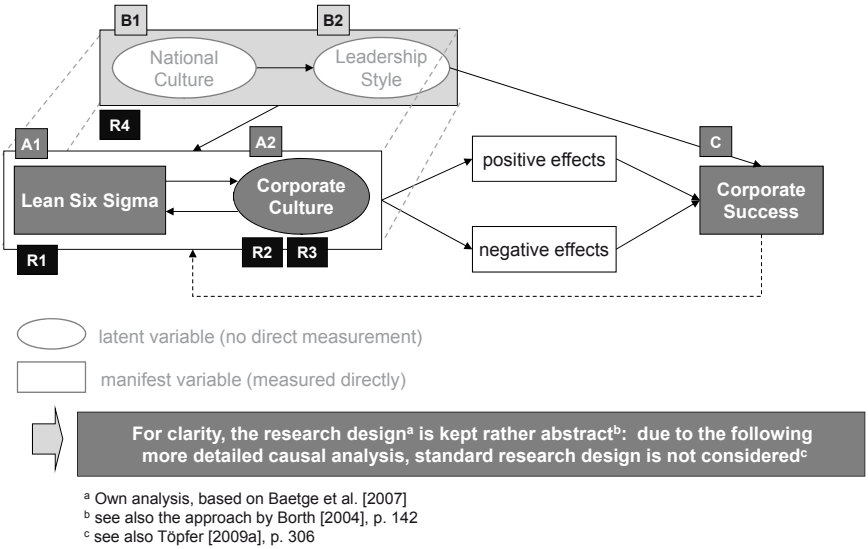

Figure 2.14: Overview of Research Questions - their placement in the research framework (Source: own figure)

assumed to be latent.[1] They relate the main research topics Lean Six Sigma, Corporate Culture, and Corporate Success more closely and suggest the causal relationships and propositions to be further investigated and defined throughout this thesis.

[1]Latent variables cannot be measured directly (see Töpfer [2009a], pg. 239). As an example, Corporate Culture is a factor that needs to be further operationalized, i.e., attitudes and beliefs are to be translated into measurable variables.

3

Literature Review

3.1 Structure and Methodology of the Literature Review

Similar to the approach by Prajogo and Sohal [2006], the literature review is presented in sections (see [Prajogo and Sohal, 2006, p. 36]), each focusing on the relationship between (at least) two variables of the broader research framework (see figure 3.1).

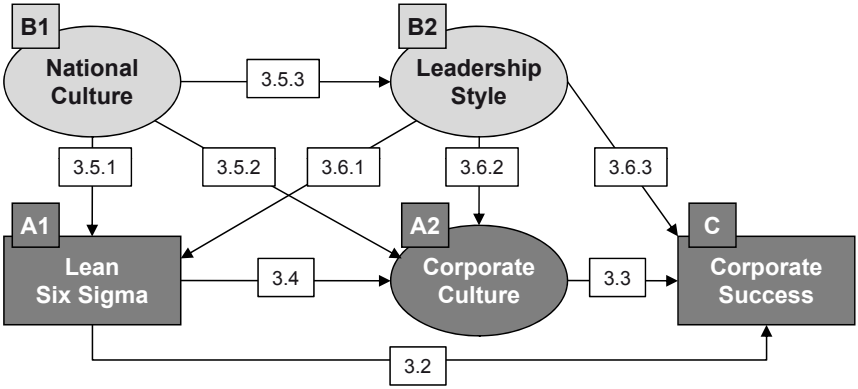

Figure 3.1: Flow of the Literature Review - Relationships examined in each section (Source: own figure)

The order is determined by grade of complexity. The first section of the review (3.2) deals with the relationship between Lean Six Sigma and Corporate Success, the second section (3.3) with the relationship between Corporate Culture and Corporate

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Success. These provide the basis for understanding the relationship between Corporate Culture and Lean Six Sigma, examined in the third section (3.4). The fourth section evaluates the impact of National Culture on the three variables Lean Six Sigma (3.5.1), Corporate Culture (3.5.2), and Leadership Style (3.5.3); the fifth section evaluates the impact of leadership style on Lean Six Sigma (3.6.1), Corporate Culture (3.6.2), and Corporate Success (3.6.3). Each of the sections contains a presentation of key findings at the end to summarize the hypothesized relationships between the examined variables (e.g., section 3.2.4, Hypothesized Relationship between Lean Six Sigma and Corporate Success). The development of the hypotheses follows the general procedure recommended for scientific research in the social sciences (e.g., see [Biemann, 2007, p. 152] and [Töpfer, 2009a, p. 146f.]): preliminary theoretical considerations and propositions will be highlighted during the review and discussion of key findings. Those hypotheses considered relevant to the framework of this research (i.e., existing hypotheses which are transferred to the specific topic and context of this thesis) will receive a unique identifier (see the introductory figures[1] in the beginning of each section for the nomenclature of the relationship identifiers) and appear again in the respective summary.

In order to structure and evaluate the high amount of identified studies, relevant assessment criteria are linked in individual scoring models.[2] This means that the strength of relationship between the reviewed variables and the quality of each study is systematically assessed according to a clearly defined set of criteria on a customized scale. As a reference the logic of the exact procedure of each scoring model is explained in detail in the respective sections (e.g., tables 3.10 and 3.11 in section 3.3 for the analysis of studies investigating the relationship between Corporate Culture and Corporate Success).

After the review of all possible relationships between the variables (found in literature), section 3.7 provides a condensed summary, i.e., the complete hypothesized model, for a comprehensive overview of selected hypotheses and to lead into chapter 4 (Methodological Foundations).

In terms of methodology, no single approach has been applied to identify relevant surveys for each section. All accessible databases, journals, books, and conversations

[1] According to the approach by Lehr [2006] (see [Lehr, 2006, p. 11ff.] an extract of the overview given in figure 3.1 will be zoomed in on the variables in focus of each section.

[2] A scoring model is a systematic heuristic method for the evaluation and selection of complex alternatives, e.g., see http://wirtschaftslexikon.gabler.de/Archiv/4761/nutzwertanalyse-v7.html.

with partners in the academic and practical environments have been used as sources for identifying them. Reviewed databases are listed in table 3.1.

Electronic Database, Publisher, and URL	Description/Content
Academic Search (EBSCO Host) http://www.ebscohost.com/	Multidisciplinary collection of more than 300 full text and secondary databases
Emeraldinsight (Emerald) http://www.emeraldinsight.com/	Leading publisher of management research, covering more than 2,000 book titles and over 290 journals on strategy, leadership, library and information management, marketing and human resource management plus engineering, applied science, and technology titles
ScienceDirect (Elsevier) http://www.sciencedirect.com/	Leading full-text scientific database, offering journal articles and book chapters from more than 2,500 peer-reviewed journals and more than 11,000 books
Springerlink (Springer) http://www.springerlink.com/	Integrated full-text database for journals and books published by Springer, offering over 1,250 fully peer-reviewed journals and more than 10,000 books online
Web of Science (Thomson Reuters) http://www.isiknowledge.com/	Interdisciplinary collection, covering more than 150 disciplines related to science and technology (Science Citation Index (SCI)) and more than 50 disciplines related to the social sciences (Social Science Citation Index (SSCI))
Wiley InterScience (John Wiley) http://www.interscience.wiley.com/	Over 3 million articles across nearly 1,500 journals and 7,000 online books and major reference works

Table 3.1: Literature Sources - List and description of databases searched (Source: own compilation according to description presented on website of each publisher)

The search terms used to find publications in these databases, which are search terms relevant to the five research concepts, are listed in table 3.2. As the literature review examines relationships between at least two research concepts, selected publications had to contain at least one search term for each research concept in order to be included in the review, e.g., the terms Six Sigma and Performance for section 3.2 (The Relationship between Lean Six Sigma and Corporate Success).

Research Concept	Search Terms (English and German)
Lean Six Sigma (A1)	Lean, Six Sigma, Lean Six Sigma, TQM, QM
Corporate Culture (A2)	Culture, Organizational/Corporate Culture, Kultur, Unternehmenskultur
National Culture (B1)	National Culture, Nationalkultur, Hofstede, GLOBE
Leadership style (B2)	Leadership, Leadership Style, Führung, Führungsstil
Corporate Success (C)	Organizational Success/Performance/Effectiveness, Unternehmenserfolg

Table 3.2: Searching Methodology - List of terms for each research concept (Source: own table)

As far as state-of-the-art articles or meta-analyses could be identified (e.g., Baetge et al. [2007] as a starting point for understanding the relationship between Corporate Culture and Corporate Success or Kaynak [2003], summarizing all studies examining the relationship between TQM and Performance), these served as a base for further literature review. The initial key word searches followed by a detailed, sequent reading, filing, and analysis led to the final results presented in each section below.[1]

3.2 The Relationship between Lean Six Sigma and Corporate Success

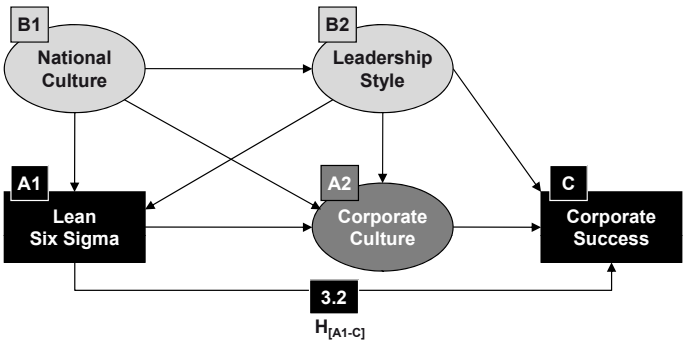

Figure 3.2: Flow of Section 3.2 - Relationships examined (Source: own figure)

The sparse number of publications about Lean Six Sigma as one integrated concept (see section 2.1.3) implies that there are not many surveys that analyze the relationship between Lean Six Sigma and Corporate Success. Academic publications have just been starting to emerge. Literature about similar concepts and analogue relationships needs to be considered to gain significant understanding in this area. Expanding the literature review to include the relationship between Quality Management and Organizational Performance as a wider framework seems indispensable. On the one hand, Lean Six Sigma can be interchanged with the more narrow concepts Six Sigma or Lean Management. On the other hand, Six Sigma can be considered as an extension or

[1] To structure and summarize the great number of evaluated studies, the explanations in each section are supported by clearly arranged tables. As announced in section 1.3 key outcomes are summarized according to the level of analysis and value of findings.

broader concept of TQM (see the argumentation in section 2.1.2 and by [Kumar et al., 2008, p. 3]), so that relevant studies looking at the link between TQM and Performance are evaluated as well. In line with the findings in section 2.3.1, Corporate Success is reflected through a multitude of alternative terms in these studies, e.g., outcome, benefits, effectiveness, and performance. As predicted, focus and definitions depend much on an author's choice and intention. Guided by the conceptualization and decoding for this research (see section 2.7), the following analysis will consider the different views and translate them into a more meaningful conceptualization where necessary.

The analysis below considers all studies relevant for gaining understanding of the relationship between Lean Six Sigma and Corporate Success. The methodologies range from simple description (e.g., case studies) to correlation analysis, factor analysis, longitudinal studies, and complex structural equation modeling (SEM[1]).

To evaluate the quality and relevance of published research findings, each study is assessed according to the following criteria:

- **Variables**: applied QM variables (6S, Lean, or TQM) and performance variables (Performance outcomes (P), Attitudes or Mind Set (A), Quality outcomes/ benefits/ success (Q)); the exact operational definitions for these categories vary across the listed studies (for an overview of some operational definitions see also [Kaynak, 2003, p. 410f.])
- **Method**: For a better overview, the methods are clustered into description (D), correlation (C), factor analysis (F), longitudinal study (L), path analysis or SEM (S) or other testing (T), e. g. Wilcoxon signed-rank test; in line with the variety of the variables' operational definitions the exact methodological approaches per category vary across the listed studies as well.
- **Strength**: Claimed strength between QM variable (A1) and Corporate Success (C) assessed on a three point scale from ++ (strong effect of A1 on C) to + (effect of A1 on C confirmed) or – (effect of A1 on C not confirmed) based on qualitative comparison (own analysis according to the descriptions in each study).

[1]Most authors indicate which software package they used to perform the SEM, e.g., Lisrel has been the program of choice of Fuentes-Fuentes et al. [2004]; Kaynak [2003]; Prajogo and Sohal [2006]; Stashevsky and Elizur [2000]. Zu et al. [2008] do not reveal which program they used.

- **Relevance**: relevance of study (for answering the research questions imposed in section 1.2) assessed on a three point scale from ++ (high value) to – (low value) based on qualitative comparison (own analysis).
- **Influences**: according to content and relevance of study claimed influence of other research concepts (i.e., Leadership Style (B1) or Corporate Culture (A2)).
- **RQ** (Research questions): according to results and relevance of study effected research questions imposed in section 1.2.

The following sections will take a closer look at the studies and contain an assessment for the criteria strength and relevance, each section focusing on the studies concerning a particular QM concept (6S, Lean, and TQM).

3.2.1 Six Sigma Benefits

Author and Year	Variables	Method	Strength	Relevance	Influences	RQ
Kwak and Anbari [2006]	6S, Q	D	+	–	A2	R1, R3
Kumar et al. [2008]	6S, Q	D	+	–		R1
Zu et al. [2008]	**6S, P**	**S**	++	++	**B2**	**R1, R4**

Table 3.3: Six Sigma and Corporate Success - Publications studying the link between Six Sigma and Performance (Source: own analysis)

To summarize the benefits of Six Sigma, **Kwak and Anbari [2006]** and **Kumar et al. [2008]** have investigated various literature in Six Sigma—and have provided an updated overview of benefits obtained by individual companies, listing the type of monetary performance metrics and savings (see [Kwak and Anbari, 2006, p. 711] and [Kumar et al., 2008, p. 4]). To turn the savings into one comparable measure is difficult, as the metrics span multiple time horizons, focus on various company divisions, and reflect different industries. Furthermore, the overview is limited to US manufacturing and does not include the published benefits achieved in other nations, e.g., European or Asian countries (e.g., see Töpfer [2007a, 2009c]) or other sectors, e.g., the service industry. A deeper analysis including the evaluation of causal relationships is missing, i.e., in the worst case, the reported benefits could be coincidental and not linked to Six Sigma efforts. The quality of the savings are not further assessed.

Zu et al. [2008] go one step further. They create a comprehensive causal model, linking Six Sigma with traditional Quality Management practices and Quality and

Business Performance Outcomes (see [Zu et al., 2008, p. 633]). After identifying three critical practices for Lean Six Sigma implementation, namely, Six Sigma role structure, Six Sigma structured improvement procedure, and Six Sigma focus on metrics (see [Zu et al., 2008, p. 631]), they derive sequent hypotheses and adequate measurement items in order to assess how these Six Sigma practices integrate into traditional QM practices and lead to better performance of a firm. Table 3.4 summarizes the key findings of the study, divided into theoretical and managerial implications (see [Zu et al., 2008, p. 641f.]).

	Theoretical Implications		**Managerial Implications**
1.	A synergy exists between Six Sigma and traditional QM practices.	1.	Six Sigma grew out of traditional QM; however, it offers three additional practices and therefore provides new paths to quality improvement.
2.	Top management support (understanding, acceptance, and willingness to support) is critical for both Six Sigma and QM.	2.	Top management's willingness to allocate resources is critical for successful Six Sigma adoption.
3.	Six Sigma's role structure enhances workforce management by building critical human resources to achieve sustainable competitive advantage.	3.	With the Six Sigma role structure the firm's infrastructure is improved, i.e., the ability in developing employees for continuous improvement is augmented.
4.	The integration of Six Sigma and QM emphasizes the use of accurate, timely data, objective measurements, and goal setting, leading to improved product/service design and processes.	4.	The supply of timely and accurate quality information motivates and guides the improvement activities in product/service design and process management.
5.	A sound (existing) QM foundation supports an effective adoption of new Six Sigma practices.	5.	Managers can use the scales of the study as a checklist to assess the status of QM and Six Sigma implementation.
6.	Investments in QM and Six Sigma benefit a firm's bottom line by improving product and service quality.		

Table 3.4: Key Findings of Zu et al. [2008] - List of implications for theory and practice (Source: see [Zu et al., 2008, p. 641f.])

In sum and as highlighted in table 3.3, the study by Zu et al. [2008] is considered most relevant for this research. This study applies advanced scientific methodology, relies on sufficient empirical data and gives proof for an impact of Six Sigma on Quality and Business Performance. Transferring their results to the first research question of this thesis (R1), it can be assumed that **there exists a positive relationship between Lean Six Sigma and Corporate Success, i.e., Lean Six Sigma implementation increases Corporate Performance and consequently Corporate Success**.

3.2.2 Lean Management and Performance Outcomes

Author and Year	Variables	Method	Strength	Relevance	Influences	RQ
Morris et al. [1999]	Lean, P	C	+	+		R1
Oliver et al. [2002]	Lean, P	L	+	+	B1	R1, R4
Plumb [2005]	Lean, A	D	–	–		R1

Table 3.5: Lean Management and Corporate Success - Publications studying the link between Lean and Performance (Source: own analysis)

As already mentioned in section 2.1.1 the exact level and quality of lean implementation has not been broadly studied or defined yet. However, relationships similar to that between Lean Management and Performance have been examined by Morris et al. [1999], Oliver et al. [2002] and Plumb [2005]. In line with the intuitive character of Lean Management and the looser link to scientific data analysis (see section 2.1.3), the types of analysis are limited to mere descriptions (Plumb [2005]), simple correlation analysis (Morris et al. [1999]), and a longitudinal study (Oliver et al. [2002]).

Plumb [2005] does not specifically focus on lean management but examines the shift toward continuous processing in the pharmaceutical industry. He analyzes the manufacturing stages of the pharmaceutical manufacturing process and describes good manufacturing practices and other impact factors like market environment, pricing, and risks to give reasons for a change in mind-set and a move from batch to continuous processing. This study neither reveals an explicit strength in the relationship between lean and attitudes, nor is the quality of the study sufficient enough to be considered valuable for this research (which is why it scores low in table 3.5).

Taking lean management to be synonymous to downsizing (see section 2.1.1), the evaluation of **Morris et al. [1999]** reveals the effects of downsizing on companies sampled by Cascio et al. [1997], measuring profitability and stock market performance for twelve successive years. The key finding is that performance improvements depend on the reason for downsizing, i.e., without thoughtful restructuring of the firm's assets, laying off employees may not lead to improved financial performance (see [Morris et al., 1999, p. 84]). In turn, if lean management is appropriately understood and implemented, i.e. employees are seen as the most important asset in a company, a positive effect on financial performance could be assumed (leading to a positive scoring for both assessment criteria strength and relevance in table 3.5).

Oliver et al. [2002] analyze manufacturing performance improvements through lean production in the Japanese, US, and UK automotive industry by benchmarking 26 first tier component maker plants in the years 1994 and 1999–2001 (see [Oliver et al., 2002, p. 3]). The patterns of change in each country demonstrate that Japanese plants show a superior productivity increase and improved operational performance in comparison to the US and UK manufacturers. The concept of continuous improvement in Japanese plants is therefore seen as a role model for the Western manufacturers. In line with the evaluation of Morris et al. [1999], positive scores for both assessment criteria strength and relevance are marked in table 3.5. As a result of the country comparison National Culture (B1) is listed as influencing variable.

3.2.3 TQM and Performance Outcomes

The largest number of studies investigate the relationship between TQM and Performance. As studies in this area have a longer history, methodologies applied are much more advanced. Following the conclusion of some authors that the relationship among TQM practices and their effects on firm performance are too complex to be identified by bivariate regression analysis or correlations (see [Kaynak, 2003, p. 426] and [Sila and Ebrahimpour, 2005, p. 1138]), **table 3.6 only focuses on studies using the more sophisticated methodology of path analysis or SEM**.[1]

In order to present the studies in more detail, table 3.7 expands the high-level compendium of table 3.6 and provides a more in-depth view of operational definitions and main findings.

Study	**TQM**[2]	**Perf.**[3]	**Main findings**
Anderson et al. [1995]	M (7)	O (1)	Direct effect of employee fulfillment on customer satisfaction. No significant relationship between continuous improvement and customer satisfaction.

[1]The difference between path analysis and SEM is explained in section 4.1 (Structural Equation Modeling).

[2]Operationalization of TQM: multidimensional (M) or single construct (S). Numbers in brackets indicate the number of factors included in the chosen construct. For a listing of the factors' names see the literature review by Kaynak [2003]; Sila and Ebrahimpour [2005] and the individual sources.

[3]Operationalization of Performance: individual / employee (E), financial (F), market (M), operating (O), perceived (P), and quality performance (Q). Numbers in brackets indicate total number of metrics included. For a listing of the nature and names of the metrics see the literature review by Kaynak [2003]; Sila and Ebrahimpour [2005] and the individual sources.

Study	TQM	Perf.	Main findings
Flynn et al. [1995]	M (7)	O, P (8)	Core TQM practices (statistical control, product design, process flow) have positive effects on quality market outcomes and operating performance, leading to competitive advantage.
Grandzol and Gershon [1997]	M (7)	F, O, P (9)	Continuous improvement leads to operating performance which leads to financial performance. Employee fulfillment, cooperation and customer focus positively impact customer satisfaction.
Choi and Eboch [1998]	S (1)	O, P (3)	TQM practices affect customer satisfaction more strongly than plant performance. Plant performance has no significant effect on customer satisfaction.
Forza and Flippini [1998]	M (5)	O, P (3)	Process control has significant effect on quality conformance. TQM links with customers have significant effect on customer satisfaction.
Rungtusanatham et al. [1998]	M (7)[1]	O, P (2)	Continuous improvement has positive effect on customer satisfaction. Employee fulfillment has no effect on customer satisfaction.
Dow et al. [1999]; Samson and Terziovski [1999]	M (10)	O, P (6)	A combination of employee commitment, shared vision, and customer focus has positive impact on quality outcomes. Leadership, HR management, and customer focus (soft factors) are significantly and positively related to operating performance.
Das et al. [2000]	M (2)	F, O, P (5)	High involvement work practices are positively correlated with quality practices, which are positively correlated with customer satisfaction, which is positively correlated with firm performance.
Stashevsky and Elizur [2000]	M (3)	E (1)	Both elements of TQM, namely, quality management (QM) and the perceived degree of participation in decision-making (PDM), affect improvement effort and consequently individual performance; however, the relative impact of PDM is considerably higher. Individual performance is therefore mainly effected by PDM.[2]
Wilson and Collier [2000]	M (5)	F, O, P (9)	Process management, and information and analysis have significant and positive direct effects on financial performance.
Kaynak [2003]	M (7)	F, M, Q (4)	A positive relationship exists between the extent to which companies implement TQM and firm performance. The interdependencies of TQM practices were validated.

[1] Same as Anderson et al. [1995]

[2] The findings of Stashevsky and Elizur [2000] are supported by an earlier investigation of Lawler et al. [1995], who concluded that the application of TQM in combination with PDM had a strong relationship with organizational performance.

Study	TQM	Perf.	Main findings
Fuentes-Fuentes et al. [2004]	M (3)	E, F, O (3)	TQM success depends on specific environmental characteristics. As environmental dynamism has the most relevant effect on the degree of implementation of the main TQM principles, TQM is especially suited for firms that compete in dynamic sectors.
Sila and Ebrahimpour [2005]	M (7)	E, F, M, O (19)[1]	Leadership and information and analysis act as the foundation of synergies between TQM factors. Only leadership and process management have positive, direct effects on business results.
Prajogo and Sohal [2006]	M (6)	Q (3)[2]	TQM partially mediates the relationship between differentiation strategy and the three performance variables (product quality, product innovation, and process innovation), advancing the understanding of TQM in a broader context.

Table 3.7: TQM and Performance - Operationalizations and key findings of publications using path analysis or SEM (Source: own analysis)

Table 3.7 emphasizes what Sila and Ebrahimpour [2005] have noted before: to pinpoint visible patterns by comparing TQM factor-performance relationships across studies is nearly impossible due to the use of different survey instruments, analytical frameworks, and operationalizations of TQM and performance (see [Sila and Ebrahimpour, 2005, p. 1138], also see [Kaynak, 2003, p. 406]). Even within the listed studies, which take the same methodological approach of path analysis or SEM, the **analytical approaches differ in strength and complexity**. However, across the studies, two central overlapping characteristics and findings can be identified:

- Performance is mostly broken down into perceived, operating, and financial performance. Fewer authors include market and quality outcomes or individual performance into their operationalization of performance.
- TQM practices have a positive effect on performance, e.g., on customer satisfaction, as a key variable of operating performance or on financial performance.

[1] Sila and Ebrahimpour [2005] take the most complex approach, with the highest number of performance metrics. They differentiate the dimensions human resource (4), customer (4), financial and market results (5), and organizational effectiveness, here denoted as E, F, M, and O, respectively.

[2] Unlike Kaynak [2003], the authors Prajogo and Sohal [2006] do not base their survey on Saraph et al. [1989] (lack of testing for reliability and validity) but choose the approach by Ahire et al. [1996], who define (product) quality performance based on reliability, performance, durability, and conformance to specification.

Author and Year	Variables	Method	Strength	Relevance	Influences	RQ
Anderson et al. [1995]	TQM, P	S	+	–		R1
Flynn et al. [1995]	(T)QM, P	S	+	+		R1
Grandzol and Gershon [1997]	TQM, P	S	+	+		R1
Choi and Eboch [1998]	TQM, P	S	–	–		R1
Forza and Flippini [1998]	TQM, P	S	+	+		R1
Rungtusanatham et al. [1998]	TQM, P	S	+	+		R1
Dow et al. [1999]; Samson and Terziovski [1999]	TQM, P	R, S	++	+	B2	R1, R4
Das et al. [2000]	TQM, P	S	++	+		R1
Stashevsky and Elizur [2000]	TQM, P	S	++	+		R1
Wilson and Collier [2000]	TQM, P	S	+	+		R1
Kaynak [2003]	TQM, P	S	+	+		R1
Fuentes-Fuentes et al. [2004]	TQM, P	S	+	+		R1
Sila and Ebrahimpour [2005]	TQM, P	S	++	++	B2	R1, R4
Prajogo and Sohal [2006]	TQM, P	S	+	+		R1

Table 3.6: TQM and Corporate Success - Publications studying the link between TQM and Performance (Source: own analysis)

Three recommendations can be derived from these two findings. First, the outcomes of Lean Six Sigma as a quality management concept building upon TQM are to be measured through a **multidimensional construct**, following the idea of the DMP (see section 2.3.2). Second, metrics defining the multiple performance dimensions **may range from financial indicators to intangible human criteria** (see also section 2.3.2). Third, **direct links can be assumed between Lean Six Sigma and performance**.[1] A clear operationalization of the two variables into specific factors allows modeling multiple relationships.[2]

3.2.4 Hypothesized Relationship between Lean Six Sigma and Corporate Success

Following the assessment tables and recommendations of the previous sections, hypotheses characterizing the relationship between Lean Six Sigma and Corporate Success are listed in table 3.8.

[1] This undermines the conclusion of Zu et al. [2008] that investments in TQM and Six Sigma benefit a firm's bottom line (see table 3.4).

[2] The exact operationalization will be done in section 4.4. Corresponding hypotheses will be summarized in the next section (3.2.4).

Hypothesis	Assumed Relationship
H[A1-C]1	L6S infrastructure practices (role structure) are positively related to overall business performance.
H[A1-C]2	L6S core practices (structured procedure) are positively related to process management and quality performance.
H[A1-C]3	L6S core practices (focus on metrics) are positively related to both process management and product/service design and consequently quality performance.
H[A1-C]4	L6S infrastructure practices (role structure) have more impact on individual outcomes (employee attitudes and motivation) than L6S core practices (structured procedure and focus on metrics).

Table 3.8: Relationship between Lean Six Sigma and Corporate Success - Overview of hypotheses (Source: own analysis)

On the basis of the idea by Zu et al. [2008] and Schroeder et al. [2008], **Lean Six Sigma will be broken down into the three elements role structure, structured procedure**, and focus on metrics. Each of these elements is linked to multiple performance outcomes, e.g., Lean Six Sigma focus on metrics leads to improved product/service design and processes, which in turn increase quality performance.

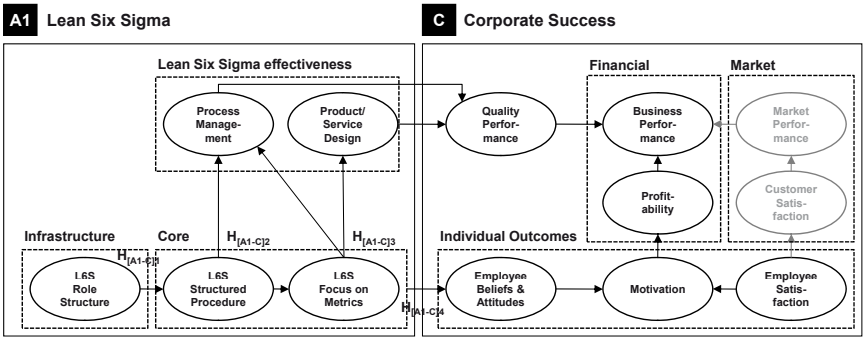

Figure 3.3: Extract of Hypothesized Model (A1-C) - Links between Lean Six Sigma and Corporate Success (Source: own figure)

For a better overview, these links are also presented in figure 3.3, including the positioning of the hypotheses and their assignment to the variables (see the unique identifiers presented in table 3.8).

3.3 The Relationship between Corporate Culture and Corporate Success

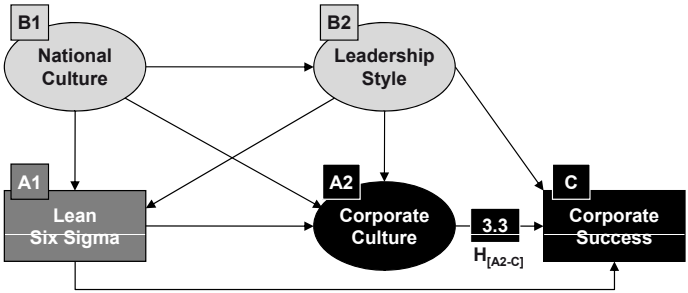

Figure 3.4: Flow of Section 3.3 - Relationships examined (Source: own figure)

Meta-analyses have shown that measurement instruments depend highly upon the underlying research question (see [Baetge et al., 2007, p. 185]). In comparison to singular analysis focusing on either Corporate Culture or Corporate Success (or similar concepts) alone (see the findings described in chapter 2), studies including the statistical empirical relationship between the two concepts might use a different, multidimensional operationalization. Like the approach by Baetge et al. [2007], these studies will be in focus of this chapter.

Related to Corporate Success, culture is found to be both an asset and a liability (see [Sathe, 1983, p. 9]): when efficient, it can still lack effectiveness.[1] This also applies to Corporate Culture, defined as manageable business culture.

Baetge et al. [2007] identified 16 studies that have dug deeper into the dynamics between Corporate Culture and Corporate Success. These studies are included in table 3.9.[2] However, further literature research (according to the methodology stated in section 3.1) has brought many more studies to light, which have been included as well (resulting in double the number of sources stated by Baetge et al. [2007]). Reasons

[1] See the definition in section 2.3.1. Efficiency is defined as doing something in the right way, i.e., achieving something with a minimum expenditure of resources. Effectiveness defines whether this practice is appropriate, i.e., doing the right thing. E.g., doing the wrong thing the right way could be efficient but not effective (see [Sathe, 1983, p. 10]).

[2] The studies analyzed by Baetge et al. [2007] are marked with an asterisk (*).

why these additional sources had not been considered by Baetge et al. [2007] might be rooted in their more narrow definition of Corporate Success, their different methodology of literature review (i.e., they create the landscape of studies without explicit disclosure of the included databases that led to their results), or the different time frame they examined (e.g., they list the study of Deshpandé et al. [1993] but miss the subsequent studies by the same authors, eventually summarized by Deshpandé and Farley [2004]). **The purpose of table 3.9 is to cluster the variety of different studies into three common categories to make them comparable**. The three categories are operationalization and measurement of Corporate Culture, operationalization and measurement of Corporate Success an the nature of sample used in each study, characterized by targeted nations and industries as well as number of included companies and respondents. Although the breadth of information in table 3.9 seems overwhelming, this detailed presentation is necessary to guide a systematic literature analysis as performed in the following sections. The detailed overview helps to reach the next level of understanding according to the scientific research process introduced in section 1.3 and documented in appendix E.1.

Study	**Corp. Culture**[1]	**Corp. Success**[2]	**Sample**[3]
Denison [1984, 1990]*	A, M, C, I[4]	F (2)	USA (43, 43.747), cross-sectional
Hansen and Wernerfelt [1989]*	C	F (1)	USA (60, n/a), cross-sectional
Rousseau [1990]*	satisfaction-oriented, safety-conscious norms	F (1)	USA (1, 263), non-profit sector
Calori and Sarnin [1991]*	work-related values, management practices	F (3)	France (5, 280), cross-sectional
O'Reilly et al. [1991]	54 values[5]	E, F (4)	USA (e.g., 8, 189), education, government, and accounting sector[6]

[1]Operationalization and measurement of Corporate Culture

[2]Operationalization and measurement of Corporate Success (same nomenclature as for performance in table 3.7)

[3]Sampled country (number of companies and respondents included in empirical study), industry

[4]Adaptability (A), mission (M), consistency (C), and involvement (I) constitute the four dimensions of the Denison Organizational Culture Model and are (partly) replicated by the majority of subsequent research studies.

[5]Named as Organizational Culture Profile (OCP), e.g., to determine the person-organization fit

[6]Five different respondent groups were included, consisting of MBA students, junior and senior accountants in public accounting firms, and middle managers in government agencies. The numbers

Study	Corp. Culture	Corp. Success	Sample
Kotter and Heskett [1992]*	A, C, culture-environment-fit	F (3)	USA (207, 600), cross-sectional
Gordon and DiTomaso [1992]*	A, C, stability	F (2)	USA (11, 850), cross-sectional
Marcoulides and Heck [1993]*	structure, values, climate, task organization, employee attitude	F, M (4)	USA (26, 392), cross-sectional
Deshpandé et al. [1993]*	CVF[1]	F, M (4)	Japan (50, 200), cross-sectional
Denison and Mishra [1995]*	A, M, C, I	E, F, Q (7)	USA (26, 764), cross-sectional
Petty et al. [1995]*	teamwork, trust & credibility, performance & common goals, organizational functioning	O (5)	USA (1, 832), electric utility industry
Wilderom and Van den Berg [1998]*	empowerment, intergroup, HR, external and improvement orientation	E, F, M (4)	Netherlands (1, 1.950), banking sector
Christensen and Gordon [1999]*	aggressiveness, innovation, confrontation, planning, results, people and team orientation, communication	F (1)	USA (77, 11.870), cross-sectional
Homburg and Pflesser [2000]	market-oriented values, norms, artifacts and behavior	F, M (3)	Germany (1.100, 173), cross-sectional
Ogbonna and Harris [2000]	CVF	F, M, O (10)	UK (1.000, 322), cross-sectional
Flamholtz [2001]	C[2]	F (1)	USA (1, 741), parts manufacturing
Fey and Denison [2003]*	A, M, C, I	F, M, Q (8)	Russia (179, 179), cross-sectional
Fulmer et al. [2003]*	"great place to work"[3]	F, M, Q (3)	USA (50, n/a), cross-sectional
Filbeck and Preece [2003]*	"great place to work"	F (1)	USA (57, n/a), cross-sectional
Herrmann et al. [2004]*	63 values	F (3)	Germanic[4] (33, 2.134), cross-sectional
Carmeli and Tishler [2004]	A, M, C, I[5]	F, M (6)	Israel (263, 99), local government

here represent the 8 accounting firms and 189 accountants, sampled in respondent group three (see [O'Reilly et al., 1991, p. 496f.]).

[1]Based on Quinn [1988], see also table 2.3 in section 2.4.1

[2]Degree of agreement with given cultural principles in five areas: vision, customers, people, performance & accountability, teamwork & communication, corporate citizenship

[3]Credibility, respect, fairness, pride, camaraderie

[4]Germany, Switzerland, Lichtenstein

[5]Based on Denison [1990]; however, Carmeli and Tishler [2004] consider culture as one of six

Study	Corp. Culture	Corp. Success	Sample
Denison et al. [2004]	A, M, C, I	E, F, M (5)	Worldwide[1], cross-sectional
Deshpandé and Farley [2004]	CVF	F, M (4)	Worldwide, cross-sectional
Flamholtz and Kannan-Narasimhan [2005]	6 Factor Scale[2]	F (1)	USA (1, 702), parts manufacturing
Yilmaz et al. [2005]	customer/learning-oriented values, strength	F, M, Q (9)	Turkey (134, 1.349), cross-sectional
Skerlavaj et al. [2007]	OLC/CVF[3]	F, P (5)	Slovenia (203, 203), cross-sectional
Yilmaz and Ergun [2008]	A, M, C, I	E, F, M, Q (7)	Turkey (100, 1.176), cross-sectional
Gregory et al. [2009]	CVF	E, F (4)	USA (99, 354), hospital industry
MacIntosh and Doherty [2009]	CIFO[4]	E (2)	Canada (n/a, 416), fitness industry
Zheng et al. [2009]	A, M, C, I	F, M, P (5)	USA (2, 384), HR organizations

Table 3.9: Corporate Culture and Corporate Success - Studies analyzing the effects of Culture on Performance (Source: own analysis)

Table 3.9 not only includes bivariate analyses but also research projects that have embedded the link between Corporate Culture and Corporate Success into further (more complex) relationships and models. These types of relationships range from further variables acting as mediators between Organizational Culture and Organizational Performance (e.g., employees' attitudes (Gregory et al. [2009]) or knowledge management (Zheng et al. [2009])) to Organizational Culture as mediator between Leadership Style and Organizational Performance (see Ogbonna and Harris [2000]).

intangible organizational elements, namely, managerial capabilities, human capital, internal auditing, labor relations, organizational culture, and perceived organizational reputation.

[1]Study 1: North America, Asia, EMEA (230, 36.820); Study 2: South Africa, Canada, Jamaica, Australia, USA, Brazil, Japan (1, 2.162)

[2]Customer service, corporate citizenship, identification with the parent company, performance and behavioral standards, human resource practices, corporate communications

[3]Based on Denison and Spreitzer [1991]; McDermott and Stock [1999]

[4]Culture Index for Fitness Organizations, containing eleven dimensions: organizational presence, member success, connectedness, formalization, creativity, sales, organizational integrity, health and fitness, service, work ethic, atmosphere

3.3.1 Bivariate Analyses of Corporate Culture and Corporate Success

Bivariate analysis is the simultaneous analysis of two variables (see Cui and Greatorex [2010]). The majority of studies listed in table 3.9 perform a bivariate analysis between the two concepts Corporate Culture and Corporate Success. Baetge et al. [2007] give a detailed outline. Despite the major differences in operationalization, measurement, and analysis of Corporate Culture and Corporate Success, the main findings relevant for this research are reproduced and enhanced below.

Denison [1984, 1990] invented his own Organizational Culture Model, with twelve dimensions reflecting company-specific beliefs and assumptions on the basis of four cultural traits: adaptability, mission, consistency, and (employee) involvement. His goal was to be able to profile and compare organizations in their cultural strengths and weaknesses and derive recommendations how to use the diagnosed culture for increased organizational effectiveness (see [Denison et al., 2004, p. 100f.]). His model measures different indices with the "Survey of Organizations" (SOO) and has been replicated by many subsequent studies examining the relationship between Corporate Culture and Corporate Success. Denison's main findings include that

- the organization-of-work index[1] is a predictor of both short- and long-term performance;
- the decision-making practices index[2] indicates long-term performance;
- consistent or strong cultures[3] imply higher short-term performance but as a powerful source of stability and internal integration, could act as a constraint for needed customer driven adaptability in a constantly changing environment (see [Denison, 1990, p. 178]).

Subsequent studies by Denison and his colleagues (see **Denison and Mishra [1995]**) found a differentiation between the four cultural traits and their predictive power of effectiveness. Involvement and adaptability support the organization's capacity to

[1] "A composite of four survey items that reflect the degree to which work is sensibly organized, work methods are adapted to changing conditions, decisions are made at appropriate levels, and the goals of the organization are perceived by the individual as clear and reasonable." ([Denison, 1984, p. 11])

[2] A two item survey measure, reflecting participation in decision making and information sharing (see [Denison, 1984, p. 11]).

[3] Consistency and strength are used simultaneously, and mean that the majority of employees (independent of their hierarchical level) agree with the corporate values.

change, while consistency and mission contribute to the organization's capacity to remain stable and predictable over time (see figure 3.5 ([Denison and Mishra, 1995, p. 216])).

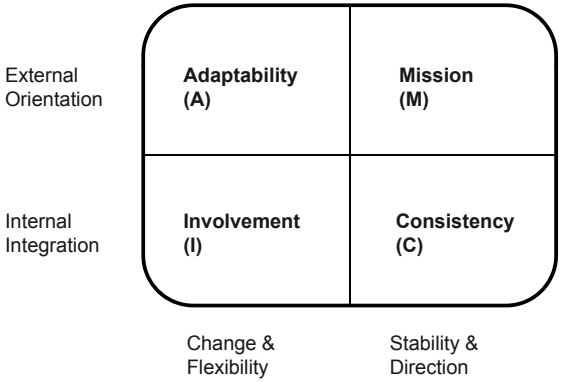

Figure 3.5: Four Cultural Traits - Theoretical Model of two dimensions (Source: [Denison and Mishra, 1995, p. 216])

The learnings of Denison [1984, 1990]; Denison and Mishra [1995] can be transformed into a set of rough hypotheses (see also [Denison et al., 2004, p. 99]):

- Corporate culture traits of mission and consistency are the best predictors of profitability.
- Corporate culture traits of involvement and adaptability are the best predictors of innovation.
- Corporate culture traits of adaptability and mission are the best predictors of sales growth.

In an other study, **Fey and Denison [2003]** prove that these propositions need to be slightly revised depending on the nation studied. The dynamics of companies in Russia turn out to be different than in the United States, e.g., adaptability has a stronger effect on effectiveness in a communist society than in the United States, where mission shows the highest correlation (see [Fey and Denison, 2003, p. 692]). **The best predictor of Corporate Culture traits on Corporate Success factors like financial outcomes is therefore dependent on the national culture, supporting**

the fourth research question (see section 1.2) and the findings laid out in section 3.5.2.

Hansen and Wernerfelt [1989] use the same instrument as Denison[1] and find out that factors of organizational climate[2] contribute nearly twice as much to firm profit rates (e.g., ROA) as economic factors (relative market share as an indicator of firm competitive positioning, firm size, and industry profitability).

Investigating normative beliefs in fund raising organizations, **Rousseau [1990]** concludes that security-oriented normative beliefs are negatively related to both fund-raising success and to staff job attitudes, while teamwork-oriented norms are positively related to staff attitudes. She chooses the Organizational Culture Inventory (OCI) in accordance with Cooke and Lafferty [1989], a 120-item inventory tapping 12 normative beliefs, to measure Corporate Culture in this context. Her research provides the main finding that greater managerial control, intragroup competition, or hierarchical decision making (i.e., security orientation) are associated with poorer organizational and member outcomes, therefore negatively influencing Corporate Success.

In conjunction with the findings of Zu et al. [2010] (for further explanation see section 3.4), this raises a crucial point for this research, leading to hypothesis H[A2-C]1.

H[A2-C]1:	A hierarchical corporate culture decreases employee motivation and thus negatively impacts Corporate Success.

Due to the different macro-cultural context and measurement approach, **Calori and Sarnin [1991]** admit that their findings are hard to compare with Denison [1984] or Hansen and Wernerfelt [1989] (see [Calori and Sarnin, 1991, p. 71]). Their research is limited to five french single business companies, involved in mature industries and pursuing a differentiation strategy. The study offers three hypotheses (see [Calori and Sarnin, 1991, p. 71]):

[1] That is, the SOO questionnaire in accordance with Taylor and Bowers [1972]

[2] Hansen and Wernerfelt [1989] characterize climate as "the interactions of (a firm's) facilities, structures and people..., organizational and perceptual variables that reflect individual-organizational interactions, which affect individual behavior" ([Hansen and Wernerfelt, 1989, p. 401]). Although the relationship between culture and climate is controversial (see Ostroff et al. [2003]), for simplicity, the terms are used synonymously in this context.

- A clear cultural profile is associated with a company's growth. The (11) cultural attributes positively related to growth performance include personal fulfilment, listening to others, team spirit, responsibility, trust, openness to the environment, adaptation, anticipation, entrepreneurship, quality, and consistency.[1]
- Very few values (5) and corresponding management practices are associated with a firm's profitability (ROI, ROS): openness to the environment, participation in local activities, societal contribution, solidarity, and flexibility.
- A company's cultural strength, measured by intensity (certain values are more important for employees than others) and homogeneity (a majority of employees share the same values), is positively correlated with its relative growth.

Calori and Sarnin [1991] summarize that organizational culture seems to have more influence on growth than on profitability and raise the importance of contingency factors, e.g., in form of the three parameters diversity of the company (e.g., co-existing business cultures), characteristics of the business (industry, profession), and macro-culture (national cultures) (see [Calori and Sarnin, 1991, p. 51]). This leads to the following propositions:

- A firm's corporate culture depends on the national culture.
- A firm's corporate culture depends on the business.
- A firm's corporate culture depends on the diversity of the company.

Following the idea that organizations have cultures that are more or less attractive to certain types of individuals (e.g., see Wilkins and Ouchi [1983]), **O'Reilly et al. [1991]** build upon the quantitative assessment approach by Rousseau [1990] and measure Organizational Culture on both the organizational and individual level. They focus on (54) central values of individuals and develop the so called "Organizational Culture Profile" to investigate how person-culture fit increases commitment, satisfaction, and performance. The large number of examined values allows a fine-grained evaluation of organizations' cultures, uncovering variations in value structures that appeared highly similar at first (see [O'Reilly et al., 1991, p. 509]). The proposition that person-organization fit is related to work outcomes can be proven:

[1] As [Baetge et al., 2007, p. 197] correctly recognize, Calori and Sarnin [1991] do not disclose a clear definition of these complex cultural attributes.

- Person-organization fit (measured at time 1, when respondents originally entered their firms) is a significant predictor of normative commitment, job satisfaction, and intentions to leave (at time 2, a year later), independent of age, gender, and tenure.
- Person-organization fit (measured at time 1, when respondents originally entered their firms) is a significant predictor of actual turnover, i.e., staying with a firm (at time 2, after two years). In other words, individuals with a low person-organization fit are more likely to leave an organization.

These positive results of a fit between individuals' preferences and organizational cultures frame hypothesis H[A2-C]2.

H[A2-C]2:	The more the individual values are congruent with the corporate values (as part of the existing Corporate Culture), the higher the individual/ employee outcomes.

Kotter and Heskett [1992] followed Calori and Sarnin [1991] in analyzing the relationship between a strong corporate culture (majority of employees share the same values) and performance. They could prove a weak correlation between these two constructs and in line with Calori and Sarnin [1991] acknowledge the importance of contingency factors (see [Kotter and Heskett, 1992, p. 27]). Additional interviews with industry experts highlight that those companies with a higher culture-environment fit are more successful long-term, as they are characterized by higher adaptability. However, Kotter and Heskett [1992] fail to prove a quantitative relationship between adaptability or culture-environment fit and performance.

In contrast, **Gordon and DiTomaso [1992]** are able to prove that cultural strength is significantly correlated with growth of capital and bonuses of insurance companies. Adaptability appears to be predominantly positive; stability is negatively correlated with these two outcomes, confirming the hypotheses that a Corporate Culture with a high degree of adaptability is especially suited to gain a competitive advantage in dynamic industries.

Marcoulides and Heck [1993] are the first authors who use structural equation modeling to examine the links between Corporate Culture and Corporate Success. For

the causal analysis[1] they consider five latent variables as visible and observed aspects of Organizational Culture (see [Marcoulides and Heck, 1993, p. 223f.]:

Organizational Structure: e.g., measured by the complexity evident in the organization's resource and communication patterns (Complexity) or the breadth and depth evident in the organization's hierarchy (Sophistication)

Organizational Values: e.g., measured by the emphasis the organization places on risk-taking (Risk), on protecting its employees in the workplace (Safety), on productivity and efficiency (Efficiency), or on integrity and orderliness of performance (Professionalism)

Organizational Climate: e.g., measured by the perceptions among employees of the quality of interactions and recognition within and across organizational levels (Organizational Life)

Task Organization: e.g., measured by whether managers take personal interest in the welfare and performance of their employees (Mentoring) and utilize effective methods of selecting decision-making alternatives (Decision Making), and the extent that employees have opportunities to pursue interesting and challenging work (Challenge)

Worker Attitudes & Goals: the beliefs of employees about a variety of issues, e.g., measured by perceptions about tolerance, nationalism, commitment to the organization, and involvement in decision-making

All five latent variables have some direct (or indirect) effect on performance. Employee attitudes and task organization activities show the largest direct effects. Marcoulides and Heck [1993] hereby position organizational culture as an "interconnected web of relationships which may be reliably measured" ([Marcoulides and Heck, 1993, p. 221]).

[1] For a differentiation between SEM and Causal Modeling see section 4.1.2.

Deshpandé et al. [1993] differentiate Corporate Culture on the two dimensions flexibility vs. stability and internal vs. external orientation. Through a quadrad analysis in Japanese firms (the authors interviewed a pair of marketing executives of a vendor and purchasing executives of a customer), they analyzed four types of corporate culture (based on [Deshpandé et al., 1993, p. 31] and theoretically consistent with the competing values model (CVF) by Quinn [1988]): market, adhocracy, clan, and hierarchy culture. Deshpandé et al. [1993] find out that Japanese companies with corporate cultures stressing competitiveness (markets) and entrepreneurship (adhocracies) outperform companies dominated by internal cohesiveness (clans) or by rules (hierarchies): "Simply put, customer-oriented and innovative firms do perform better, a basic assertion of the marketing concept" (see [Deshpandé et al., 1993, p. 31]). This first test, in Japan, has been replicated multiple times, leading to the same type of study across the world. Spanning a decade and a dozen countries, the replicated studies use the same conceptual framework and research methodology.[1] For an overview of the research chronicle see Deshpandé and Farley [2004]. Results are similar in all examined countries, confirming not only the earlier hypothesis by Deshpandé et al. [1993], but also the findings by Gordon and DiTomaso [1992] and Denison et al. [2004] mentioned above (hypothesis H[A2-C]3).

H[A2-C]3:	Relatively open, externally oriented (developmental) corporate cultures relate to better performance, while relatively closed, internally (hierarchical) oriented corporate cultures relate to poorer performance.

In this context, market orientation and innovativeness have a consistently positive impact on performance. **Deshpandé and Farley [2004]** observe that innovativeness is more important in the industrial world (advanced marketing practices), while market orientation is more important in the industrializing world (marketing at an earlier stage of development) (see [Deshpandé and Farley, 2004, p. 18]).

[1] The framework is built on an expanded theory of competing values to examine the impact of organizational culture, market orientation, organizational climate, and innovativeness on firm performance. Organizational Culture is hereby measured by the CVF, performance with self-reported scales. The sampling includes double dyads made up of four interviews—two pairs each of matched buyers and sellers in a business-to-business relationship, named "quadrad design" by Deshpandé et al. [1993].

Petty et al. [1995] characterize and measure Organizational Culture with the dimensions teamwork, trust and credibility, performance and common goals, and organizational functioning (sources of interference or frustration in the work process). Deviating from all approaches reviewed so far, they choose a different operationalization of performance: broken down into the operational components operations, customer accounting, support services, marketing, and employee safety and health; financial indicators like profitability or economic survivability are completely waived (see [Baetge et al., 2007, p. 204]). The lagged correlations between culture at time 1 (first administration of survey) and performance at time 2 (second administration of survey, one year later) indicate that teamwork is the only variable strongly associated with organizational performance.

Wilderom and Van den Berg [1998] measure the gap between desired and perceived organizational culture (organizational culture gap) in the five dimensions empowerment, intergroup orientation, HR orientation, external orientation, and improvement orientation. They use structural equation modeling to test their main hypotheses that a higher cultural gap will lead to lower levels of performance. Although the model disproves these initial hypotheses and reveals a positive effect between cultural gap and objective performance and no relationship is found between the latent variables,[1] Wilderom and Van den Berg [1998] conclude that good morale among employees will pay off and increase organizational performance long-term. Their recommendation is to decrease the cultural gap to gain long-term benefits.

Christensen and Gordon [1999] suggest a more complex contingency model than Hansen and Wernerfelt [1989] and phrase the assumption that Corporate Cultures are molded by industry-specific effects. They empirically differentiate eight cultural practices among a sample of industries and study the link between these practices and revenue growth. The focus on revenue growth as a single and narrow indicator of performance is rooted in the attempt to include as many industries and firms as possible in the analyses, and in the difficulties equating variables across industries (see [Christensen and Gordon, 1999, p. 406]). Overall, Christensen and Gordon [1999] are able to provide preliminary evidence for industry-moderated culture-performance

[1] Wilderom and Van den Berg [1998] interpret this as a "suppressor effect," meaning that the latent variables leadership and subjective performance probably overshadow the relationship between organizational culture and performance.

relationships, supporting the following proposition ([Christensen and Gordon, 1999, p. 401]):

- Relationships between corporate culture and growth vary across industries or industrial types.

Homburg and Pflesser [2000] develop a multilayer model of market-oriented organizational culture. Following the model by Schein [1984] and framing a construct consisting of the four latent variables (1) shared basic values supporting market orientation, (2) norms for market orientation, (3) artifacts of market orientation, and (4) market-oriented behaviors, Homburg and Pflesser [2000] provide evidence that culture influences market performance and indirectly also financial performance. As a moderating effect, market dynamism comes into play ([Homburg and Pflesser, 2000, p. 453]):

- The greater the extent of market dynamism, the greater is the positive impact of market-oriented behaviors on market performance.

In turn, a high level of market dynamism makes a market-oriented culture even more important, underlining the findings by Deshpandé et al. [1993] and Denison et al. [2004] that culture traits of adaptability, openness, and external (market) orientation are related to better performance. Homburg and Pflesser [2000] provide the additional insight that the establishment of norms will not produce the desired behavioral outcomes unless the norms are supported by appropriate artifacts. This point refers back to the positive effects of charismatic and transformational leadership (see section 2.6.2), stressing the need to "walk the talk" in order to effectively influence the employees' value systems.

Following Kotter and Heskett [1992] in their study of culture across companies, **Flamholtz [2001]** focuses on one single company, to deal with the effects of corporate culture on financial performance. He adopts the conclusion of Kotter and Heskett [1992] that strong cultures help business performance because they create an unusual level of motivation in employees (see [Kotter and Heskett, 1992, p. 16] and [Flamholtz, 2001, p. 269]). Regression analysis confirms a statistically significant relationship between the single financial performance indicator EBIT (earnings before interest and taxes) and the degree of cultural agreement between the company division and the corporate

culture.[1]

In a later study **Flamholtz and Kannan-Narasimhan [2005]** revise the five factor measurement of the cultural buy-in by Flamholtz [2001] to a six factor model. They provide empirical evidence, that some dimensions of corporate culture have a greater impact upon the financial performance of a firm than others. Multiple regression shows, that four of the factors they identified (customer focus, corporate citizenship, performance standards, and identification with the company) stand out to be directly influencing financial performance, with customer focus having the greatest impact. The two other factors (human resource practices and organizational communication) have a significant influence upon these four primary cultural factors. Flamholtz and Kannan-Narasimhan [2005] draft a theoretical causal model of culture dimensions and financial performance, depicting these relationships.

Investigating the "100 Best Companies to Work for in America," **Fulmer et al. [2003]** show that positive employee relations serve as an intangible asset and source of sustained competitive advantage at the firm level. Companies on the 100 Best list possess stable and highly positive workforce attitudes and hold performance advantages over the broad market, reflected both in accounting ratios (ROA and market-to-book ratio) and stock price performance (total shareholder returns), implying that these companies are able to successfully manage relationships with multiple stakeholder groups (see [Fulmer et al., 2003, p. 986]). In turn, Fulmer et al. [2003] find no evidence that positive employee relations come at the expense of financial performance.

Filbeck and Preece [2003] draw upon the same sample as Fulmer et al. [2003], coming to the conclusion that satisfied employees may lead to satisfied shareholders (see [Filbeck and Preece, 2003, p. 791]). Not only after achieving the award but for the entire sample period, the "100 Best Firms" outperform the benchmark firms in all measures of return (see [Filbeck and Preece, 2003, p. 789]).

Compared to the large number of studies performed in the US, the study by **Hermann et al. [2004]** is an exception in that it focuses on German speaking countries

[1] Operationally, Flamholtz [2001] measured agreement by the percentage of favorable responses to cultural value statements, where the number in favor was defined as the sum of responses which were "to a very great extent" and "to a great extent" (on a Likert scale) (see [Flamholtz, 2001, p. 272]). Flamholtz [2001] calls this cultural "buy-in."

only (Germany, Switzerland, and Lichtenstein). The authors use logistic regression[1] and structural equation modeling to examine the relationship between 63 cultural values and three financial indicators: sales growth, number of employees, and operating profit (calculated as a 3-year average). These factors are assessed not only by members of the 33 companies included in the sample but also by financial experts. Both views are condensed by independent public accountants. Without disclosing statistical results,[2] main findings include the following:

- A high correlation exists between a clearly communicated vision and Corporate Success.
- Further cultural success factors are tradition, experience, creativity and knowledge, and an internal environment of self-fulfillment, self-respect, and equal opportunities.
- Corporate Success is determined more by a culture of commitment and initiative than by financial incentives and rewards.
- Counterproductive cultural elements include internal competition (employees measure each other), high individual responsibility, controls and routines (see [Hermann et al., 2004, p. 12f.]).

In line with the assessment of studies investigating the relationship between Lean Six Sigma and Corporate Success above table 3.10 summarizes the evaluation of this section. It gives a brief overview of the claimed strength of relationship between Corporate Culture and Corporate Success and the quality and relevance of each study in answering the research questions R2 and R4. The assessment is summarized by one score per study, based on the following criteria (own evaluation):

- **SEM**: studies which apply the methodology of path analysis or SEM are marked, a mark equals one point.

[1] In comparison to simple regression, logistic regression considers the probability that the dependent variable (in this case Corporate Performance or expected outcomes) will be influenced or reached (see [Backhaus et al., 2006, p. 426]).

[2] As the study is a product of the consultancy firm Deep White Unternehmens- und Wertekultur GmbH (Bonn), no details are publicly available about probabilities and factor loadings needed to understand the exact relationship between individual values and performance outcomes.

Author and Year	SEM	CF	Strength	Quality	R2	R4	Score
Denison [1984, 1990]*			++	++	•		7
Hansen and Wernerfelt [1989]*			++	–	•		4
Rousseau [1990]*			++	–	•		4
Calori and Sarnin [1991]*		•	+	+	•	•	7
O'Reilly et al. [1991]			+	+			4
Kotter and Heskett [1992]*		•	–	++		•	7
Gordon and DiTomaso [1992]*			+	++	•		6
Marcoulides and Heck [1993]*	•		++	+	•		7
Deshpandé et al. [1993]*			++	+	•		6
Denison and Mishra [1995]*			++	++	•		7
Petty et al. [1995]*			–	+			3
Wilderom and Van den Berg [1998]*	•		–	+			4
Christensen and Gordon [1999]*			+	+	•	•	4
Homburg and Pflesser [2000]		•	+	+	•		6
Flamholtz [2001]			+	–	•		3
Fey and Denison [2003]*		•	+	+	•	•	5
Fulmer et al. [2003]*			+	+	•		5
Filbeck and Preece [2003]*			+	+	•		4
Herrmann et al. [2004]*	•		++	++			9
Denison et al. [2004]			++	++	•		8
Deshpandé and Farley [2004]			++	++	•		7
Flamholtz and Kannan-Narasimhan [2005]	•		+	+	•		5

Table 3.10: Corporate Culture and Corporate Success - Assessment of Bivariate Analyses (Source: own analysis)

- **CF**: studies revealing the relevance of contingency factors (e.g., impact of environment or industry on the relationship between Corporate Culture and Corporate Success), a mark equals one point.
- **Strength**: Claimed strength between variables Corporate Culture (A2) and Corporate Success (C) assessed on a three point scale from ++ (strong effect of A2 on C, equals 2 points) to + (effect of A2 on C confirmed, equals 1 point) or – (effect of A2 on C not confirmed) based on qualitative comparison (own analysis according to the descriptions in each study). A strong effect equals 2 points, a confirmed effect equals one point.
- **Quality**: Quality of the study assessed based on fulfillment of five criteria concerning data sample and operationalization: 1.) cross-sectional, 2.) multinational study with 3.) high number of respondents (>500), 4.) a multidimensional definition of Corporate Culture (A2) and 5.) a multidimensional definition of Corporate Success (C). Fulfilling (≥ 4) criteria gives a rating of ++ , fulfilling (≥ 2) criteria a rating of +, below 2 a rating of –. Points are given according to exact number of fulfillment (e.g., fulfilling all 5 criteria equals 5 points).
- **R2** and **R4** (Relevance): studies which help to answer research questions R2 and/ or R4 imposed in section 1.2 are marked, a mark equals one point.
- **Score**: total score calculated as the sum of all points across the criteria (i.e., all marks and fulfillment of the strength and quality criteria), with a maximum of 11 reachable points per study.

The studies analyzed by Baetge et al. [2007] are marked with an asterisk (*). Those studies providing input to the formulation of the hypotheses above are highlighted by a grey shading. Most of them have the highest score overall.

3.3.2 Multivariate Analyses of Corporate Culture and Corporate Success

In comparison to bivariate analysis, which simultaneously analyses two variables, multivariate analysis is the simultaneous analysis of three or more variables (see Greatorex [2010]). The minority of studies listed in table 3.9 take into account that the relationship between Corporate Culture and Corporate Success is mediated or moderated by other variables.

Ogbonna and Harris [2000] investigate the association between the three concepts organizational culture, leadership, and organizational performance, providing evidence that the relationship between leadership style and performance is mediated by organizational culture. This insight provides the key hypothesis H[B2-C]1, supporting section 3.6.4 (Hypothesized Impact of Leadership Style) and the research framework of this thesis (see [Ogbonna and Harris, 2000, p. 781]). Furthermore, Ogbonna and

H[B2-C]1:	Leadership Style is not directly linked to Corporate Success (but is indirectly associated via Corporate Culture).

Harris [2000] find that cultural strength is not linked to performance if the culture is internally focused and characterized by integration, internal cohesiveness, and uniformity (see [Ogbonna and Harris, 2000, p. 781]). This supports the hypothesis put forward by Rousseau [1990] and Deshpandé et al. [1993] that relatively closed, internally or security-oriented cultures relate to poorer performance, most notably in the long term (see Denison [1990]). On the other hand, it contradicts the finding of other authors that cultural strength is positively linked with success (see Calori and Sarnin [1991]; Kotter and Heskett [1992]; O'Reilly et al. [1991]), at least in the short term (see Denison [1990]). In contrast, Ogbonna and Harris [2000] confirm that externally oriented cultures are positively linked with performance and conclude that "strongly held values are appropriate only if the culture is geared toward the external environment" ([Ogbonna and Harris, 2000, p. 782]). Sustainable competitive advantages can only be reached if an organization's culture is adapted to external contingencies, undermining the hypotheses formulated by Deshpandé et al. [1993], Homburg and Pflesser [2000] and Denison et al. [2004].

Carmeli and Tishler [2004] perceive an absence of large-sample studies demonstrating how organizational elements, independently, complementarily and interactively, may or may not enhance performance. Their study is dedicated to a multivariate analysis of the public sector, examining local government authorities in Israel. The results indicate that six intangible organizational elements (managerial capabilities, human capital, internal auditing, labor relations, organizational culture, and perceived organizational reputation), together with environmental uncertainty and geographical location, strongly affect and explain organizational performance (reflected by financial

performance, employment rate, municipal development, and internal migration[1]). They provide mutually enhancing interactions toward Corporate Success. The two intangible elements organizational culture and perceived organizational reputation are found to be the measures having the biggest impact on Organizational Performance.

Yilmaz et al. [2005] provide a research framework in which cultural strength acts as a mediator between customer and learning orientation and performance, in turn additionally affected by factors of national culture. Figure 3.6 presents their hypothesized model, slightly modified to show the link to the framework of this research (see also figure 2.14 in section 2.7). Their tested model supports three general theses (see [Yilmaz et al., 2005, p. 1347]):

1. Customer- and learning-oriented value systems act both jointly and independently as drivers of superior organizational performance.
2. Customer- and learning-oriented value systems are more likely to develop if complemented by appropriate factors of national culture.[2]
3. To reach even higher effectiveness, customer- and learning-oriented value systems are to be supported by a strong corporate culture.

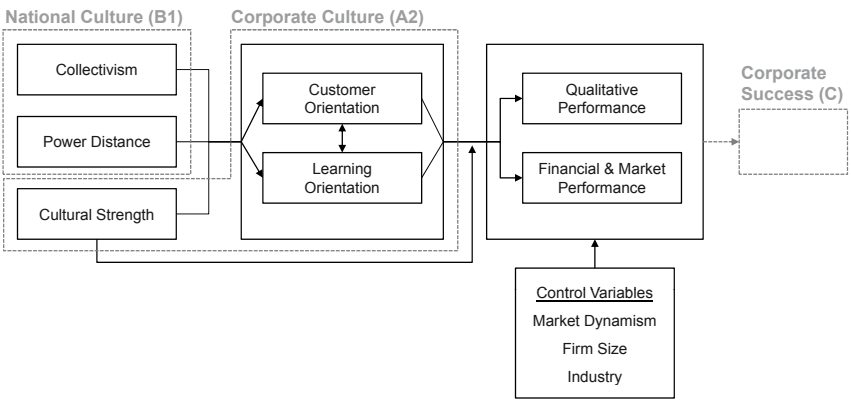

Figure 3.6: Model of Yilmaz et al. [2005] - Joint effects on firm performance (Source: [Yilmaz et al., 2005, p. 1342])

[1]For a detailed overview of the operationalizations see [Carmeli and Tishler, 2004, p. 1263].
[2]This point will be discussed further in section 3.5 (The Impact of National Culture).

In the case of Turkey, customer- and learning-oriented value systems are easier to develop when complemented by a collectivist national culture and a strong corporate culture (see [Yilmaz et al., 2005, p. 1349]). Building upon the previous propositions, hypothesis H[A2-C]4 can be defined.

H[A2-C]4:	A Corporate Culture's strength mediates the relationship between Corporate Culture and Corporate Success.

Skerlavaj et al. [2007] also dedicate their work to organizational learning culture (OLC) and its improvement of organizational performance. On the basis of data from Slovenian companies and structural equation modeling, their results show a positive direct impact of OLC on all three elements of non-financial performance (employee, customer, and supplier perspective) and a positive indirect effect on financial performance (via the employee perspective). OLC is therefore embedded in the popular CVF, confirming that the investigated firms are in reality a combination of all four ideal types of culture (see [Skerlavaj et al., 2007, p. 361]) and supporting the balanced culture hypothesis by Quinn [1988] and Denison [1990].

Another multivariate study which draws attention to the balanced culture hypothesis has been recently published by **Yilmaz and Ergun [2008]**. They recognize the need to simultaneously complement internal integration and coordination with external adaptability to be successful (see [Yilmaz and Ergun, 2008, p. 291]). Taking the model of four cultural traits by Denison [1984, 1990], they collect data from 100 manufacturing firms in Turkey to obtain insight into the dynamics between these cultural traits and a wide variety of effectiveness measures (sales and market share growth, ROA, quality improvements, new product development capability, employee satisfaction, and overall firm performance). As all traits influence performance, Yilmaz and Ergun [2008] recommend focusing on all cultural elements to improve a broad spectrum of effectiveness measures. Regarding the balanced culture hypotheses, they conclude that (see [Yilmaz and Ergun, 2008, p. 303])

- imbalances between adaptability (A) and mission (M) and between involvement (I) and consistency (C) negatively affect relevant measures of firm effectiveness;
- imbalances between mission (M) and involvement (I) and between adaptability (A) and consistency (C) improve certain effectiveness measures.

Just as Yilmaz et al. [2005] determine cultural strength as a mediator between Corporate Culture and Corporate Success, **Gregory et al. [2009]** examine employee attitude as a potential mediator. Conducting their study in 99 healthcare facilities across the US, they provide another application of the CVF (as it is described by Denison and Spreitzer [1991]) and support the balanced culture hypothesis as well. They observe that balanced cultures achieve higher levels of patient satisfaction. At the same time, culture impacts employee attitudes (measured by employee and physician satisfaction), which in turn have an impact on the studied outcome variables (controllable expenses and patient satisfaction). In sum, the two hypotheses H[A2-C]5 and H[A2-C]6 are supported (see [Gregory et al., 2009, p. 675]).

H[A2-C]5:	Companies with strong, well-balanced cultures will achieve higher levels of performance than companies with unbalanced cultures.
H[A2-C]6:	Employee attitudes and motivation will mediate the relationship between corporate culture and corporate performance.

Focusing on attitudes and satisfaction in a different sector, **MacIntosh and Doherty [2009]** provide a similar framework to that of Gregory et al. [2009] but for the fitness industry. Job satisfaction of fitness staff in Canada is found to partially mediate the link between Organizational Culture and Intention to Leave, which supports that job satisfaction predicts turnover intention (see [MacIntosh and Doherty, 2009, p. 9]). A customized tool is used for measurement (CIFO), incorporating the industry-specific aspects of culture and adding to the precise and meaningful analysis conducted in this study.

Yet another mediator between culture, structure, strategy, and effectiveness has been identified by **Zheng et al. [2009]**. As a systematic and integrative process of coordination, knowledge management is found to fully mediate the impact of organizational culture on organizational effectiveness while partly mediating the link between structure and strategy to effectiveness.

The hypothesized model presented in figure 3.7 (taken from [Zheng et al., 2009, p. 4]) provides a next step in finding the deeper mechanisms between Organizational Culture and performance, emphasizing the inadequacy of examining only a direct linkage between the two concepts (see [Zheng et al., 2009, p. 7]). Culture determines the basic beliefs, values, and norms necessary for the implementation of other third instruments

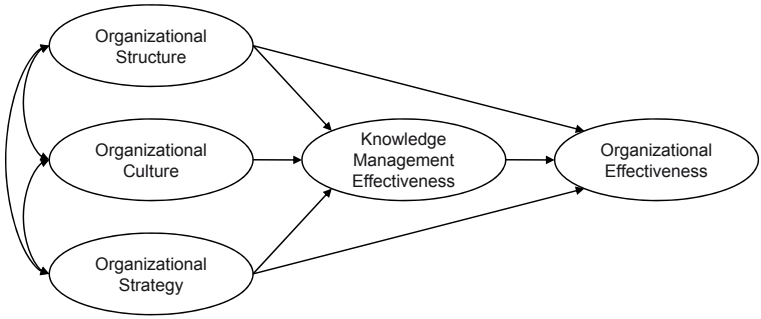

Figure 3.7: Model of Zheng et al. [2009] - Knowledge Management as mediator between an organization's context and effectiveness (Source: [Zheng et al., 2009, p. 4]

acting as accelerators to performance, e.g., regarding the why and how of knowledge generation, sharing, and utilization in an organization (see [Zheng et al., 2009, p. 7]). Transferring this insight to Lean Six Sigma leads to hypothesis H[A2-C]7.

H[A2-C]7:	The relationship between Corporate Culture and Corporate Success is (partly) mediated by Lean Six Sigma.

In line with the assessment in the previous section, table 3.11 confirms the **high value and relevance of the multivariate studies in answering the research questions**. Almost all of them provide good insight for the creation of valuable hypotheses (indicated by the grey shading).

Author and Year	SEM	CF	Strength	Quality	R2	R4	Score
Ogbonna and Harris [2000]	•	•	++	+	•	•	9
Carmeli and Tishler [2004]		•	++	+	•	•	7
Yilmaz et al. [2005]			++	++	•		7
Skerlavaj et al. [2007]	•		++	+	•		7
Yilmaz and Ergun [2008]			++	++	•		7
Gregory et al. [2009]			++	+	•		5
MacIntosh and Doherty [2009]			+	+	•		4
Zheng et al. [2009]			++	+	•		5

Table 3.11: Corporate Culture and Corporate Success - Assessment of Multivariate Analyses (Source: own analysis)

3.3.3 Hypothesized Relationship between Corporate Culture and Corporate Success

Baetge et al. [2007] raise a couple of reasons why a meta-analysis of the reviewed studies is not possible (see [Baetge et al., 2007, p. 207]):

- The operationalizations of Corporate Culture and Corporate Success depend on the authors' perspectives and individual research goals (and they do not necessarily correspond with the measurement approach).
- A heterogeneous landscape of measurement approaches exist (e.g., most questionnaires have 5- or 7-point Likert scales but show different complexity and lengths of item batteries).
- The studies focus on very different industries and types of organizations (with very different sample sizes).
- The type and sophistication of analysis varies (e.g., simple correlation and regression vs. complex causal SEM).

Most of the reviewed studies do not use structural equation modeling for their analysis (except Marcoulides and Heck [1993] and Wilderom and Van den Berg [1998]) and can be viewed inferior to the multivariate studies presented in section 3.3.2 or the studies focusing on path analysis to examine the relationship between TQM and performance (see table 3.7) in terms of methodological strength.

However, independent of the type and complexity of the model, a number of the reviewed studies conclude that **culture must not only be strong** (widely shared) **but also have unique qualities that cannot be imitated** (see [Ogbonna and Harris, 2000, p. 769] according to Denison [1990] and Gordon and DiTomaso [1992]), **in order to lead to superior performance**. These two propositions are reflected in the hypotheses which have been derived above. Opposing the conclusion by Baetge et al. [2007] that a meta-analysis is not possible, table 3.12 and figure 3.8 summarize a selection of the hypotheses seen as a common denominator (as mentioned in section 3.1 and visible in the text, additional hypotheses have been created but not highlighted and given a unique identifier). This is not to neglect the diversity of the very different studies, research approaches, and hypotheses but to identify central propositions for this research.

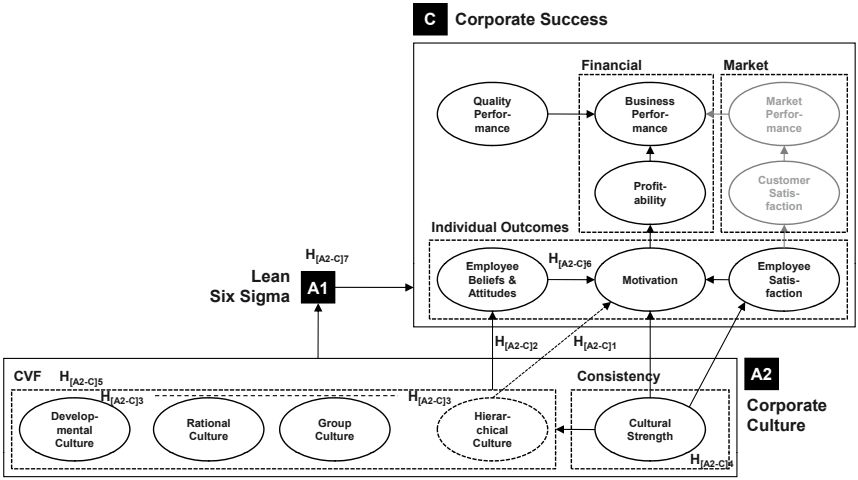

Figure 3.8: Extract of Hypothesized Model (A2-C) - Links between Corporate Culture and Corporate Success (Source: own figure)

Two measurement instruments have been used most frequently and stand out among the studies investigating the relationship between Corporate Culture and Corporate Success: **the Denison Organizational Culture Model** by Denison [1984] has been used eight times (with the complete four dimensions adaptability (A), mission (M), consistency (C), and involvement (I)), and **the Competing Values Framework (CVF)**, originally by Quinn [1988], has been used five times. These two approaches are the most suitable ones to be used in this research.[1] As the following sections will show, the CVF has been favored to study the link between Corporate Culture and Lean Six Sigma, National Culture, and Leadership, so that the relationships and hypotheses presented in table 3.12 and figure 3.8 rely on this concept.

[1] Baetge et al. [2007] provides an alternative draft for a new measurement concept, claimed to reflect the least common denominator of most studies. This concept is in an early development stage, lacking empirical and appropriate validity and reliability testing (see [Baetge et al., 2007, p. 211f.]), and will therefore not be considered for this research.

Hypothesis	Assumed Relationship
H[A2-C]1	A hierarchical corporate culture does not contribute to corporate effectiveness and thus negatively impacts Corporate Success.
H[A2-C]2	The more the individual values are congruent with the corporate values (as part of the existing Corporate Culture), the higher the individual/employee outcomes.
H[A2-C]3	Relatively open, externally oriented (developmental) corporate cultures relate to better performance, while relatively closed, internally (hierarchical) oriented corporate cultures relate to poorer performance.
H[A2-C]4	A Corporate Culture's strength mediates the relationship between Corporate Culture and Corporate Success.
H[A2-C]5	Companies with strong, well-balanced cultures will achieve higher levels of performance than companies with unbalanced cultures.
H[A2-C]6	Employee attitudes and motivation will mediate the relationship between corporate culture and corporate performance.
H[A2-C]7	The relationship between Corporate Culture and Corporate Success is (partly) mediated by Lean Six Sigma.

Table 3.12: Relationship between Corporate Culture and Corporate Success - Overview of hypotheses (Source: own analysis)

3.4 The Relationship between Corporate Culture and Lean Six Sigma

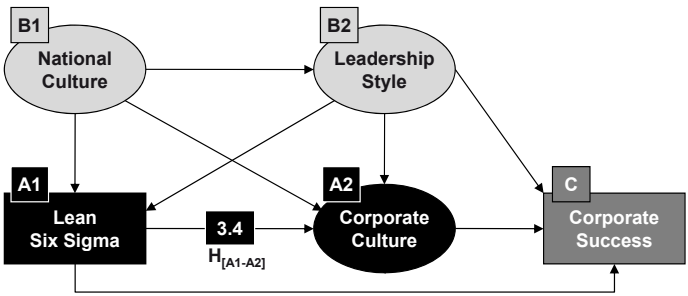

Figure 3.9: Flow of Section 3.4 - Relationships examined (Source: own figure)

Research on motivational factors and their influence on quality management outcomes is scant (see [Linderman et al., 2006, p. 779]). Just as there are few surveys studying the relationship between Lean Six Sigma and Corporate Success (see section 3.2), few results are provided by literature review on the relationship between Corporate Culture and Lean Six Sigma. The findings are more preliminary than for the

studies linking Corporate Culture with Corporate Success.

After the literature review is once more expanded to encompass broader concepts (i.e., Six Sigma (6S), Quality Management (QM), TQM, and Organizational Culture (OrgCult)), at least 14 relevant publications can be identified (see table 3.13). That most of the publications date from the last couple of years emphasizes the increased interest in the topic.

Author and Year	QM Variable (Framework)	Culture Variable (Framework)
Zu et al. [2006, 2010]	6S, TQM	OrgCult (CVF)
Stache and Töpfer [2009]	L6S	CorpCult
McNabb and Sepic [1995]	TQM	OrgCult, Climate
Kekäle and Kekäle [1995]	TQM	CorpCult
Chang and Wiebe [1996]	TQM	OrgCult (CVF)
Zeitz et al. [1997]	TQM	OrgCult
Dellana and Hauser [1999]	TQM (MBNQA)	OrgCult (CVF)
Al-khalifa and Aspinwall [2000]	TQM	OrgCult (CVF)
Irani et al. [2004]	TQM	OrgCult
Philip and McKeown [2004]	TQM	OrgCult
Prajogo and McDermott [2005]	TQM (MBNQA)	OrgCult (CVF)
Dahlgaard and Dahlgaard-Park [2006]	TQM, Lean, 6S	OrgCult
Cheng and Liu [2007]	TQM	OrgCult
Naor et al. [2008]	QM	OrgCult (CVF)

Table 3.13: Relationship between Lean Six Sigma and Corporate Culture - Publications analyzing the link between Quality Management and Organizational Culture (Source: own analysis)

Table 3.13 does not include studies that cover both Corporate (or Organizational) and National Culture. These will be reviewed in section 3.5.1.

3.4.1 Six Sigma and Corporate Culture

Zu et al. [2006, 2010] collect data from 226 manufacturing plants in the US to examine how organizational culture is related to quality practices associated with Six Sigma implementation. Using structural equation modeling, they link the four cultural orientations defined by the CVF with ten quality practices, seven for TQM and three for Six Sigma.[1]

[1]The publication by Zu et al. [2006] broadly overlaps with Zu et al. [2010] in content, i.e., refers to the same literature review and research design, suggesting it to be the preliminary work for Zu et al. [2010]. As some key thoughts mentioned in Zu et al. [2006] do not appear in Zu et al. [2010], both

As different culture types affect different practices, a comprehensive environment simultaneously supporting multiple and competing cultural value types is needed to achieve the full benefits of quality management practices like Six Sigma (see [Zu et al., 2010, p. 100] and [Zu et al., 2006, p. 25]). More specifically, this **balanced culture hypothesis** (according to Denison [1990]; Quinn [1988]) is supported by the following empirical results (see [Zu et al., 2010, p. 97f.]):

- **The group culture** is significantly related to seven of ten TQM and Six Sigma practices (confirming the findings by Prajogo and McDermott [2005] and Naor et al. [2008], see also section 3.4.3). With its emphasis on commitment and cooperation, the group culture encourages open communication and employee involvement and accelerates continuous improvement efforts.
- **The rational culture** is significantly related to the majority of TQM and Six Sigma practices (nine of ten). The emphasis on productivity, achievement, and clearly defined objectives supports the use of quality information and the pursuit of superior quality and competitiveness, and raises customer understanding.
- **The developmental culture** is significantly related to only one practice, namely, Six Sigma role structure. The focus on individuality and flexibility fits with the allocation of Six Sigma experts according to nature of the tasks, training status, and expertise.
- **The hierarchical culture** has no significant links to any of the investigated TQM and Six Sigma practices and is therefore the least influential compared to the other three culture types (confirming the lack of significance of hierarchical culture for organizational effectiveness noticed by Cameron and Freeman [1991]; Quinn and Spreitzer [1991]; Rousseau [1990]; Yeung et al. [1991]).

As the main conclusion, Zu et al. [2006, 2010] derive two possible relationship directions between culture and Lean Six Sigma (adapted according to [Zu et al., 2010, p. 100]):

1. **Lean Six Sigma must fit to the existing Corporate Culture to succeed.**
2. **Lean Six Sigma implementation may change a Corporation's Culture.**

Zu et al. [2006, 2010] emphasize that to prove this (complex) reciprocal relationship, longitudinal approaches seem to be necessary (see [Zu et al., 2010, p. 100]).

publications are considered here.

3.4.2 Lean Six Sigma and Corporate Culture

The only publication examining the relationship between Lean Six Sigma and Corporate Culture has been published by **Stache and Töpfer [2009]**. Analyzing the situation of Lilly Deutschland GmbH, the German affiliate of the international pharmaceutical corporation Eli Lilly, the level of cultural maturity for Lean Six Sigma implementation could be measured by passing a customized questionnaire to 100 employees. As a final result, strengths and weaknesses of the existing Lean Six Sigma culture[1] could be identified in various areas, influencing employee involvement (see figure 3.10, based on [Stache and Töpfer, 2009, p. 346]).

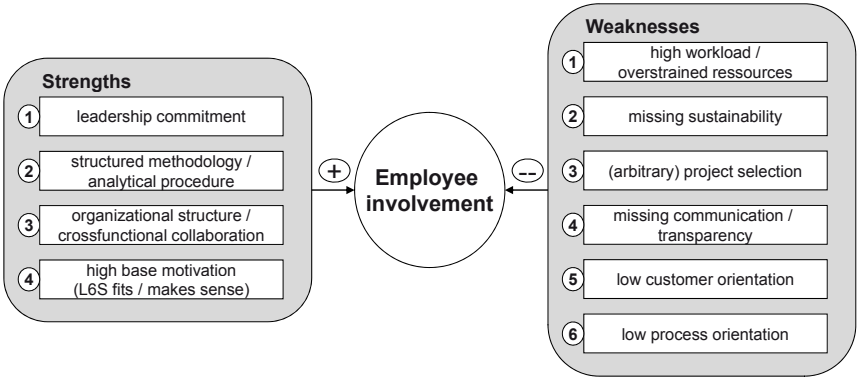

Figure 3.10: Results of Stache [2007] - Strengths and weaknesses of the Lean Six Sigma Culture at Lilly Germany (Source: [Stache and Töpfer, 2009, p. 346])

Data and results are based on the research of Stache's Master Thesis in 2007 (see Stache [2007]; for a comprehensive overview of the research methodology see also [Töpfer, 2009a, p. 294f.]). Although the evaluation takes into account rudimentary behavioral concepts of HR management (e.g., Voigt and Jöns [2005]; Wunderer and Jaritz [2006]) and popular cultural definitions and typologies (e.g., Deal and Kennedy [1982]; Heinen and Fank [1997]; Sackmann [2004]), it does not rely on more sophisticated cultural frameworks (e.g., CVF, Denison's Model) and is limited to a descriptive

[1] That is, the conjunction between existing Corporate Culture and Lean Six Sigma

analysis. A complete causal model (using structural equation modeling) is neither hypothesized nor tested. Overall, Stache and Töpfer [2009] provide first evidence for the propositions of this research, which aims at a much higher standard due to the following goals:

- The relationship between Corporate Culture and Lean Six Sigma is embedded into a larger framework, including the additional variables National Culture, Leadership Style and Corporate Success.
- A comprehensive Literature Review is provided for all possible relationships between these five components, uncovering multiple definitions and sophisticated frameworks from different disciplines.
- The empirical testing relies on structural equation modeling and follows, in comparison to the rather descriptive and instrumental exploratory approach by Stache [2007] (see [Töpfer, 2009a, p. 295]) an explicative, confirmatory design (see [Töpfer, 2009a, p. 124] and [Fritz, 1995, p. 60]).

3.4.3 TQM and Corporate Culture

Stating that managers are victims of culture, and change a victim of implementation processes (see [McNabb and Sepic, 1995, p. 369f.]), **McNabb and Sepic [1995]** build a model of culture, climate, policies, performance outcomes, and readiness to change (see figure 3.11, simplified according to [McNabb and Sepic, 1995, p. 370]), to investigate the dynamics for a multiunit federal agency.

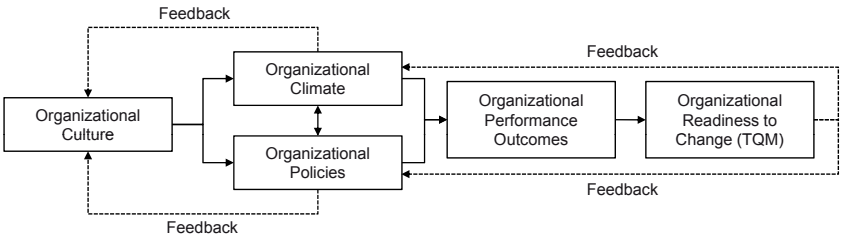

Figure 3.11: Model of McNabb and Sepic [1995] - Factors determining readiness for change to a TQM operation (Source: [McNabb and Sepic, 1995, p. 370])

The specific differentiation in this model is convincing. While Organizational Culture consists of, e.g., structure, technology (a set of tactics to do tasks), and social interactions, climate is defined as, e.g., the environment and communication. Climate is therefore seen as the result of culture, "a reflection of culture that is distorted by the qualities and abilities of people in the group" ([McNabb and Sepic, 1995, p. 373]). This "atmosphere" (Dastmalchian et al. [1991]) of an organization emerges from the social interactions, which in turn can be differentiated into three levels of human behavior and cognition (creations, values, and basic assumptions (see the model by Schein [1984])). Together with policies (measured by attitudes toward training and development and reward systems), climate relates to job performance and job satisfaction as performance outcomes.[1] The model closes with the assumption that positive performance and satisfaction lead to higher readiness to accept TQM, i.e., **happy and secure employees who perform well are more willing to accept a new concept** (see [McNabb and Sepic, 1995, p. 376]).

As culture dictates acceptance of all organizational change, the authors claim two possible directions to prevent resistance against a successful TQM implementation:

- Culture and climate are measured and adjusted before TQM change is begun.
- Change to TQM is adjusted to fit with the existing culture and climate.

The results of the survey (sample of 256 respondents from five federal agencies) favor the first option, i.e., change to TQM can take place only if adequate time is given to assess and modify the existing culture and climate first. This argumentation, however, cannot be clearly traced, as neither is the questionnaire disclosed, nor a causal analysis performed.[2]

Kekäle and Kekäle [1995] attempt to find a least resistance TQM model, i.e., a set of practices in harmony with the existing corporate culture (see [Kekäle and Kekäle, 1995, p. 215]); one that works in multiple companies. They rely on written case studies concerning six companies in the UK, case studies rooted in the research project and publications by Wilkinson et al. [1994, 1992]. The results suggest outcomes are best

[1] As Fisher [1980] noted, a strong or consistent relationship between job satisfaction and job performance cannot be found, as the two variables differ in specificity: satisfaction is a general attitude and performance a specific behavior.

[2] McNabb and Sepic [1995] use discriminant analysis to prove their points, although their initial model hinted more toward structural equation modeling.

if the basic assumptions (one level of the model by Schein) of an existing Corporate Culture match the assumptions of the TQM approach. In practice, Kekäle and Kekäle [1995] give the same recommendation as McNabb and Sepic [1995]: to perform an unbiased analysis of the Corporate Culture first, before the introduction of quality programs. TQM is to be seen as a "long-term strategic choice" ([Kekäle and Kekäle, 1995, p. 218]), requiring enough time and continuity for implementation.

Interviewing a panel of eleven experts from the Conference Board Total Quality Management Centre, **Chang and Wiebe [1996]** evaluated the ideal organizational culture embodied by a TQM philosophy. Using the CVF, they found that group and developmental cultures appeared to be dominant, although all four culture types (group, developmental, hierarchical, and rational) were assessed as supporting TQM.

In their reduced instrument, **Zeitz et al. [1997]** link seven TQM[1] and five culture dimensions[2] in a survey of 54 items. Deriving data from 886 respondents, they employ SEM, considering the five cultural factors as the independent variables which determine the level of seven TQM practices as the dependent variables (see [Zeitz et al., 1997, p. 426]). In essence the model reveals that trusting social relationships and communication are key prerequisites for a successful TQM program (see [Zeitz et al., 1997, p. 433]).

Like Chang and Wiebe [1996] and Zeitz et al. [1997], the authors **Dellana and Hauser [1999]** consider organizational culture as the antecedent of TQM practices. Using the MBNQA criteria to represent TQM practices and the CVF to represent organizational cultures, Dellana and Hauser [1999] test the association between each of the six TQM elements and the four cultural dimensions of the competing values model. Their approach and findings turn out to be very similar to Chang and Wiebe [1996]: both group and developmental culture are associated with high MBNQA scores.

Al-khalifa and Aspinwall [2000] also use the CVF to measure Organizational Culture but leave out an additional measurement for TQM. Quality experts in the UK are asked to assess how the ideal cultural characteristics described in the CVF will support the TQM philosophy and its implementation, without giving a further definition of TQM (see [Al-khalifa and Aspinwall, 2000, p. 1039]). The results match with the findings of Chang and Wiebe [1996] and Dellana and Hauser [1999]: the ideal

[1] Management support, suggestions, use of data, supplies, supervision, continuous improvement, and customer orientation

[2] Job challenge, communication, trust, innovation, and social cohesion

culture types that support TQM implementation are group and developmental culture (see [Al-khalifa and Aspinwall, 2000, p. 1037]).

Irani et al. [2004] use a case study to explore the synergy between continuous improvement and innovation, two corporate success factors achieved through a Total Quality Culture. They argue that delighting customers becomes a key priority in highly competitive markets and that the implementation of continuous improvement and innovation depends on "a blend of creativity, clear thinking, and the ability to get things done" ([Irani et al., 2004, p. 647]). A successful Corporate Culture in this (TQM) context is nurtured by characteristics on both the organizational and individual level (see table 3.14 and [Irani et al., 2004, p. 647f.]).

	Organizational Characteristics		Individual Characteristics
1.	Free information flow for innovative data mining	1.	Project aims and benefits are clearly defined
2.	Close relationships between employees through frequent lateral and vertical contact	2.	Strong coalition and support by everyone involved in a project
3.	Emphasis on and tradition of teamwork and team rewards	3.	Employees have courage and take calculated risks when setbacks occur
4.	Authentic leaders who believe in innovation and provide necessary resources and support	4.	Participative management style by leaders, who mobilize people to fully contribute to project work
		5.	Personal involvement for sustainable project outcomes (especially after initial project enthusiasm has faded away)
		6.	Handling of project resistance and interferences (including dangerous covert forms)

Table 3.14: Key Findings of Irani et al. [2004] - Characteristics encouraging continuous improvement and innovation (Source: see [Irani et al., 2004, p. 647f.])

Drawing upon the cultural theory of grid and group, rooted in anthropology (based on Douglas [1970]), **Philip and McKeown [2004]** use the same method and derive similar conclusions to Irani et al. [2004]. In their case study of a single engineering/aerospace company in the UK, the best mix of cultural typologies is market-led and team-based, with the retainment of some hierarchical aspects to co-ordinate the activities of the company as a whole (see [Philip and McKeown, 2004, p. 635]). Within these cultural directions, the critical success factors (which influence each other) are (see [Philip and McKeown, 2004, p. 635])

- Building a close community through teamwork,
- Developing trust among employees to share tacit knowledge,

- Enhancing vertical and horizontal communication,
- Fostering innovation and entrepreneurship through unique planning approaches and openness to new ideas.

The study by **Prajogo and McDermott [2005]** can be seen as the antecedent or initiator of the publications by Skerlavaj et al. [2007] and Zu et al. [2010]. They link different subsets of TQM practices with different types of cultures, taking the CVF as a base for the cultural typology and the MBNQA[1] criteria to measure the TQM practices. Following the argument that corporate culture affects TQM implementation, and not the other way around (see also the two possible relationship directions between culture and Lean Six Sigma according to [Zu et al., 2010, p. 100]), Prajogo and McDermott [2005] follow the earlier studies examining the TQM-culture relationship (see Chang and Wiebe [1996]; Dellana and Hauser [1999]; Zeitz et al. [1997]). The results support the pluralist view[2] and again the balanced culture hypothesis according to Quinn [1988] and Denison [1990]. According to Prajogo and McDermott [2005], TQM calls for the use of contrasting management styles and cultural activities, a coexistence of control and people-centered practices. This flexibility to switch between contrasting models is also known as the "ambidextrous" approach (see Tushman [1996]) and contradicts the traditional unitarist view[3] of TQM.

Analyzing the overlapping principles of Lean Production, Six Sigma and TQM, **Dahlgaard and Dahlgaard-Park [2006]** discuss how to build a successful Corporate Culture for these management philosophies. In line with the argumentation in section 2.1.3, Lean Production and Six Sigma are classified as new roadmaps of TQM. Through pure literature research and comparative cases, Dahlgaard and Dahlgaard-Park [2006] recommend building quality into people by satisfying both their spiritual and mental needs in a balanced way (see [Dahlgaard and Dahlgaard-Park, 2006, p. 277]). As a prevailing focus on training tools and techniques masks the human factor and obscures how to build the right Corporate Culture (see [Dahlgaard and Dahlgaard-Park, 2006, p. 279]), the quality strategy is to be implemented through a combination of top-down

[1] Malcolm Baldrige National Quality Award

[2] Demanding the existence of a multidimensional culture for successful TQM implementation (see [Prajogo and McDermott, 2005, p. 1107]

[3] "The unitarist approach considers TQM as a unidimensional set (or package) of practices, which needs to be supported by one specific type of culture" ([Prajogo and McDermott, 2005, p. 1106]).

and bottom-up approach, creating a quality culture on three levels (see table 3.15, simplified according to [Dahlgaard and Dahlgaard-Park, 2006, p. 278]).

Individual	Team	Organization
Creativity and self motivation	Communication skills	System thinking
Meta-skills (learn to learn)	Dialog and discussion skills	Organizational communication
Mental paradigm	Balancing inquiry/advocacy skills	Support system[1]
Proactivity and autonomy	Emphatic listening	Strategic plan for CV and CC
Positive thinking	Respect others/differences	Policy deployment
Right choice, know CV/CC[2]	Win/win paradigm	Leadership

Table 3.15: TQM implementation according to Dahlgaard and Dahlgaard-Park [2006] - Corporate Culture elements on three levels (Source: [Dahlgaard and Dahlgaard-Park, 2006, p. 278])

All the critical factors listed in table 3.15 are interrelated, e.g., the shared vision of an organization is broken down into team goals and personal visions (see [Dahlgaard and Dahlgaard-Park, 2006, p. 278]). Understanding these interrelations enables the successful implementation of the quality management concept in focus.

Following the earlier findings of Kekäle and Kekäle [1995], Dellana and Hauser [1999] and Al-khalifa and Aspinwall [2000], the authors **Cheng and Liu [2007]** investigate the relationship between Organizational Culture and TQM in construction firms in Hong Kong. They also use the CVF to measure Organizational Culture but rely on the ECI Measurement Matrix of the European Construction Institute to measure the firm's progress toward total quality (see [Cheng and Liu, 2007, p. 12]). Results indicate the ideal TQM culture to be hierarchical for the dimensions leadership, organization glue, and criteria of success; a clan culture is preferred for the management of employees and an adhocracy culture for strategy ([Cheng and Liu, 2007, p. 14]). Caution is advised though, as these findings are based on a very small sample of nine contractors.

Naor et al. [2008] analyze manufacturing practices in six countries (Sweden, United States, Japan, Finland, South Korea, and Germany[3]) and test two alternative models (a mediation and a moderation model) to investigate the relationship between Organizational Culture, core and infrastructure quality, and performance. Due to its large employment in theory and practice and the close relation to quality management,

[2]Motivation, training and education

[2]CV = core values, CC = core competencies

[3]The sample consists of approximately 30 plants per country (see [Naor et al., 2008, p. 687]).

CVF is used to measure Organizational Culture (see [Naor et al., 2008, p. 673]). The core and infrastructure practices are measured using the instrument developed by Flynn et al. [1994]. From the results of regression analysis Naor et al. [2008] assume that culture has a significant relationship with infrastructure practices, involving more of the social and behavioral aspects of QM (see [Naor et al., 2008, p. 691]). In contrast, core practices have a more technical orientation, contain mechanistic activities, and rely more on analytical and mathematical skills. Interestingly, the infrastructure practices show a significant positive effect on manufacturing performance, while core practices do not, leading to the conclusion that **performance is more related to "soft" factors than to "hard" quality tools** (see [Naor et al., 2008, p. 692]). The following propositions can be derived from these findings (supporting hypothesis H[A1-C]4 listed in section 3.2.4):

- **Lean Six Sigma infrastructure practices (role structure) are positively related to performance.**
- **Lean Six Sigma core practices (structured procedure and focus on metrics) are negatively related to performance.**

Additionally, Naor et al. [2008] suggest that infrastructure practices can improve performance even without the presence of core practices (see [Naor et al., 2008, p. 693f.]). This raises the question whether Lean Six Sigma could be successfully implemented by focusing primarily on the role structure and shaping the existing Corporate Culture toward high levels of group, rational, and developmental traits. Also worth mentioning is that the exploration of a **direct link between culture and performance**[1] in their moderation model supports the findings of some studies reviewed in section 3.3.

Apart from the studies exploring the link between TQM and Organizational Culture, little research also relates Organizational Culture to the implementation of manufacturing practices (e.g., Bates et al. [1995]; McDermott and Stock [1999]; Nahm et al. [2004]; Yauch and Steudel [2002]; Zammuto and O'Connor [1992]). In essence, these studies produce similar findings, e.g., Nahm et al. [2004] use structural equation modeling to examine culture (based on the three level model by Schein [1984]), time-based

[1] Naor et al. [2008] measure manufacturing performance with subjective assessments of competition, on the four dimensions cost, quality, delivery, and flexibility.

manufacturing practices, and their effect on performance and show a correlation between these elements. The final scales they use are short and easy (see [Nahm et al., 2004, p. 596]) and will be considered again in chapters 4 and 5 for the development of the questionnaire.

3.4.4 Hypothesized Relationship between Lean Six Sigma and Corporate Culture

In line with the summaries provided in sections 3.2.4 and 3.3.3, the relationships between Lean Six Sigma and Corporate Culture are found to be complex and multidimensional. Table 3.16 and figure 3.12 depict the specific links and hypotheses between the two concepts.

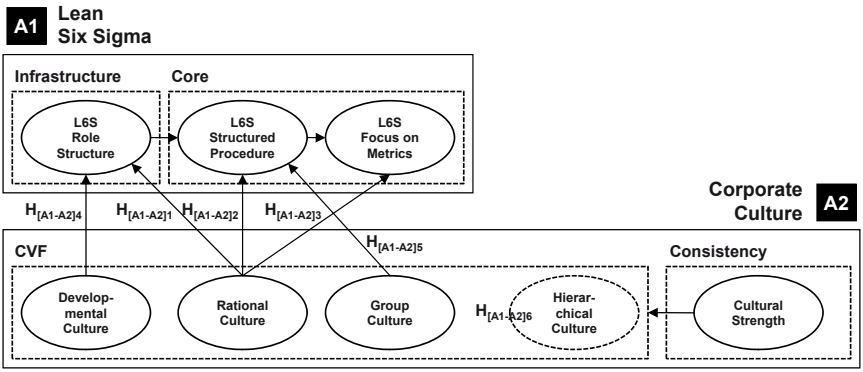

Figure 3.12: Extract of Hypothesized Model (A1-A2) - Links between Lean Six Sigma and Corporate Culture (Source: own figure)

The ideal culture types of the CVF are assumed to be linked in different ways with the three components of Lean Six Sigma. In line with the negative relationship assumed between hierarchy and motivation (see H[A2-C]1 in section 3.3.3), **a hierarchical Corporate Culture is not assumed to support Lean Six Sigma**.

Hypothesis	Assumed Relationship
H[A1-A2]1	A corporation's emphasis on the rational corporate culture will be positively associated with the level of Lean Six Sigma role structure.
H[A1-A2]2	A corporation's emphasis on the rational corporate culture will be positively associated with the level of Lean Six Sigma structured improvement procedure.
H[A1-A2]3	A corporation's emphasis on the rational corporate culture will be positively associated with the level of Lean Six Sigma focus on metrics.
H[A1-A2]4	A corporation's emphasis on the developmental corporate culture will be positively associated with the level of Lean Six Sigma role structure.
H[A1-A2]5	A corporation's emphasis on the group corporate culture will be positively associated with the level of Lean Six Sigma structured improvement procedure.
H[A1-A2]6	A corporation's emphasis on the hierarchical corporate culture will not be associated with any element of Lean Six Sigma.

Table 3.16: Relationship between Lean Six Sigma and Corporate Culture - Overview of hypotheses (Source: own analysis)

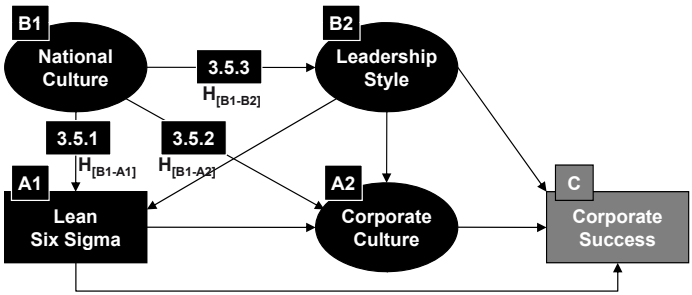

Figure 3.13: Flow of Section 3.5 - Relationships examined (Source: own figure)

3.5 The Impact of National Culture

3.5.1 National Culture and Quality Management

Expanding the literature review to include broader QM concepts by using a procedure similar to that of section 3.4 identifies 15 relevant publications which are listed in table 3.17.

3.5.1.1 Six Sigma and National Culture

As already mentioned, authors like Crom [2000] and Gowen [2002] have highlighted that Six Sigma needs to be implemented differently in various parts of the world (see

Author and Year	QM Variable (Framework)	Culture Variable (Framework)	Examined Countries
Schön [2006]	6S	CorpCult, NatCult (Trompenaars)	Sweden
Wong [2007]	Lean	CorpCult (Schein), NatCult (Hofstede)	Taiwan
Ijose [2009]	Lean	OrgCult (Schein), NatCult (Hofstede)	USA
Kanji and Yui [1997]	TQM	OrgCult, NatCult	UK, Japan
Tata and Prasad [1998]	TQM	OrgCult (CVF), NatCult (Hofstede)	n/a
Kroslid [1999]	QM	NatCult (Hofstede)	Worldwide (12 countries)
Mathews et al. [2001]	TQM	NatCult (Earley and Erez; Hofstede; Trompenaars)	UK, Finland, Portugal
Souza-Poza et al. [2001]	TQM (MBNQA)	OrgCult (CVF), NatCult (Hofstede)	USA, Switzerland, South Africa
Lagrosen [2002]	TQM	OrgCult, NatCult (Hofstede)	UK, Germany, France, Italy
Lagrosen [2003]	TQM	OrgCult, NatCult (Hofstede)	30 countries (Swedish MNC)
Flynn and Saladin [2006]	TQM (MBNQA)	NatCult (Hofstede)	USA, Japan, Germany, Italy, England
Kyoon Yoo et al. [2006]	QM	NatCult (Hofstede)	Korea, USA, Mexico, Taiwan
Jung et al. [2008]	TQM (MBNQA)	OrgCult based on NatCult (Hofstede)	USA, Mexico, China
Vecchi and Brennan [2009]	QM	NatCult (Hofstede)	Worldwide (23 countries)
Kull and Wacker [2010]	QM	NatCult (House et al.)	China, South Korea, Taiwan

Table 3.17: Relationship between Lean Six Sigma and National Culture - Publications analyzing the link between Quality Management and National Culture (Source: own analysis)

also [Schön, 2006, p. 405]).

Focusing on the relationship between Six Sigma and Corporate Culture, **Schön [2006]** provides a European view on the topic. Investigating the Six Sigma implementation at Volvo, Ericsson, and SKF in Sweden through semi-structured interviews, she found that effects of corporate and national culture are clearly notable and require a customized implementation approach, i.e., the terminology and infrastructure of Six Sigma might have to be created in a form more relevant for the corporate and national culture of an individual company, to be successfully implemented (see [Schön, 2006, p. 427]). With this key finding, she could confirm the earlier suggestions by Trompenaars [1993], Crom [2000] and Gowen [2002] that **improvement methodologies such as Six Sigma, should be implemented differently in different countries**.

3.5.1.2 Lean Management and National Culture

Considering that the inconsistencies of national cultures increase differences in Corporate Cultures and act as a barrier to the implementation of, e.g., lean production systems (see [Wong, 2007, p. 415]), **Wong [2007]** conducts case studies[1] in Taiwanese enterprises to reveal how they take an alternative path (reflected by self-directed working teams) in implementing lean thinking, a philosophy rooted in Japan. The analytical frameworks used are the four dimensions of National Culture by Hofstede [1980a] and the three level model of Corporate Culture by Schein [1984]. Wong [2007] identifies four culturally adaptive features for the implementation of Lean Production:

1. Personal engagement of the top manager, who expresses his strong ambition and (long-term) vision.
2. Support through external experts to ensure a diligent implementation.
3. Short-term incentives for teams and individuals are needed, especially in the beginning and for companies waiving long-term incentive systems like seniority-based wages.
4. The level of short-term incentives may decrease over time (indicator of change in value system).

[1] Wong [2007] collects data through a total of four in-depth interviews of 2–3 hours. Although he criticizes the current literature for only relying on single culture and comparative research (see [Wong, 2007, p. 414]), his approach is just as anecdotal.

Ijose [2009] also proposes that national and corporate culture have a direct impact on a company's value system and behavioral norms and therefore also on the execution of organizational practices (such as lean management practices, see [Ijose, 2009, p. 2]). Offering an integrative conceptual framework, the study describes how to connect the elements of national and corporate culture to gain sustained competitive advantages in the US automotive manufacturing sector. Again, the models by Hofstede [1980a] and Schein [1984] are taken as a reference point. The influence on employee and management behavior is seen on three levels: national culture, corporate culture and corporate subcultures. As the study's main purpose is limited to the development of a conceptual framework (for including culture in practice adoption studies), no empirical validation has been performed to prove the concept.

Overall, the two publications by Wong [2007] and Ijose [2009] reflect just a shallow dive into the dynamics between Lean Management and National Culture. They provide **conceptual drafts which lack adequate empirical testing** and cannot yet be generalized for multiple companies and industries.

3.5.1.3 (T)QM and National Culture

Using a paired comparison model, **Kanji and Yui [1997]** analyze and discuss the quality culture of 46 Japanese companies in the UK and their parent companies in Japan. Recognizing that a national background influences Organizational Culture, Kanji and Yui [1997] create a model of quality culture depicted in figure 3.14 (adapted according to [Kanji and Yui, 1997, p. 426]).

The difference in national culture leads to a great variation in motivation and peer recognition between Japan and the UK, summarized in the dissimilar characteristics shown in table 3.18 ([Kanji and Yui, 1997, p. 426]).

Interestingly, in contrast to the UK, Japan shows little difference in cultural profile between companies with and without TQM, suggesting that the underlying national culture is more suitable, i.e., has a better fit, for TQM.

Tata and Prasad [1998] provide a conceptual model that links selected elements of the CVF with selected dimensions of the national culture framework of Hofstede [1980a]. The authors hypothesize that in national cultures with high power distance and high uncertainty avoidance, companies are more likely to have control-oriented

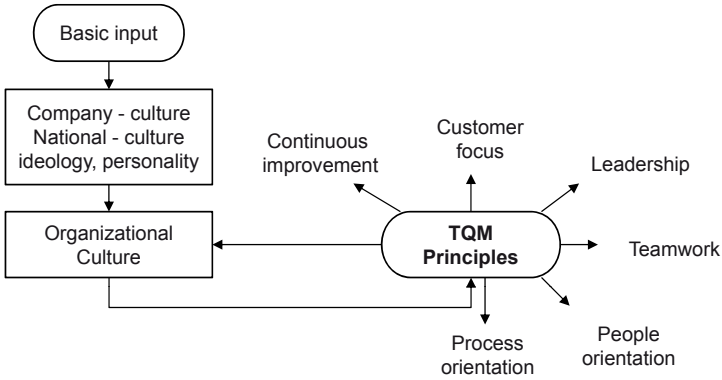

Figure 3.14: Model of Kanji and Yui [1997] - Creating quality culture (Source: see [Kanji and Yui, 1997, p. 426])

British workers	Japanese workers
Job demarcation	Cooperation
Achieving their job steadily	Sometimes unreliable
Diverse way of thinking	Unified way of thinking
Uneven capability of work speed	Even capability of working speed
Little overtime	Higher overtime
Mobility (high labor turnover)	Stability
Enjoying life (work life)	Life for work

Table 3.18: Characteristics of National Culture in UK and Japan - Findings of Kanji and Yui [1997] (Source: [Kanji and Yui, 1997, p. 426])

Corporate Cultures and mechanistic structures that are not conducive to TQM implementation. These companies require a fundamental change in their culture (see [Tata and Prasad, 1998, p. 710]).

According to **Kroslid [1999]**, the development of quality management has followed two distinct paths, the deterministic school and the continuous improvement school. The relative dominance of these two schools varies in different countries. Examining twelve leading industrial nations, he found that China, Japan, South Korea, Sweden, and the United States predominantly position themselves within the continuous improvement school, while Australia, Brazil, Germany, Great Britain, Italy, and Saudi Arabia relate more to the deterministic school of thought. Furthermore, Kroslid [1999] studied the conviction of blue-collar workers about the benefits of TQM and found that

the correlation with the values defined by Hofstede was very small.

Mathews et al. [2001] confirm that different countries implement quality programs in various ways. Their analysis of 405 responses from three European countries (UK, Portugal, and Finland) using the three research approaches by Hofstede [1980a], Trompenaars [1993] and Earley and Erez [1999] shows that national culture provides an explanation for observed variations between these countries. Differences are observed in four areas: motivation and techniques for, and outcomes and problems of, quality management. While the UK makes the greatest use of employee empowerment and the motivation for quality management is externally focused (customer demand and competitive pressure), Portugal and Finland are rather internally oriented, and with traits of strong uncertainty avoidance they need managerial initiative and a system of rules and documented tools to feel comfortable with quality management (see [Mathews et al., 2001, p. 699f.]).

Souza-Poza et al. [2001] explore the link between cross-cultural differences of corporate culture and TQM implementation. They combine the measurement approaches that are most popular in other publications on the topic: corporate culture is measured using the CVF (see also Al-khalifa and Aspinwall [2000]; Chang and Wiebe [1996]; Dellana and Hauser [1999]; Flynn and Saladin [2006]; Prajogo and McDermott [2005]; Zu et al. [2010]); the model by Hofstede [1980a] is used as a framework to analyze national culture (see also Flynn and Saladin [2006]; Ijose [2009]; Wong [2007]); and TQM is measured based on MBNQA dimensions (see also Dellana and Hauser [1999]; Flynn and Saladin [2006]; Jung et al. [2008]; Prajogo and McDermott [2005]). Obtained by sampling 133 manufacturing companies in the USA, Switzerland, and South Africa, the results highlight different relationships between regions, implying that TQM implementation across countries needs be customized according to the national culture. Corporate Culture is considered to be too complex to allow for the prediction of a single culture as the most suitable form for the implementation of TQM (see [Souza-Poza et al., 2001, p. 758]). Souza-Poza et al. [2001] believe that **TQM success depends on leadership being sensitive to local needs and adaptive to national and corporate cultural conditions** (see [Souza-Poza et al., 2001, p. 759]).

Another European perspective of the topic is given by **Lagrosen [2002]**, who carried out case studies in the UK, Germany, France, and Italy. Differences in the focus of quality management are explained by two relevant dimensions of Hofstede

[1980a]: power distance and uncertainty avoidance (see table 3.19, adapted according to [Lagrosen, 2002, p. 281]).

	Power Distance Low	**Power Distance High**
Uncertainty Avoidance Low	Tendency to focus on the individual employee. Training of employees emphasized. Responsibility lies with employees. **(UK)**	
Uncertainty Avoidance High	Tendency to focus on routines and procedures to be followed by employees. Training of employees emphasized. Responsibility is in the system. **(Germany)**	Tendency to focus on leaders, leadership and management. Responsibility is with the leaders. **(France, Italy)**

Table 3.19: Quality Management in Europe - Preferred ways of working as a function of Uncertainty Avoidance and Power Distance (Source: [Lagrosen, 2002, p. 281])

In essence, the UK has a focus on people, Germany on procedure and structure, France on communication, and Italy on leadership (see [Lagrosen, 2002, p. 282]). As a managerial implication, Lagrosen [2002] derives distinct quality practices for each country that connect to these preferred ways of working.

One year later, **Lagrosen [2003]** studies Corporate Culture as an indication of national culture in a Swedish multinational company. Gathering data from 30 countries, he sets up a similar matrix (see table 3.20, [Lagrosen, 2003, p. 484])). This time, he identifies significant correlations with Hofstede's dimensions Uncertainty Avoidance and Individualism.

The two dimensions have implications not only for a nation's attitude toward business process focus and continuous improvement but also for customer orientation. The different meaning of customer orientation in each country is to be considered when setting a preferably customized customer relations strategy as a key part of TQM (see [Lagrosen, 2003, p. 485f.]).

Flynn and Saladin [2006] analyze manufacturing plants in the US, Japan, Germany, Italy, and England and find out that **national culture has a significant impact on implementation of quality management**. Using the framework of Hofstede [1980a] for national culture and the Baldrige award (MBNQA) for TQM, the ideal national culture for the Baldrige constructs is characterized by higher levels of

	Uncertainty Avoidance Low	**Uncertainty Avoidance High**
Individualism Low (collectivist)	Will fairly easily adopt business process focus and continuous improvements. Will tend to favor customers that are important and with which the company has good relations. **(China, Kenya, Malaysia, Singapore)**	Will be more sceptical toward business process focus and continuous improvements. Will tend to favor customers with which the company has good relations. **(Chile, Colombia, Mexico, Peru, South Korea, Taiwan, Turkey, Venezuela)**
Individualism High (individualist)	Will fairly easily adopt business process focus and continuous improvements. Will tend to favor important customers. **(Australia, Canada, Denmark, Netherlands, New Zealand, Norway, South Africa, Sweden, UK, USA)**	Will be more sceptical toward business process focus and continuous improvements. Will tend to deal with all customers on an equal basis. **(Austria, Belgium, Finland, France, Germany, Italy, Spain, Switzerland)**

Table 3.20: Quality Management in Europe - Preferred ways of working as a function of Individualism and Uncertainty Avoidance (Source: [Lagrosen, 2003, p. 484])

power distance, uncertainty avoidance, masculinity, and collectivism—the typical culture of Japan (see [Flynn and Saladin, 2006, p. 597]). This is not surprising, as the MBNQA criteria are based on the best performers in the world—and Japanese quality management was the global leader at the time the MBNQA was constructed (see [Flynn and Saladin, 2006, p. 597]). National Culture scores of the other examined countries do not show such a good fit with the MBNQA measures, suggesting that a diverse set of cultures asks for customized practices and approaches for TQM implementation[1] (see [Flynn and Saladin, 2006, p. 598]). Flynn and Saladin [2006] admit, however, that "these chicken-and-egg effects are difficult to untangle: does a preponderance of highly competitive companies in a market lead to a greater emphasis on quality management, or are they highly competitive because their national culture is strongly aligned with quality management values?" ([Flynn and Saladin, 2006, p. 599]).

Kyoon Yoo et al. [2006] contribute to the study of relationships between the variables national cultures, employee empowerment, and quality practices. Comparing cultural differences of the four countries Korea, USA, Mexico, and Taiwan, they follow the national specifity argument or culture-specific hypotheses (see also Vecchi and

[1] Flynn and Saladin [2006] make one suggestion to adapt the European Quality Award to Hofstede's classification of Anglo, Germanic, Latin European, and Nordic cultures.

Brennan [2009]), claiming that different countries exhibit distinct, persistent national culture. The research framework of Kyoon Yoo et al. [2006] is presented in figure 3.15. The connecting arrows between the five variables reflect the four hypotheses (the leading signs denote whether the effect of the preceding variable on the affected variable is positive or negative).

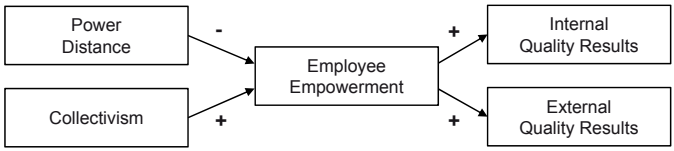

Figure 3.15: Hypothesized Model of Kyoon Yoo et al. [2006] - Relationship between national culture, employee empowerment, and quality results (Source: [Kyoon Yoo et al., 2006, p. 609])

Three of the four hypotheses are supported, indicating that for the examined countries collectivistic cultures have a significant positive effect on employee empowerment, which in turn has a positive effect on quality results (both internal and external). The specific employee empowerment practices differ according to the cultural pattern of the country, implying that particular aspects need to be carefully selected in order to achieve the desired quality outcomes (see [Kyoon Yoo et al., 2006, p. 619]).

In a recent approach by **Jung et al. [2008]**, organizational culture stemming from national culture and its effect on TQM implementation performance has been investigated. After Souza-Poza et al. [2001], this is the second publication touching on the links between three variables (TQM, Organizational Culture, and National Culture) closely related to three concepts of this research (Lean Six Sigma (A1), Corporate Culture (A2), and National Culture (B1)). The measurement of national culture is based on the widespread framework of Hofstede [1980a] and TQM is again presented based on the MBNQA TQM elements. The study surveys 186 mid-level managers from multinational companies in three countries (USA, China, and Mexico). The national culture dimensions Power Distance, Long-Term Orientation, and Individualism stand out as being more critical for TQM implementation (see [Jung et al., 2008, p. 632]), with Power Distance being the most influential cultural element in that it impacts all

seven TQM elements[1] (see [Jung et al., 2008, p. 630]). Despite the well-known problem of single-respondent bias (see Kumar et al. [1993]), Jung et al. [2008] sampled only one manager per company, limiting the generalizability of their study (see [Jung et al., 2008, p. 631]).

Vecchi and Brennan [2009] give a comprehensive overview of studies addressing the diversity of quality practices among countries. Dividing the research into the three approaches following the "convergence," "divergence," and "culture-specific" hypothesis,[2] they adopt the "culture-specific" hypothesis to explore whether quality should be managed differently across national cultures. As a brief overview, table 3.21 shows which comparative or benchmarking studies have been performed for the convergence and divergence hypotheses in the field of quality management (see Vecchi and Brennan [2009]). Studies pursuing the culture-specific hypothesis and adopting Hofstede's Model in the context of quality management are included in the beginning of section 3.5.1 (National Culture and Quality Management), the overview given in table 3.17.

Author and Year	Favored hypotheses	Examined regions
Zhao et al. [1995]	Convergence	India, China, Mexico
Abdul-Aziz et al. [2000]	Convergence	UK, Malaysia
Chin et al. [2002]	Convergence	Hong Kong, Shanghai
Sila and Ebrahimpour [2003]	Convergence	Worldwide (meta-analysis)
Rungtusanatham et al. [2005]	Convergence	Germany, Italy, Japan, UK, USA
Raghunathan et al. [1997]	Divergence	USA, China, India
Subba Rao et al. [1997]	Divergence	India, China, Mexico
Corbett et al. [1998]	Divergence	5 countries in Asia / South Pacific
Tata et al. [2000]	Divergence	USA, Costa Rica

Table 3.21: Impact of National Culture on Quality Management - Publications analyzing the Convergence and Divergence Hypotheses (Source: own analysis based on Vecchi and Brennan [2009])

[1] Jung et al. [2008] interpret that employees in cultures which tolerate power inequality better are more likely to respect the top down implementation of TQM and will tend to implement the given rigorous plans vigorously.

[2] The "convergence" hypothesis assumes that managers from different cultures adopt similar management practices to resist competitive pressures (Form [1979]). The "divergence" hypothesis questions the universal applicability of standardized approaches and speaks for an adaptation of management practices according to the national context (see Child and Kieser [1979]). The "culture-specific" hypothesis believes that even if managers are located in different societies, they face similar challenges, but their deeply inhibited value system will affect the way they do business and react to change (see Hofstede [1980a]).

The results of Vecchi and Brennan [2009], which are drawn from a large scale survey covering a wide range of countries,[1] indicate that different aspects of national culture have facilitating or inhibiting consequences on QM implementation. In line with the findings of Jung et al. [2008], high power distance and high collectivism lead to increased commitment and higher levels of engagement in quality management practices among employees (see [Vecchi and Brennan, 2009, p. 156]). Countries with high scores on masculinity and uncertainty avoidance emphasize internal inspection and tend to spend more resources on this matter. In contrast, feminine countries have an external focus, leading to, e.g., a more genuine environmental concern and proactive attitude toward cooperation. In terms of quality performance, countries with high power distance, high collectivism, and high uncertainty avoidance tend to perform better due to higher levels of centralization and compliance (see [Vecchi and Brennan, 2009, p. 157]). Although the results indicate a significant relationship between the cultural dimensions and quality management, influences through co-existing corporate, organizational, industrial, or sectoral cultures are not considered.

Kull and Wacker [2010] perform the first multilevel study that relies on the cultural dimensions of the GLOBE study (see House et al. [2004]) to show that Asian countries vary in QM effectiveness and that effectiveness depends on specific cultural dimensions (see [Kull and Wacker, 2010, p. 234]). Eight general types of QM values (taken from Detert et al. [2000]) are compared with the GLOBE dimensions in order to derive specific hypotheses. Using a sophisticated Hierarchical Linear Model (HLM), only two GLOBE dimensions turn out to significantly impact QM effectiveness (i.e., moderating the influence of QM practices on product quality): uncertainty avoidance and assertiveness (see [Kull and Wacker, 2010, p. 234]). Kull and Wacker [2010] interpret that these two dimensions affect individual decisions the most (see Higgins [1997]):

- **Uncertainty avoidance** has a positive influence on QM effectiveness. National cultures with high uncertainty avoidance adhere to the systematic approaches of QM, as they are comfortable with rules, process controls, and written stan-

[1] Data is taken from the International Manufacturing Strategy Survey (IMSS), a project which intends to establish a longitudinal database through several iterations in a global setting (see [Vecchi and Brennan, 2009, p. 153f.]).

dards. QM helps to prevent process uncertainty and avoids anxiety of individual employees.

- **Assertiveness** has a negative influence on QM effectiveness (highest statistical significance, superior to that for Uncertainty avoidance). Opportunistic behavior and inter-employee competition prevail, nurtured by the belief that people are in control of their environment. Collective rewards and recognition contradicts personal responsibility and reward of individual employees, leading to a personal interest in corruption of QM practices.

Among the Asian countries being examined, China holds the highest assertiveness (probably due to its past command economy, see [Kull and Wacker, 2010, p. 236]), and therefore lower QM effectiveness is expected in comparison to its Asian neighbors. At the same time, conclusions can also be drawn for other countries around the world. Excellent results from QM are expected from cultures with low assertiveness and high uncertainty avoidance (Taiwan, Nigeria). The most difficulties with QM implementation are expected in high assertiveness, low uncertainty avoidance countries (USA, Finland).

Taking the central findings of the reviewed studies all together, certain traits of National Culture promise to have more positive effect on the quality management concept Lean Six Sigma than others. In line with the hypothesized relationship between Lean Six Sigma and Corporate Culture (see section 3.4.4) connecting the National Culture Framework by Hofstede with the conceptualization for Lean Six Sigma by Zu et al. [2008] results in a set of four hypotheses (H[B1-A1]1 to H[B1-A1]4).

H[B1-A1]1:	A high level of uncertainty avoidance will be positively related with the level of L6S infrastructure practices (role structure) and L6S core practices (structured procedure and focus on metrics).
H[B1-A1]2:	A high level of individualism will be negatively related with the level of L6S core practices (structured procedure and focus on metrics).
H[B1-A1]3:	A high level of masculinity will be positively related with the level of L6S core practices (focus on metrics).
H[B1-A1]4:	A high level of power distance will be positively related with the level of L6S core practices (structured procedure).

3.5.2 National Culture and Corporate Culture

Despite the evaluation by Karahanna et al. [2005] that individuals' workplace behavior is a function of all different cultures simultaneously, **only a few studies have focused on multiple layers of culture** (see [Groeschl and Doherty, 2000, p. 16]). Those studies that included at least two cultural layers are context-bound, i.e., as already described for the field of quality management (see section 3.5.1), Corporate/Organizational and National Culture are integrated to explain certain practices or outcomes of different subjects.

In the field of quality management, the study by Yilmaz et al. [2005] has shown that customer- and learning-oriented value systems in Turkey are easier to develop when complemented by a collectivist national culture and a strong corporate culture (see [Yilmaz et al., 2005, p. 1349] and the explanation in section 3.3).

Table 3.22 gives a snapshot of the range of other areas in which the interplay of National and Corporate Culture has been investigated.[1]

The study by **Pizam et al. [1997]** compares national and industry cultures and their impact on managerial behavior in the hospitality industry and concludes that national cultures, as defined by Hofstede, have a stronger effect on managerial behavior than does the culture of the hotel industry. In a similar approach, **Mwaura et al. [1998]** demonstrate areas of divergence between national and corporate culture in a US owned Sheraton Hotel in China, which in turn provoke management difficulties and critical incidents in the areas personal relationships, lack of empowerment, meaning of life, training, role of women, communication, HR management, and Guanxi (for a detailed explanation see [Mwaura et al., 1998, p. 215f.]).

Multilevel research efforts also exist in the field of HR management. On the basis of case studies, **Schneider [1990]** recognizes incompatibilities between National and Corporate Culture (see [Schneider, 1990, p. 174]) and describes which HR practices of a parent company may cause areas of conflict with local cultures of foreign subsidiaries (e.g., sending expatriates). She concludes that only a reciprocal socialization process can lead to acceptance of top-down norms and values of the parent company's Corporate Culture (see [Schneider, 1990, p. 185]). Following the classification of Perlmutter [1969] that multinational companies (MNC) could apply similar management

[1] The purpose of table 3.22 is to present the landscape of different subjects and not to give a complete overview, as this would go far beyond the scope of this thesis.

Subject/Field	Studies	Key findings
Hospitality Industry	Mwaura et al. [1998]; Pizam et al. [1997]	National culture has stronger effects on management behavior than Corporate Culture.
Human Resources	Rosenzweig and Nohria [1994]; Schneider [1990]; Yuen and Hui [1993]	HR practices are shaped by both home and host country culture (internal consistency vs. local isomorphism). Weighting depends on investigated country.
Information Technology	Myers and Tan [2002]; Tan et al. [2003]; Weisinger and Trauth [2003]	National, Professional, and Corporate Culture in IT overlap and depend on situation and context. A generalized model with fixed variables is not recommended.
Management Control Systems	Chow et al. [1999]; O'Connor [1995]	Significant firm-within-national-ownership effect (strong effect of national culture of home country), but other contingency factors (e.g., Organizational Culture) also play a role.
Market Research	Craig and Douglas [2006]; Steenkamp [2001]	The multiple layers of culture are complex and dynamic. Research approaches need to be multilayered to reach better understanding of attitudes and behaviors of individuals.
Organizational Structure	Williams and van Triest [2009]	Both National and Corporate Culture influence the design and configuration of an organization's structure.
Overall Discussion	Karahanna et al. [2005]; Lau and Ngo [1996]; Werner [2009]	The complex interplay of National and Corporate Culture depends on the situation and context.

Table 3.22: Corporate Culture and National Culture - Range of studies analyzing the interplay between multiple levels of Culture (Source: own analysis)

practices to those of the home country (ethnocentric), could conform to local practices of the affiliate's host country (polycentric), or could adhere to a worldwide standard (global), **Rosenzweig and Nohria [1994]** find that HR practices of MNC affiliates in the US closely follow local practices. On the other hand, similarities are shaped by, e.g., the presence of expatriates and the extent of communication with the parent company. Overall Rosenzweig and Nohria [1994] find that multinational corporations are composed of differentiated practices, shaped by forces of both the local and parent company environment. Comparing HR policies and practices of subsidiaries in Singapore belonging to Japanese and American MNCs, **Yuen and Hui [1993]** find that American subsidiaries reflect greater influence of the headquarters and Japanese subsidiaries reflect greater host-culture influence.

In the field of information technology research, Karahanna et al. [2005] mention only two studies: Tan et al. [2003] (who claim to focus on national and organizational culture) and Weisinger and Trauth [2003] (who aim to focus on national, professional, and organizational culture). A closer look at the first study by **Tan et al. [2003]** reveals that instead of Organizational Culture the authors rely on the concept of Organizational Climate. They investigate how the individualism-collectivism dimension of national culture moderates the impact of organizational climate and information asymmetry on human predisposition to report bad news. Their results indicate that people from an individualistic culture seem to be more sensitive to organizational climate when reporting bad news about software projects, whereas people from a collectivistic culture seem to pay greater attention to information asymmetry. In contrast, **Weisinger and Trauth [2003]** examine multiple contextual cultural influences. They focus on the national cultures of both the host and home countries, the industry culture, and the organizational culture of particular IT workplaces reported through seven examples in the published literature. Their conclusion confirms the adoption of a more dynamic, situational view of culture, raised earlier by **Myers and Tan [2002]**. Culture is characterized to be contested, temporal, and emergent (see [Weisinger and Trauth, 2003, p. 29]) and recommended to be seen as a vehicle that may or may not successfully carry over technology and management practices to a different cultural context. The successful transfer depends on openness toward implicit aspects of the cultural context and willingness to learn and grow in cross-national teams.

Expanding the view to management accounting systems, a few more interesting studies can be identified. The majority of them focus on linking control practices to Hofstede's dimension individualism (see [Chow et al., 1999, p. 455]). **Chow et al. [1999]**, who use Hofstede's national culture taxonomy to derive predictions about Japanese-, Taiwanese-, and US-owned firms' design of seven management controls in their Taiwanese operations, conclude that Taiwanese national culture is an important determinant of the management control system (MCS) designs used by the Japanese and US firms. Contingency factors like organizational culture, competition, and competitive strategy probably also play a role and leave room for further investigations and insights on the topic. **O'Connor [1995]** draws similar conclusions investigating participative budgeting in Singapore.

The publications by **Craig and Douglas [2006] and Steenkamp [2001]** are dedicated to the role of Corporate and National Culture in the field of market research. While Craig and Douglas [2006] investigate the implications of cultural dynamics for consumer research, Steenkamp [2001] evaluates the usefulness of national culture in international marketing research. Literature review reveals that an increasing permeability of cultural boundaries is changing the nature of culture, making it more difficult to study and at the same time more important, as it shows a more pervasive influence on consumer behavior (see [Craig and Douglas, 2006, p. 322f.]). Craig and Douglas [2006] suggest that "research designs must account for this complexity and span multiple contexts to establish the generality of findings. This will result in improved knowledge of culture and its role in molding consumption behavior" ([Craig and Douglas, 2006, p. 322]). Reviewing the frameworks of Hofstede and Schwartz, the author Steenkamp [2001] comes to the same conclusion and finds that "no limited set of dimensions can exhaustively describe the culture of societies in their full richness and complexity" ([Steenkamp, 2001, p. 41][1]). He recognizes that culture can be studied at different levels that are not mutually exclusive (see [Steenkamp, 2001, p. 37]) and he recommends to develop and test multilayered theories and models to reach a better understanding of the role of culture in attitudes and behavior (see [Steenkamp, 2001, p. 41]).

[1]See also [Sackmann, 2002, p. 141], who argues that no single model with two, three, or eight dimensions will be able to capture the multidimensional phenomenon of Corporate Culture.

In a recent effort, **Williams and van Triest [2009]** study the aspects of both internal corporate culture and external national cultures and their impact on decentralization in multinational corporations. Their results suggest that the decision to decentralize is positively influenced by innovativeness (as part of Corporate Culture; to gain competitive advantage through responsiveness), positively influenced by individualism, and negatively influenced by uncertainty avoidance (as part of National Culture).

Three publications discuss the general interplay of National and Corporate Culture (Karahanna et al. [2005]; Lau and Ngo [1996]; Werner [2009]). In her doctoral dissertation, **Werner [2009]** assumes that national differences are reflected in Corporate Cultures (see [Werner, 2009, p. 2]). She finds that Swedish companies in very different industries mirror the understanding of community as a main trait of the National Culture in Sweden (see [Werner, 2009, p. 204]). Self-fulfillment and sensitive, respectful treatment of employees are the main values of Swedish societies, clearly visible in the prevailing pragmatic working style in multiple workplaces.[1] However, this Corporate Culture diminishes as Swedish corporations expand globally: subsidiaries in different political and cultural contexts develop different subcultures, deviating from the attitudes and behaviors observed in Sweden (see [Werner, 2009, p. 204]).

Despite the lack of a meta-theory and research covering multiple industries or sectors at the same time, the common hypotheses according to **Karahanna et al. [2005]** summarize part of the main findings of the literature reviewed above:

- Behaviors that include a strong social component or include terminal and moral values are predominantly affected by supranational and national cultures.
- For behaviors with a strong task component or for those involving competence values or practices, organizational and professional cultures dominate.

As Karahanna et al. [2005] recognized, the relative influence of Corporate Culture vs. National Culture on individual behavior therefore depends on the behavior under investigation. It can be assumed that **in particular situations certain traits of national culture can override Corporate Culture**, therefore placing the direct influence or **"shaping" of Corporate Culture** in the background, and the conscious

[1] Werner [2009] uses case studies (desk research, participating observation, and qualitative interviews) of eight Swedish companies for her investigation.

"management" of the National Culture becomes a priority of leaders in the company. Other situations may cause just the opposite dynamic. This complex interplay between Corporate and National Culture requires careful consideration in the form of even more specific hypotheses to be developed for setting up the structural equation model in chapter 4.

Contrary to the findings of Werner [2009], the authors **Lau and Ngo [1996]** note that a strong home culture of a parent company develops distinct Corporate Cultures in subsidiaries, leaving little influence from the host country's culture (see [Lau and Ngo, 1996, p. 474]):

- The national culture of a corporation's (MNC) origin has influences on the corporate culture of affiliates operating in another national culture.

On the other hand, different nationalities lead to different Corporate Cultures. In agreement with the argumentation by Werner [2009] and the approach by Lau and Ngo [1996] (who conceptually link the CVF with the national culture framework of Hofstede), a set of five hypotheses is derived (H[B1-A2]1 to H[B1-A2]5). This set

H[B1-A2]1:	Companies with a high individualistic and masculine orientation are characterized by a rational culture (US).
H[B1-A2]2:	Companies with a collectivistic and low masculine orientation are characterized by a group culture (China).
H[B1-A2]3:	Companies with a masculine and an individualistic orientation are characterized by a hierarchical culture (UK).
H[B1-A2]4:	Companies with a masculine and low uncertainty avoidance orientation are characterized by a developmental culture (Hong Kong).
H[B1-A2]5:	Companies with high power distance orientation are characterized by a hierarchical culture (Germany).

of hypotheses presents the second part for a complete system of relevant hypotheses describing the impact of National Culture, which will be summarized in section 3.5.4.

3.5.3 National Culture and Leadership Style

"The identification of cultural contingencies and how they may impact leadership were a trend in the late 1980s and early 1990s" ([Scandura and Dorfman, 2004, p. 279]).

For example, Smith et al. have made several contributions to the research of leadership in cross-cultural settings (see Smith et al. [2003]; Smith and Bond [1998]; Smith et al. [1989]). Table 3.23 presents these along with other key studies that are milestones in the study of leadership in a cross-cultural context and that give valuable insight for this research.

Triandis [1982] assigned cultural orientation to certain management activities (see table 3.24, based on [Triandis, 1982, p. 156f.] and [Chong, 2008, p. 192]). To take one example from table 3.24, planning is triggered by future orientation but inhibited by high power distance (lack of trust in others) and low uncertainty avoidance (less need for contingency plans). The algebraic signs indicate whether a positive or negative form of the (national) culture dimension affects the listed management activities.

The effect of high power distance on the activities planning and controlling people leads to the proposition represented by the hypothesis H[B1-B2]8.

Another of the first works to recognize cross-cultural differences in leadership is the study by the French researcher **Laurent [1983]**. Using the data of 817 Managers in 10 countries (9 European countries and the US), Laurent [1983] concludes that Western nations differ in their images of organizations and their management.

In addition to **Misumi [1985]** and **Misumi and Peterson [1985]**, who discovered that national culture and leadership behavior in Japan differs from the culture in the West (especially US), **Phatak [1986]** also compares Western and non-Western value orientations and comes to the same conclusion. He suggests five values (partly similar to the dimensions of Hofstede [1980a]) that distinguish the Western from the non-Western societies and which are valuable for managers in an international context (see also [Miroshnik, 2002, p. 531f.]):

1. *Individualism*: Personal accomplishment and self-expression vs. conformity and cooperation.
2. *Informality*: Traditions, ceremonies, and social rules vs. direct focus on the business issue.
3. *Materialism*: Human mastery and control of nature vs. worship of nature.
4. *Change*: Changes are natural phenomena and passively accepted vs. humans manipulate and change the environment to their liking.
5. *Time orientation*: Time as a continuously depleting resource vs. time as an unlimited and unending resource.

Author/Study	Key findings / propositions
Triandis [1982]	Specific management actions are facilitated or inhibited by culturally determined orientations.
Laurent [1983]	National Culture is a strong determinant of perceptions of what proper management should be.
Misumi [1985]; Misumi and Peterson [1985]	National culture and supervisor-subordinate relationships differ between the US and Japan.
Phatak [1986]	American culture differs from East Asian culture.
Smith et al. [1989]	Task- versus relationship-oriented behavior varies across cultures.
Hofstede et al. [1990]	National culture shapes both Corporate Culture and leaders' values, who in turn shape corporate practices and culture.
Markus and Kitayama [1991]	Major cultural differences exist in cognition, emotion, and motivation (of leaders and subordinates). The personal attachment to the leader determines work motivation.
Gerstner and Day [1994]	No single trait appears among the top 5 business leadership traits of each of the 8 cultures studied.
Dorfman [1996]	National culture has an impact on leader power, personal characteristics of the leader (especially the leader's image), and interpersonal actions between the leader and followers or the leader and organizational groups.
House et al. [1997]	National Culture Values determine which leader behaviors tend to be most effective (cultural congruence). Unconventional leadership behavior leads to innovation and increase in performance (cultural difference). Some leader behaviors are universally accepted regardless of the national culture (near universality).
Offermann and Hellmann [1997]	Managerial cultural background relates to both task- and human-oriented leadership behavior. Impact of early cultural socialization throughout a leader's lifetime, despite exposure to other national cultures.
Boutet et al. [2000]	There is a direct connection between culture and managerial competences.
Miroshnik [2002]	National Culture and leadership are the key issues in shaping Organizational Culture.
Smith et al. [2002]	Links between (national) cultural values and how managers handle work events are characterized by both consistencies and lacunae.
Zielke [2002]	National cultures shape all leadership instruments and processes. Goal- and task-oriented leadership prevails in the West (Management-by-Objectives, e.g., USA), while emotion-based leadership prevails in Asia (Management-by-Intuition, e.g., Japan).
Deal et al. [2003]	Cultural adaptability is a specific competency critical to global leadership success.
GLOBE (House et al. [2004])	Leadership is both culture-universal and culture-specific.
Byrne and Bradley [2007]	A manager's national culture and a plurality of personal values play the dominant roles in the ultimate success of international and global business, through the mediation of these cultural values on leadership style.
Chong [2008]	National culture shapes the personality and behavioral choices of managers.
Harris and Carr [2008]	National culture values influence business aims as expressed by CEOs.

Table 3.23: Leadership and National Culture - Central findings of selected cross-cultural leadership research (Source: own analysis)

Affected activities	Cultural orientation
Defining goals	Mastery/subjugation of nature (+) and masculinity (+)
Planning	future orientation (+), power distance (+), uncertainty avoidance (-)
Selecting, training, and controlling people	power distance (+), human nature perception (self-serving), self-esteem
Motivating people	high achievement, formality, task- vs. relationship-orientation

Table 3.24: Classification of Triandis [1982] - Impact of National Culture on management activities (Source: see [Triandis, 1982, p. 156f.] and [Chong, 2008, p. 192])

H[B1-B2]8: A high level of power distance will be positively associated with and supportive of the level of instrumental leadership.

The work by **Smith et al. [1989]** is another classic in examining leader behaviors across cultures (see [Scandura and Dorfman, 2004, p. 294]). Hypothesizing that general measures of leadership style would show high similarity while specific measures would vary between national cultures, they reported that task- versus relationship-oriented behavior varied across cultures in Britain, the US, Japan, and China (Hong Kong). For example, American managers were more likely to be confrontational and provide criticism compared with Japanese managers, who were more likely to provide feedback indirectly through memorandums or the subordinates' peers. This would lead into hypothesis H[B1-B2]6.

H[B1-B2]6: A high level of masculinity will be positively associated with and supportive of the level of instrumental leadership.

Markus and Kitayama [1991] integrate relevant theories from psychology and anthropology and find differences in perceptions of the self, of the others, and of interpersonal relationships according to national culture. They are able to distinguish two construals of the self: the independent and the interdependent one (see figure 3.16, taken from [Markus and Kitayama, 1991, p. 226]).

Western cultures[1] promote the independent view of the self, i.e., people tend to express their unique attributes and prefer to be seen as separate persons (see the bold

[1] E.g., Miroshnik [2002] differentiates the Western society as a cluster of Europeans, North Americans, and Northwest Russians vs. the non-Westerns as a cluster of Asians, Arabs, Latin Americans, Southeast Russians, and others (see [Miroshnik, 2002, p. 533]).

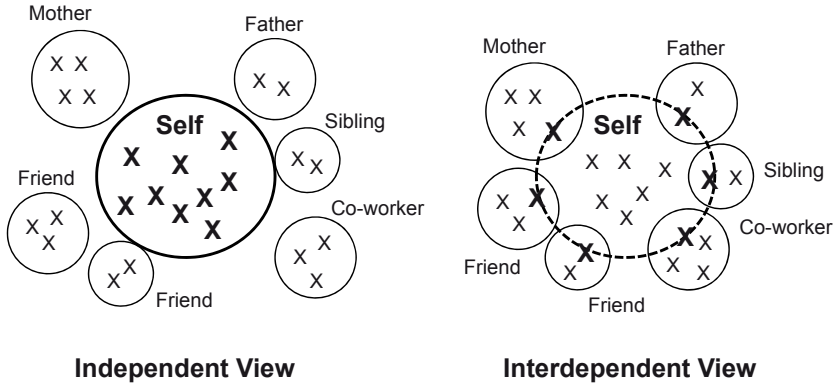

Figure 3.16: Self-Construals According to Markus and Kitayama [1991] - Conceptual representations of the independent and the interdependent view of the self (Source: [Markus and Kitayama, 1991, p. 226])

Xs drawn within the self circle in figure 3.16). Non-Western cultures insist on connectedness and interdependence among individuals (see [Markus and Kitayama, 1991, p. 226f.]). The self is seen as one part in a larger social unit or community, and individuals have an interest in "fitting in" (depicted by bold Xs on the intersections with others in figure 3.16). These two views are fundamental for understanding leadership in an international context: **individuals with an independent view of the self have different expectations toward their leaders than individuals with an interdependent or collectivist view**. The link to the national culture framework by Hofstede [1980a], which prevails in studies studying the relationship between National Culture and Leadership, becomes immediately obvious (framed by hypotheses H[B1-B2]2 and H[B1-B2]4). If people prefer to be seen as separate persons (independent

H[B1-B2]2:	A high level of individualism will be positively associated with and supportive of transformational leadership.
H[B1-B2]4:	A low level of individualism (collectivistic orientation) will be positively associated with and supportive of participative leadership.

view), they can identify with a strong transformational leadership style, while cultures

insisting on connectedness (interdependent view) would need a participative leadership style to feel as one part in the larger group.

Sampling 425 middle managers in 39 different countries, **Offermann and Hellmann [1997]** find evidence for specific links between two of Hofstede's national culture dimensions and leadership practices. These links are presented in figures 3.17 (own illustration based on Offermann and Hellmann [1997]). As a high power distance is related to a decrease in team building and approachability, hypothesis H[B1-B2]7 can be raised.

H[B1-B2]7:	A high level of power distance will relate to lower levels of supportive leadership.

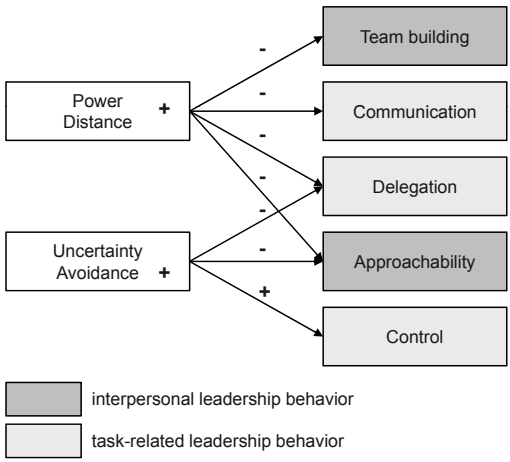

Figure 3.17: Model of Offermann and Hellmann [1997] - Links between Power Distance, Uncertainty Avoidance, and Leadership practices (Source: own illustration based on Offermann and Hellmann [1997])

Offermann and Hellmann [1997] use the 360-degree evaluation of Wilson and Wilson [1991] to determine how subordinates perceive their managers across cultures. Assessment is structured into eleven leadership behavior scales, presenting five dimensions

of two clusters (as shown in figure 3.17): "hard" task-oriented behaviors (communication, delegation and control) and "soft" interpersonal behaviors (team building and approachability). The analyzed links indicate a persistence of cultural values ([Offermann and Hellmann, 1997, p. 349]), confirming the findings of Shackleton and Ali [1990].[1] Although the internationally diverse managers are exposed to views of other nations and societies, they closely follow the cultural pattern of their cultural background.[2]

Using both in-depth interviews, standardized questionnaires, and unit-level data on the composition and history of the examined work units, **Hofstede et al. [1990]** attempt to separate the impact of national and organizational (or corporate) cultures on leadership perception, by studying 20 units of 10 different organizations in 2 countries (Denmark and Netherlands). Units of study included both entire and parts of organizations. Although National Culture is found to have a profound effect on the dynamics in an organization, Hofstede et al. [1990] also highlight the customized practices observed in the studied units: "Organization cultures reflect nationality, demographics of employees and managers, industry and market; they are related to organization structure and control systems; but all of these leave room for unique and idiosyncratic elements." Introducing an occupational level halfway between nation and organization, they believe that this level is equally strongly influenced by (national) values and (corporate) practices (see figure 3.18, [Hofstede et al., 1990, p. 312]).

The relationships which Hofstede et al. [1990] examine are therefore threefold and confirm part of the hypothesized relationships in this research: **the national culture (B1) shapes the values of leaders (B2), who in turn shape the corporate culture (A2) by turning the values into practices** (see [Hofstede et al., 1990, p. 311]).

On the other hand, employees' expectations toward leaders, also molded by societal values (national culture), shape working practices as well. In this context, **Gerstner**

[1]Testing Hofstede's dimensions Power Distance and Uncertainty Avoidance in seven different organizations representing three ethnic groups in Sudan and Britain, Shackleton and Ali [1990] find that Pakistani immigrants in Britain do not lose their identity in the British society but show strong social ties and a cohesiveness brought by Moslem faith.

[2]This may not apply to the behavior of individual managers, as Offermann and Hellmann [1997] emphasize that their conclusions (in line with the approach by Hofstede [1980a]) should only be viewed at the group level.

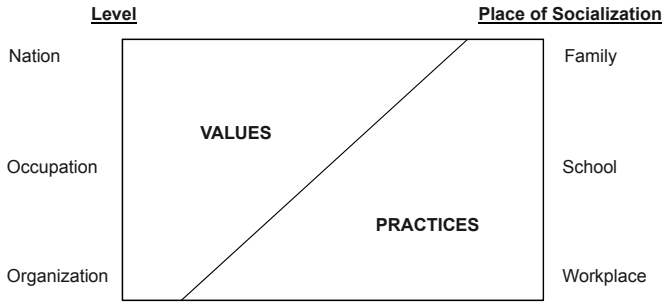

Figure 3.18: Model of Hofstede et al. [1990] - Cultural differences on three levels (Source: [Hofstede et al., 1990, p. 312])

and Day [1994] find that leadership prototypes differ across cultures. Presenting graduate students in eight cultures (China, France, Germany, Honduras, India, Japan, Taiwan, and the US) a list of 59 attributes relevant to leadership, the authors observe that ratings of leadership traits vary significantly across countries. In direct connection with this, the analysis of **Boutet et al. [2000]** indicates that managerial competences depend on the national culture. They determined which of Hofstede's cultural dimensions affects which competency (see table 3.25, based on [Boutet et al., 2000, p. 15] and [Chong, 2008, p. 193]).

Cultural dimension	Affected managerial competency
Power Distance (Low)	Leadership, Decision-making (risk-taking)
Individualism (High)	Leadership (harmony and trust), Decision-making, influencing skills, people development
Uncertainty Avoidance (Low)	Flexibility, Decision-making (risk-taking)
Masculinity (High)	Achievement motivation

Table 3.25: Classification of Boutet et al. [2000] - Impact of National Culture on managerial competency (Source: [Boutet et al., 2000, p. 15] and [Chong, 2008, p. 193])

Considering the findings of Gerstner and Day [1994] and Boutet et al. [2000] together, one learns that both **expectations and abilities of leaders are strongly influenced by the society around them**. The propositions derived above can be confirmed.

Miroshnik [2002] examines the impact of culture on multinational corporations, as she assumes culture is a predominant factor in problems and failures of businesses abroad (see [Miroshnik, 2002, p. 525]). Through literature review, she finds that a combination of macro, micro, and meso values[1] create a specific Organizational Culture, which is determined by the surrounding national culture (see [Miroshnik, 2002, p. 537]). On the other hand, leadership plays a key role in shaping Organizational Culture as well.

Investigating how middle managers in 47 countries handle eight specific work events, **Smith et al. [2002]** test the cultural value dimensions of Hofstede, Schwartz and Trompenaars. The values are found to be strong predictors of sources of guidance relevant to vertical relationships within organizations (reliance on formal rules, supervisor, and subordinates) but do not predict the reliance on peers and on more tacit sources of guidance.

Similarly to the classification by Offermann and Hellmann [1997], the author **Zielke [2002]** differentiates between hard and soft management styles. While goal- and task-oriented leadership is common in the US and Germany (Management-by-Objectives), Asian nations like Japan and Thailand prefer softer leadership behaviors, based on intuition and emotions (Management-by-Intuition) (see [Zielke, 2002, p. 49]). He goes one step further than Gerstner and Day [1994] and Boutet et al. [2000] and argues that **national cultures have an effect on all leadership instruments and processes**. Leaders need to continuously make conscious decisions on which instrument they should use or adapt in which national context.

The series of compendiums by Mobley et al. [1999], Mobley and McCall [2001] and Mobley and Dorfman [2003] cover a broad range of topics related to cross-cultural leadership. As one example, the work of **Deal et al. [2003]** (in Mobley and Dorfman [2003]) is mentioned in table 3.23, as the leader's cultural adaptability has been hypothesized by numerous authors to play an increasingly important role in multinational companies (e.g., see Miroshnik [2002]; Schneider [1990]).

Reflecting on charismatic leadership and cultural differences in relation to leadership in general, Scandura and Dorfman [2004] discuss the history, challenges, and

[1] Macro values refer to visible artifacts, expectations and norms in an organization, while micro values present traits of national culture, e.g., sense of belonging and security as central beliefs. On the third level meso values are codes of behavior in a national culture, i.e., expected behavior of a given society (see [Miroshnik, 2002, p. 538f.]).

implications of cross-cultural leadership in four theoretical letters. Although Terri A. Scandura sees **the GLOBE project** with its combination of quantitative and qualitative methods and large sample reflecting the opinions of over 17,000 Managers in 900 organizations, 3 industries and 62 countries as "a landmark study in the development of cross-cultural leadership research" ([Scandura and Dorfman, 2004, p. 278]), he admits that "some of the most important questions about leadership in an international context have not been addressed" ([Scandura and Dorfman, 2004, p. 278]). Scandura raises five key issues in international leadership research to his colleague Peter Dorfman, founder of the GLOBE project (see [Scandura and Dorfman, 2004, p. 279f.]):

1. Do universally endorsed prototypes of leadership exist, and if so, are these desirable?
2. Are interpretations and meanings of leadership the same across countries and can this be ensured by the establishment of measurement equivalence?
3. What is the right balance and method for combining "etic"[1] and "emic"[2] constructs (see Triandis [1980]) in terms of a basic research approach to studying leadership across national cultures?
4. What type of relationship exists between national culture and leadership? Is national culture a moderator between leader behavior and outcomes of work attitudes and performance, or is (national) culture an independent or mediating variable, or do culture and leadership influence each other?
5. What is the impact of leadership in the international context, and what are the outcomes (performance, job satisfaction, stress, turnover etc.)?

In his reply, Dorfman notes that more anecdotal than empirical evidence exists for solving these points. Citing Yukl [2002], he recommends devoting a great amount of time and effort to the chosen conceptual framework in order to further increase the quality of cross-cultural leadership research (see [Scandura and Dorfman, 2004, p. 284]). Results from GLOBE support both culture-universal (etic) and culture-specific (emic) positions for leadership (see [Scandura and Dorfman, 2004, p. 286]). The culture-universal factors are charismatic/value based, team-oriented, and participative leader behavior

[1] Etic approaches aim to generalize leadership theory across cultures. A common instrument used is survey research.

[2] Emic approaches investigate leadership within the cultural context in which it occurs. A common instrument is the ethnographic interview.

(see [Ensari and Murphy, 2003, p. 55]) as well as an entrepreneurial leadership style (see Gupta et al. [2004]). Countries like Sweden embody the culture-specific position of leadership (see Holmberg and Akerblom [2006] and further explanations below). Overall, the relationship between National Culture and Leadership may take all the multiple forms mentioned. Depending on the type and nature of the study, Hofstede's **national culture dimensions may have antecedent, mediating and/or moderating effects on leadership** (see [Scandura and Dorfman, 2004, p. 284]). Dorfman concludes that "careful theorizing should help determine which cultural factors are most important in any given situation" (see [Scandura and Dorfman, 2004, p. 285]). Finally, a rich understanding of leadership will only be achieved by studying the interrelations between individuals, behaviors, organizational (or in this case corporate) and national contexts (see [Scandura and Dorfman, 2004, p. 294]).

Sampling 159 firms in Denmark, Finland, and Ireland, **Byrne and Bradley [2007]** investigate (a) whether a plurality of successful leadership exists, (b) what differences occur between the influence of personal and national values on leadership style, (c) what the effect of management leadership style on international firm performance is, and (d) what the quantifiable mediative roles of personal and cultural values on management leadership style are ([Byrne and Bradley, 2007, p. 169]). In accordance with the statement by Pfeffer [2002] that **Leadership style**, due to consequent effectiveness in business, is **the single most important antecedent in maintaining competitive advantage and in supporting firm performance**, they use the framework and measurement instrument by Schwartz [1992] to confirm four hypotheses (see [Byrne and Bradley, 2007, p. 169]):

- Successful leadership style is pluralistic.
- Pluralistic successful leadership style contains a spectrum of decreasing successful firm performance.
- Personal and (national) cultural level values differ in their mediation effect on leadership style.
- Personal values are less dominant quantitatively than (national) culture level values in their separate mediating roles on manager leadership style.

Chong [2008] explores how national culture affects appraised managerial performance in a range of managerial competences. One of their key findings is that factors

of national culture shape the personality and behavioral choices of managers. Dealing with a slightly different topic, **Harris and Carr [2008]** look for an association between national values and management behavior of CEOs and find that sensitivity to differences in attitudes and business purposes is a critical success factor for international managers.

Scandinavia is one example for a region with a specific national culture and leadership style. Although Smith et al. [2003] can generally confirm the reports that Nordic managers tend to be more individualistic, feminine, and employee-oriented, they identify differences between Denmark, Finland, Norway, and Sweden which could lead to specific problem areas within Nordic collaborations. In line with this differentiation and as already mentioned, Werner [2009] has highlighted the strong sense of community and pragmatic working styles visible in Sweden. On the basis of the GLOBE study data, Holmberg and Akerblom [2006] detect a "typical" Swedish leadership style, characterized by participation and autonomy: "social ties within a work-team generally stem from a common commitment to a particular cause or goal rather than from strong interpersonal ties among the team members" ([Holmberg and Akerblom, 2006, p. 323]). Leadership is interpreted to be vague or more process-oriented.[1] Holmberg and Akerblom [2006] thereby stress the existence of local leadership nuances, opposing a simplified version of a global leadership prototype.

Concerning the leadership style relevant for this research, several authors have delved deeper into the **dynamics of transformational/charismatic leadership style in an international context**. Den Hartog et al. [1999] hypothesize that charismatic and transformational leadership, or at least significant elements of it, are universally endorsed (see [Scandura and Dorfman, 2004, p. 285]). For example, this applies for Sweden as well (see [Holmberg and Akerblom, 2006, p. 324]).

Examining perceptions about charismatic leadership in Turkey (collectivistic culture) and the US (individualistic culture), Ensari and Murphy [2003] discuss that in individualistic cultures, impressions of charisma are formed by stereotypical characteristics of leaders, while in collectivistic cultures charismatic attributions are based on company performance outcomes. Relying on Hofstede's framework, Ergeneli et al.

[1] This interpretation needs to be handled with caution: as the GLOBE data is only based on the opinions of middle-managers, this characterization is not representative for employees of other hierarchical layers in the examined organizations.

[2007] ask (predominantly Muslim) Pakistani, Kazakh and Turkish MBA students to evaluate five aspects of transformational leadership (challenging the process, inspiring a shared vision, enabling others to act, modeling the way, and encouraging the hearth). A significant negative relationship is identified between uncertainty avoidance and transformational leadership. Ergeneli et al. [2007] explain that "in high uncertainty avoidance cultures, self-efficacy is low and members of those cultures do not attribute achievements to their own ability; thus, leaders might be inadequate to increase their followers' self-efficacy, which is accepted as an important motivational construct for transformational leadership" ([Ergeneli et al., 2007, p. 720]). Contrasting this view, hypotheses H[B1-B2]1 and H[B1-B2]3 are considered.

H[B1-B2]1:	A high level of uncertainty avoidance will give rise to transformational leadership (weak situation).
H[B1-B2]3:	A high level of uncertainty avoidance will be positively associated with and supportive of participative leadership.

Finally, it should be mentioned that Dickson et al. [2003] give a comprehensive overview of the topic at hand. They see leadership research in a cross-cultural context as starting in 1996–1997 with the two publications Dorfman [1996] and House et al. [1997], which are antecedent works of the GLOBE study and have been reviewed above. Describing the decline in assumptions of universal leadership principles toward variation in leadership styles, practices, and preferences, Dickson et al. [2003] also provide a detailed review of studies **linking Hofstede's dimensions to leadership** (not only those studies including all of Hofstede's dimensions, as done by Offermann and Hellmann [1997], but also those focusing on single dimensions). A reproduction of this rich review is beyond the scope of this section, but key insights will be utilized in the development of the final structural equation model in section 4.6.

3.5.4 Hypothesized Impact of National Culture

The impact of National Culture on Lean Six Sigma, Corporate Culture, and Leadership has multiple facets. Assumed hypotheses are presented in table 3.26 and figure 3.19.

Figure 3.19 introduces two new annotations, named "A" and "B." These highlight the direct and indirect effects of National Culture on Lean Six Sigma. "B" relationships

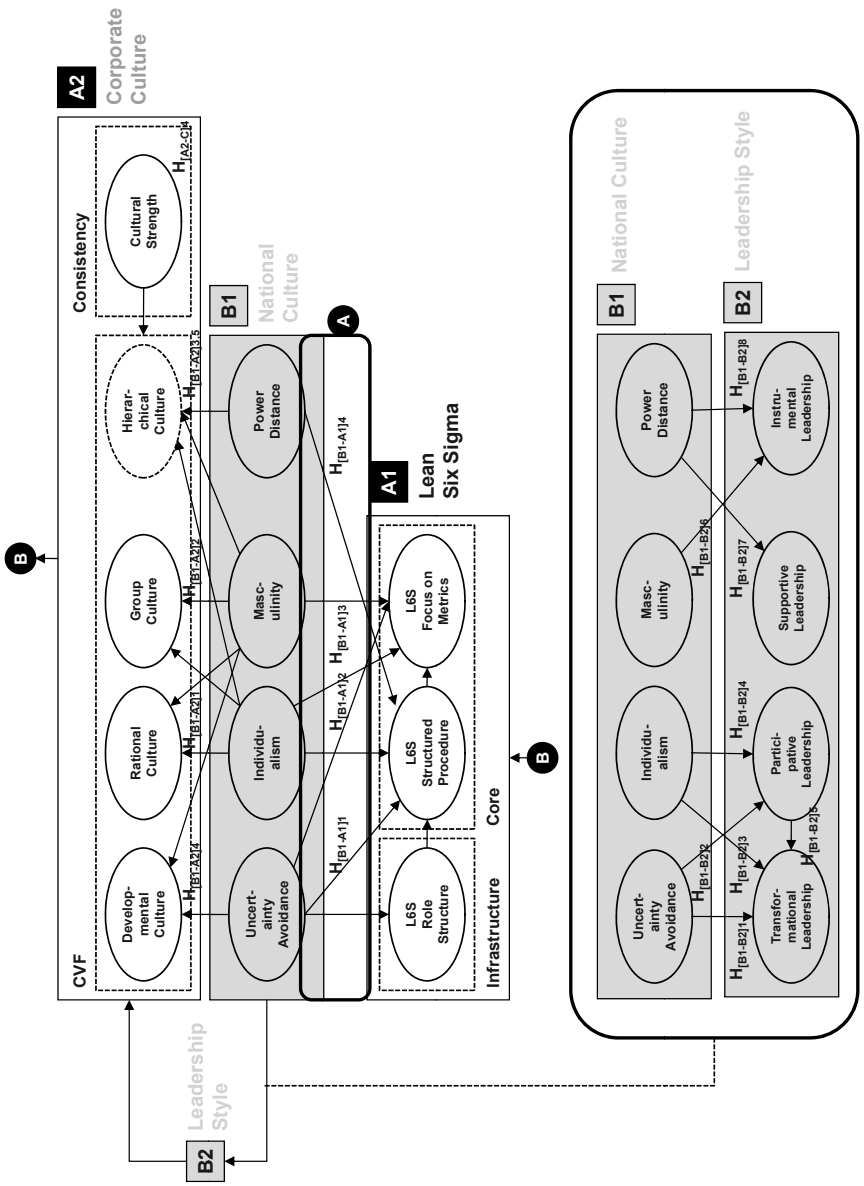

Figure 3.19: Extract of Hypothesized Model (Impact B1) - Impact of National Culture (Source: own figure)

Hypothesis	Assumed Relationship
B1-A1	**National Culture and Lean Six Sigma**
H[B1-A1]1	A high level of uncertainty avoidance will be positively related with the level of L6S infrastructure practices (role structure) and L6S core practices (structured procedure and focus on metrics).
H[B1-A1]2	A high level of individualism will be negatively related with the level of L6S core practices (structured procedure and focus on metrics).
H[B1-A1]3	A high level of masculinity will be positively related with the level of L6S core practices (focus on metrics).
H[B1-A1]4	A high level of power distance will be positively related with the level of L6S core practices (structured procedure).
B1-A2	**National Culture and Corporate Culture**
H[B1-A2]1	Companies with a high individualistic and masculine orientation are characterized by a rational culture (US).
H[B1-A2]2	Companies with a collectivistic and low masculine orientation are characterized by a group culture (China).
H[B1-A2]3	Companies with a masculine and an individualistic orientation are characterized by a hierarchical culture (UK).
H[B1-A2]4	Companies with a masculine and low uncertainty avoidance orientation are characterized by a developmental culture (Hong Kong).
H[B1-A2]5	Companies with high power distance orientation are characterized by a hierarchical culture (Germany).
B1-B2	**National Culture and Leadership Style**
H[B1-B2]1	A high level of uncertainty avoidance will give rise to transformational leadership (weak situation).
H[B1-B2]2	A high level of individualism will be positively associated with and supportive of transformational leadership.
H[B1-B2]3	A high level of uncertainty avoidance will be positively associated with and supportive of participative leadership.
H[B1-B2]4	A low level of individualism (collectivistic orientation) will be positively associated with and supportive of participative leadership.
H[B1-B2]5	A high level of participative leadership will be positively related to the level of transformational leadership.
H[B1-B2]6	A high level of masculinity will be positively associated with and supportive of the level of instrumental leadership.
H[B1-B2]7	A high level of power distance will relate to lower levels of supportive leadership.
H[B1-B2]8	A high level of power distance will be positively associated with and supportive of the level of instrumental leadership.

Table 3.26: Hypothesized Impact of National Culture - Overview of hypotheses (Source: own analysis)

are the indirect effects of National Culture on Lean Six Sigma and are synonymous to the links between Lean Six Sigma and Corporate Culture, presented in section 3.4.4. The "A" frame in figure 3.19 presents the direct effects of National Culture on Lean Six Sigma practices.[1]

According to Lau and Ngo [1996], it is assumed that more than one national culture dimension of Hofstede relates to a certain culture type of the CVF, theoretically resulting in many possible combinations. For the relationship between National Culture and Leadership, e.g., **high levels of uncertainty avoidance and individualism are assumed to support transformational leadership more than do the other dimensions** of Hofstede's national culture framework. Overall and as presented, the hypotheses chosen are derived through the literature review and logical thinking. Once the full model is tested with the sample (see chapter 5), a set of different combinations might be significant, requiring modifications of the model and underlying propositions.

3.6 The Impact of Leadership Style

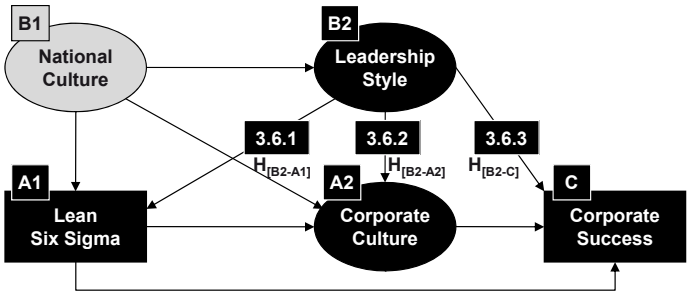

Figure 3.20: Flow of Section 3.6 - Relationships examined (Source: own figure)

The impact of Leadership Style on Quality Management, Corporate Culture, and Corporate Success has implicitly already been partly included in the literature review. This is due to the nature of the concept. As noted in section 2.6, **leadership is impacted by and impacts culture**, and is analyzed under the same umbrella, namely,

[1] To keep a structured overview, these detailed relationships between National Culture and Lean Six Sigma will not be repeated in section 3.7 but will be indicated by the "A" annotation (see figure 3.26).

values and practices. In theory, contextual contingencies shape the attitudes and actions of leaders, who in turn shape the organization (e.g., by the implementation of quality management) to lead it toward greater Corporate Success. The previous section, section 3.5.3 (National Culture and Leadership Style), has highlighted that theory on leadership has gone even further: **the impact of leadership is not the question, it is more the "how."** The following sections will therefore focus on (a) how leaders impact the implementation of QM, (b) how they actively shape their Corporate Culture, and (c) how they provide the guidance and tools to lift corporate performance toward sustainable corporate success. The assumptions that leadership impacts these constructs will be briefly covered (and supported with relevant sources) but not extensively discussed.

3.6.1 Leadership Style and Quality Management

Continuing the previous work of Youndt et al. [1996], the authors **Juhl et al. [2000]** examine the relationship between four variables, namely, leadership, HR system, manufacturing and performance. Their main focus was on the impact leadership has on quality performance and its dependence upon culture. Using data from 131 manufacturing companies in the UK, Australia, and New Zealand, Juhl et al. [2000] identify a universal structure independent of the cultural setting (national culture). This so called "Leadership Diamond" is shown in figure 3.21. The unique identifiers A1 (Lean Six Sigma), A2 (Corporate Culture), B2 (Leadership Style) and C (Corporate Success) introduced in section 1.2 have been included to show the affinity to the research framework (figure 2.14) imposed in section 2.7.

The Leadership Diamond does not reveal a direct link between leadership and performance. Performance is conditional upon the joint effect of HR system and quality of the manufacturing system, which in turn are shaped by leadership. On the basis of their data and methodology[1] the authors conclude that "the choice of leadership style is crucial to the success of business operations and hence also to the ultimate performance of the company" ([Juhl et al., 2000, p. 65]).

An extensive theoretical explanation for the connection between leadership and TQM is provided by **Waldman [1993]**. He notes that the importance of leadership

[1] The four elements were measured on a dichotomous scale (yes, no), and the model was estimated using a general program for the analysis of categorical data.

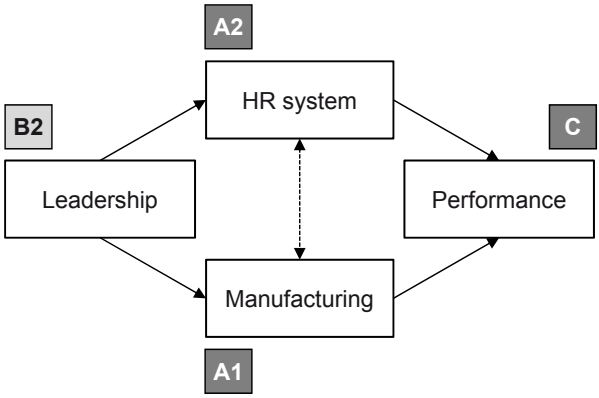

Figure 3.21: Model of Juhl et al. [2000] - The Leadership Diamond (Source: [Juhl et al., 2000, p. 59])

practices for TQM has been emphasized numerous times, but little effort has been undertaken regarding specific theoretical mechanisms. He provides a model of culture, leadership, and TQM to highlight that the engagement in TQM policies and behaviors by employees is triggered by the mutual influence of organizational culture and leadership practices (see figure 3.22, simplified and modified according to [Waldman, 1993, p. 67], including the unique identifiers as in figure 3.21).

Waldman [1993] assumes a **reciprocal relationship between Organizational Culture and Leadership**, in line with the discussion following in section 3.6.2. Leadership and TQM are therefore linked in two ways: indirectly via Organizational Culture and directly. The indirect link occurs through leadership gradually influencing and being influenced by an organization's culture, which in turn determines TQM policies and behavior. For the direct effect of leadership on TQM, Waldman [1993] considers two one-sided perspectives (see [Waldman, 1993, p. 71]):

- *Transformational leadership*: Catalyst to encourage continuous improvement and change through an inspiring vision, intellectual stimulation and motivation, and employee empowerment.
- *Leader-Member exchange (LMX)*: A combination of greater in-group vs. out-group relations, characterized by greater communication, mutual loyalty and

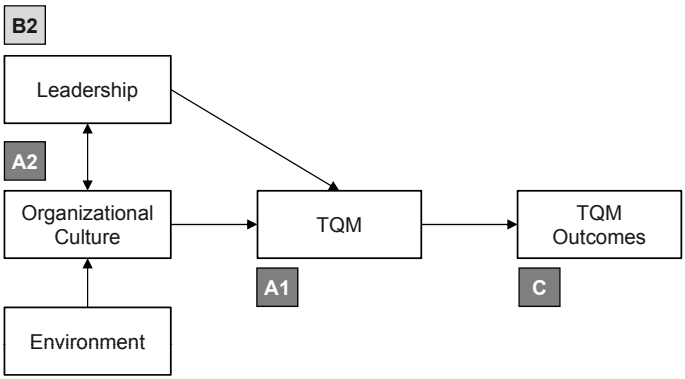

Figure 3.22: Model of Waldman [1993] - Relationships between Leadership, Culture, and TQM (Source: [Waldman, 1993, p. 67])

support increases TQM involvement of employees (e.g., volunteering for special assignments and extra work).

Puffer and McCarthy [1996] take the position that "if every employee were to take a leadership role and deal proactively with environmental issues, the organization would better cope with external pressures" ([Puffer and McCarthy, 1996, p. 110]). They recognize that leadership theories and TQM have much in common, not only because leadership is one of the six categories contained in the MBNQA (see ([Puffer and McCarthy, 1996, p. 109]). Integrating the essential elements of leadership models into the requirements of TQM, Puffer and McCarthy [1996] suggest a leadership framework for quality management that reflects a distribution of leadership throughout an organization, a distribution tending toward loosely structured networks with external partners and away from traditional internal hierarchies.

Based on the theoretical assumptions of Waldman [1993] and the propositions of Puffer and McCarthy [1996] (see [Puffer and McCarthy, 1996, p. 125]), the hypotheses H[B2-A1]1 and H[B2-A1]2 are suggested for this research.

3.6.2 Leadership Style and Corporate Culture

As already mentioned, **to distinguish between Corporate Culture and Leadership is challenging, as one concept includes the other**. For example, in the CVF,

H[B2-A1]1:	In successful L6S organizations (superior overall business performance) transformational leadership is more important than participative, supportive and instrumental leadership (because the success of L6S depends on all employees sharing a common vision or goal).
H[B2-A1]2:	In successful L6S organizations (superior overall business performance) a leadership style supporting empowerment and teamwork (participative and supportive leadership) is more important than instrumental leadership (because L6S emphasizes timely responses to customer concerns by having all employees take a leadership role as well as share information and expertise).

the descriptions of the four ideal Corporate Cultures include descriptions of the typical leadership behaviors and practices appearing in each segment (see Quinn and McGrath [1982]). One could argue that **the relationship between Leadership Style and Corporate Culture is synonymous to just Corporate Culture alone**, making this section obsolete. Because both concepts are already multidimensional and complex in themselves, leadership and culture (both National and Corporate Culture) are considered separately from the beginning of this research.

Tsui et al. [2006] provide a brief overview of three different perspectives concerning the link between leadership and Organizational Culture (see [Tsui et al., 2006, p. 113f.]):

- *Functionalist perspective*: Leaders shape Organizational Culture.
- *Attribution perspective*: There is a positive relationship between perception of leadership behavior and Organizational Culture.
- *Contingency perspective*: Leader's impact on Organizational Culture depends on context.

In the **functionalist perspective**, the dominant perspective in organizational culture literature, there is a "taken for granted assumption that leadership is the main shaper and builder of organizational culture" ([Tsui et al., 2006, p. 114]). Both conscious deliberate actions and unconscious intended behaviors shape the thinking and feeling of employees. Charismatic, dynamic, and visionary leaders who are obsessed with creating and transmitting their vision have a profound (positive) effect on an

organization's culture. In the **attribution perspective**, employees tend to overestimate leadership (see Meindl et al. [1985]): they see leaders as being responsible for firm outcomes and have a tendency to romanticize the role of supervisors. The leader's role is to justify decisions and outcomes. The **contingency perspective** limits the relationship found from both the functionalist and attribution perspectives. Leadership effects on Organizational Culture depend on conditions and contextual factors, e.g., in uncertainty or crisis leaders can rise up to the occasion, but in strong situations (close relationships and common understanding between employees), a leader's action could be overwhelmed (see Davis-Blake and Pfeffer [1989]). Due to contradictory views and debates, the question whether leadership or leadership style can impact Organizational culture remains an open issue (see [Tsui et al., 2006, p. 114]).

The purpose of this chapter is to give a brief outline of specific examples and links between certain leadership components and dimensions of Corporate Culture. Section 3.6.1 has revealed a reciprocal relationship between Organizational Culture and Leadership (assumption by Waldman [1993]). This type of relationship will be reassessed with five selected publications (see table 3.27[1]).

Study	Topic	Function of study
Shamir and Howell [1999]	Theoretical analysis and impact of charismatic leadership	Theoretical Study
Sims [2000]	Trading scandal and ethical turnaround at Salomon Brothers	Practical Case Study
Young [2000]	Six organizational processes as levers for managers to shape Organizational Culture	Practical Guidance
Tsui et al. [2006]	CEO Leadership behavior and Organizational Culture in China	Theory and Quantitative Survey
Jarnagin and Slocum Jr. [2007]	Mythopoetic leadership in multiple industries (Ritz Carlton, Mayo Clinic, Toyota)	Practical Case Studies

Table 3.27: Leadership Style and Corporate Culture - Five selected studies from a broad spectrum of research efforts (Source: own analysis)

Sims [2000] describes how Salomon Brothers, the most powerful broker on Wall Street and a top-gun trader of government securities, had to change their Organi-

[1]The selection is consciously limited to five publications that encompass a broad spectrum of research approaches. This selection does not claim to give a representative or complete picture of all research initiatives on Leadership and Corporate Culture.

zational Culture from unethical to ethical behavior, to recover from a major bond scandal. Drawing on the five primary leadership mechanisms by Schein [1985] (attention, reactions to crisis, role modeling, allocation of rewards, and criteria of selection and dismissal) and the findings of Trevino and Nelson [1995], he explains how the new CEO achieves an ethical turn around of the company. Although Sims [2000] writes in a journalistic style, he uncovers that only the right leadership (in this case eliminating corruption and illegal, unethical behavior through moral behavioral standards) is able to change an existing Organizational Culture.

Arguing that leaders need to address the level of basic assumptions (see the three level model by Schein in figure 2.9) in order to maintain or transform a Corporate Culture, **Young [2000]** provides six cultural levers (see figure 3.23, [Young, 2000, p. 20]), perceived as an improvement to the McKinsey 7-S-Model presented by Peters and Waterman [1982].

Figure 3.23: Model of Young [2000] - Six Culture Levers in an organization (Source: [Young, 2000, p. 20])

As the six processes presented in figure 3.23 are linked with each other, no lever will work in isolation. Young [2000] gives the example of Toyota and the TPS, having

a superior customer management system based on the assumption of learning culture and employee empowerment (levers management control and authority and influence) (see [Young, 2000, p. 26f.]).

Tsui et al. [2006] investigate the limits of a leader's ability to change or shape an organization's culture, by taking the example of CEOs in China. Having the functionalist, attribution, and contingency perspectives in mind, they conducted two surveys and one interview study to define the nature of relationships between leadership behavior and Organizational Culture. They conclude that leaders can shape the Organizational Culture by understanding the context, and they create a framework as presented in figure 3.24 (see [Tsui et al., 2006, p. 132]).

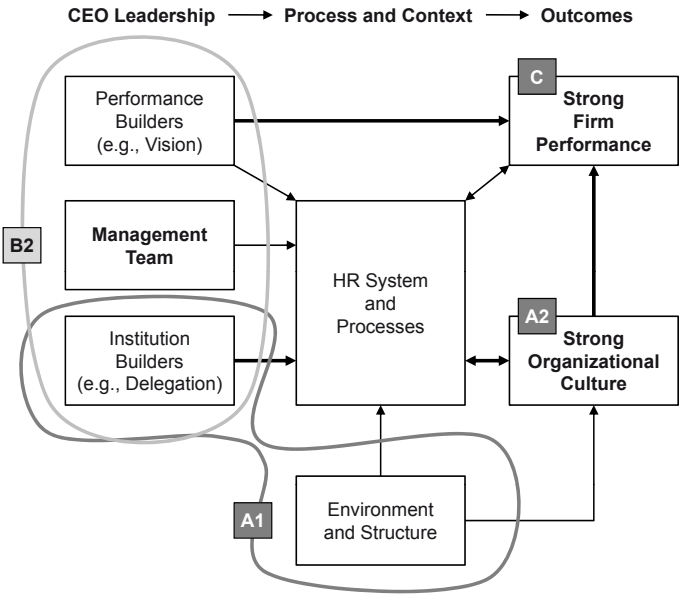

Figure 3.24: Model of Tsui et al. [2006] - Relationship between CEO leadership and Organizational Culture (Source: see [Tsui et al., 2006, p. 132])

At the same time, also figure 3.24 presents an attempt to transfer the model by Tsui et al. [2006] to the framework of this research. As done, e.g., in figure 2.11 in section 2.6, the model elements are attributed to the abbreviations of the five concepts. All variables are included except national culture.

Jarnagin and Slocum Jr. [2007] assume that "behavior in an organization is determined more by its culture than by directives from senior management" ([Jarnagin and Slocum Jr., 2007, p. 289]). Realizing that myths are useful analogies, which help to reflect and interpret the human psyche ("to explain the unexplainable"), they present a framework of Mythopoetic Leadership for the development of "robust corporate cultures" ([Jarnagin and Slocum Jr., 2007, p. 290]). By drawing on a combination of cultural heritage and rhetorical skills, leaders are encouraged to use metaphors and analogy to guide employees in their daily actions. Mission statements and storytelling are useful instruments for the development of a social identity, without a predominant focus on rational tools like structures and policies. Jarnagin and Slocum Jr. [2007] traces three examples in three different industries (health care, automotive, and hospitality) to determine seven levers for shaping Corporate Culture and turning employees into heroes.

What about the relationship between charismatic or transformational leadership style and Corporate Culture? **Shamir and Howell [1999]** argue that while charismatic leadership principles and processes potentially apply across a wide variety of situations, the emergence and effectiveness of such leadership may be facilitated by some contexts and inhibited by others.[1] Concerning the link between Organizational Culture and leadership they raise propositions that can be translated into hypotheses H[B2-A2]1 and H[B2-A2]1 (transformational leadership is assumed to be the superior concept, which includes charismatic leadership). These propositions relate to section

H[B2-A2]1:	Transformational leadership is more likely to shape a clan mode of governance (group culture) than either a market (developmental culture) or bureaucratic mode of governance (hierarchical culture).
H[B2-A2]2:	Transformational leadership is more likely to shape an adaptive (developmental) than a non-adaptive (hierarchical) corporate culture.

3.5.3, as they include traits of National Culture (Organizational Culture is assumed to be molded by the surrounding National Culture, or as Dorfman suggests "organizations mirror the 'culture' of societies in which they are embedded" ([Scandura and Dorfman, 2004, p. 304])).

[1] They included the contextual variables organizational environment, life-cycle stage, technology, tasks, goals, structure, culture, and leader's level in the organization.

3.6.3 Leadership Style and Corporate Success

The evidence of a leadership-performance link is largely anecdotal (see [Ogbonna and Harris, 2000, p. 768]). Like the findings in section 2.6, the literature on leadership and performance can be broadly categorized into phases or eras (see [Dorfman, 1996, p. 271] and the overview by [Ogbonna and Harris, 2000, p. 767f.]):

- *Trait studies*: Leaders are born with personality traits that lead them to success (see Argyris [1955]; Mahoney et al. [1960]).
- *Style and behavioral approaches*: Leaders adopt certain practices and develop styles that prove to be more successful (see Bowers and Seashore [1966]; Hemphill and Coons [1957]; Likert [1961]).
- *Situational and Contingency Theories*: Leadership effectiveness depends on a leader's ability to adapt culturally (see Erez and Earley [1993]; Fiedler [1967]; House [1971]; Vroom and Yetton [1973] and the explanation in section 3.5.3).
- *Transformational Leadership*: Visionary and enthusiastic leaders motivate their subordinates toward superior performance (see Bycio et al. [1995]; Howell and Avolio [1993] and the explanation in section 2.6.2).

While the first two phases focused on finding the one best way of leading, situational theories consider that leadership is sensitive to contexts (see also the depiction in figure 2.11 in section 2.6). The focus on transformational leadership appears to present a return to the one best way of leadership.

Avolio et al. [2009] stress that the impact of leadership varies, is multidimensional, and depends on the theoretical focus of the underlying leadership model (see [Avolio et al., 2009, p. 783]). One example studying the relationship between Leadership Style and performance is the research by **Ogbonna and Harris [2000]**, which includes Organizational Culture as a mediator and has been reviewed in detail above (see section 3.3). As a reminder the key hypothesis describing the relationship between Leadership Style and Corporate Success was that **"Leadership Style is not directly linked to Business Performance (but is indirectly associated via Leadership Practices, Corporate Culture, and Lean Six Sigma)"**. As a consequence, leadership interventions have an (indirect) impact on a variety of outcomes.

In summary, only the investigation of the antecedent national values and the link to Corporate Culture will increase the understanding of leadership behavior of individual

managers and their potential to implement quality management systems like Lean Six Sigma in order to achieve sustainable competitive advantages for their company (see also [Byrne and Bradley, 2007, p. 168]).

3.6.4 Hypothesized Impact of Leadership Style

The literature review on leadership style has revealed several implications for this research. Depending on the model and elements in focus, leadership has been found to be both culture-universal and culture-specific. **To lead to success, leadership style needs to be pluralistic, flexible, and visionary. In the context of Lean Six Sigma, leadership behaviors accelerating teamwork, empowerment, structured procedures, and a focus on metrics play a crucial role.**

Hypothesis	Assumed Relationship
B2-A1	**Leadership Style and Lean Six Sigma**
H[B2-A1]1	In successful L6S organizations (superior overall business performance) transformational leadership is more important than participative, supportive and instrumental leadership (because the success of L6S depends on all employees sharing a common vision or goal).
H[B2-A1]2	In successful L6S organizations (superior overall business performance) a leadership style supporting empowerment and teamwork (participative and supportive leadership) is more important than instrumental leadership (because L6S emphasizes timely responses to customer concerns by having all employees take a leadership role as well as share information and expertise).
B2-A2	**Leadership Style and Corporate Culture**
H[B2-A2]1	Transformational leadership is more likely to shape a clan mode of governance (group culture) than either a market (developmental culture) or bureaucratic mode of governance (hierarchical culture).
H[B2-A2]2	Transformational leadership is more likely to shape an adaptive (developmental) than a non-adaptive (hierarchical) corporate culture.
H[B2-A2]3	Participative leadership shapes a clan mode of governance (group culture).
H[B2-A2]4	Supportive leadership shapes a clan mode of governance (group culture).
H[B2-A2]5	Instrumental leadership facilitates a rational corporate culture.
H[B2-A2]6	Instrumental leadership facilitates a hierarchical corporate culture.
B2-C	**Leadership Style and Corporate Success**
H[B2-C]1	Leadership Style is not directly linked to Business Performance (but is indirectly associated via Corporate Culture and Lean Six Sigma).

Table 3.28: Hypothesized Impact of Leadership Style - Overview of hypotheses (Source: own analysis)

Table 3.28 and figure 3.25 summarize the key links assumed for the impact of Leadership Style on Lean Six Sigma, Corporate Culture, and Corporate Success. Hypotheses raised throughout the text are supplemented and expanded where necessary (e.g., the

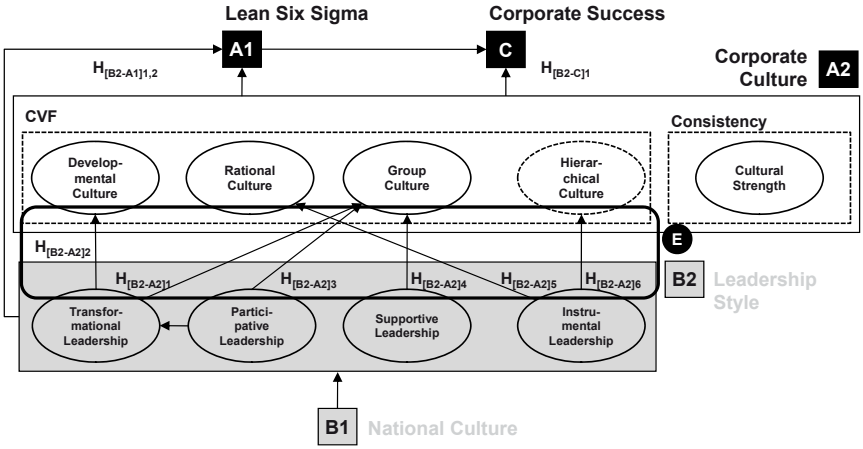

Figure 3.25: Extract of Hypothesized Model (Impact B2) - Impact of Leadership Style (Source: own figure)

extension of hypotheses reflecting the link between Leadership Style and Corporate Culture, namely H[B2-A2]3 to H[B2-A2]6).

3.7 Summary of the Literature Review and Hypothesized Model

The literature review has revealed several types of relationships between the five research concepts Lean Six Sigma, Corporate Success, Corporate Culture, National Culture, and Leadership Style, which have been summarized in the five sections 3.2.4, 3.3.3, 3.4.4, 3.5.4, and 3.6.4. A condensed view of the hypothesized relationships (in total 44) is presented in figure 3.26 and table 3.29. A detailed description of the relationships is at this point consciously waived—for further reference see the extracted models and descriptions in the partial summaries outlined above.

Hypothesis	Assumed Relationship
A1-C	**Lean Six Sigma and Corporate Success**
H[A1-C]1	L6S infrastructure practices (role structure) are positively related to overall business performance.
H[A1-C]2	L6S core practices (structured procedure) are positively related to process management and quality performance.

Hypothesis	Assumed Relationship
H[A1-C]3	L6S core practices (focus on metrics) are positively related to both process management and product/service design and consequently quality performance.
H[A1-C]4	L6S infrastructure practices (role structure) have more impact on individual outcomes (employee attitudes and motivation) than L6S core practices (structured procedure and focus on metrics).
A2-C	**Corporate Culture and Corporate Success**
H[A2-C]1	A hierarchical corporate culture does not contribute to corporate effectiveness and thus negatively impacts Corporate Success.
H[A2-C]2	The more the individual values are congruent with the corporate values (as part of the existing Corporate Culture), the higher the individual/employee outcomes will be.
H[A2-C]3	Relatively open, externally oriented (developmental) corporate cultures relate to better performance, while relatively closed, internally oriented (hierarchical) corporate cultures relate to poorer performance.
H[A2-C]4	A Corporate Culture's strength mediates the relationship between Corporate Culture and Corporate Success.
H[A2-C]5	Companies with strong, well-balanced cultures will achieve higher levels of performance than companies with unbalanced cultures.
H[A2-C]6	Employee attitudes and motivation will mediate the relationship between corporate culture and corporate performance.
H[A2-C]7	The relationship between Corporate Culture and Corporate Success is (partly) mediated by Lean Six Sigma.
A1-A2	**Lean Six Sigma and Corporate Culture**
H[A1-A2]1	A corporation's emphasis on the rational corporate culture will be positively associated with the level of Lean Six Sigma role structure.
H[A1-A2]2	A corporation's emphasis on the rational corporate culture will be positively associated with the level of Lean Six Sigma structured improvement procedure.
H[A1-A2]3	A corporation's emphasis on the rational corporate culture will be positively associated with the level of Lean Six Sigma focus on metrics.
H[A1-A2]4	A corporation's emphasis on the developmental corporate culture will be positively associated with the level of Lean Six Sigma role structure.
H[A1-A2]5	A corporation's emphasis on the group corporate culture will be positively associated with the level of Lean Six Sigma structured improvement procedure.
H[A1-A2]6	A corporation's emphasis on the hierarchical corporate culture will not be associated with any element of Lean Six Sigma.
B1-A1	**National Culture and Lean Six Sigma**
H[B1-A1]1	A high level of uncertainty avoidance will be positively related with the level of L6S infrastructure practices (role structure) and L6S core practices (structured procedure and focus on metrics).
H[B1-A1]2	A high level of individualism will be negatively related with the level of L6S core practices (structured procedure and focus on metrics).
H[B1-A1]3	A high level of masculinity will be positively related with the level of L6S core practices (focus on metrics).
H[B1-A1]4	A high level of power distance will be positively related with the level of L6S core practices (structured procedure).
B1-A2	**National Culture and Corporate Culture**
H[B1-A2]1	Companies with a high individualistic and masculine orientation are characterized by a rational culture (US).
H[B1-A2]2	Companies with a collectivistic and low masculine orientation are characterized by a group culture (China).

Hypothesis	Assumed Relationship
H[B1-A2]3	Companies with a masculine and an individualistic orientation are characterized by a hierarchical culture (UK).
H[B1-A2]4	Companies with a masculine and low uncertainty avoidance orientation are characterized by a developmental culture (Hong Kong).
H[B1-A2]5	Companies with high power distance orientation are characterized by a hierarchical culture (Germany).
B1-B2	**National Culture and Leadership Style**
H[B1-B2]1	A high level of uncertainty avoidance will give rise to transformational leadership (weak situation).
H[B1-B2]2	A high level of individualism will be positively associated with and supportive of transformational leadership.
H[B1-B2]3	A high level of uncertainty avoidance will be positively associated with and supportive of participative leadership.
H[B1-B2]4	A low level of individualism (collectivistic orientation) will be positively associated with and supportive of participative leadership.
H[B1-B2]5	A high level of participative leadership will be positively related to the level of transformational leadership.
H[B1-B2]6	A high level of masculinity will be positively will be positively associated with and supportive of the level of instrumental leadership.
H[B1-B2]7	A high level of power distance will relate to lower levels of supportive leadership.
H[B1-B2]8	A high level of power distance will be positively will be positively associated with and supportive of the level of instrumental leadership.
B2-A1	**Leadership Style and Lean Six Sigma**
H[B2-A1]1	In successful L6S organizations (superior overall business performance) transformational leadership is more important than participative, supportive and instrumental leadership (because the success of L6S depends on all employees sharing a common vision or goal).
H[B2-A1]2	In successful L6S organizations (superior overall business performance) a leadership style supporting empowerment and teamwork (participative and supportive leadership) is more important than instrumental leadership (because L6S emphasizes timely responses to customer concerns by having all employees take a leadership role as well as share information and expertise).
B2-A2	**Leadership Style and Corporate Culture**
H[B2-A2]1	Transformational leadership is more likely to shape a clan mode of governance (group culture) than either a market (developmental culture) or bureaucratic mode of governance (hierarchical culture).
H[B2-A2]2	Transformational leadership is more likely to shape an adaptive (developmental) than a non-adaptive (hierarchical) corporate culture.
H[B2-A2]3	Participative leadership shapes a clan mode of governance (group culture).
H[B2-A2]4	Supportive leadership shapes a clan mode of governance (group culture).
H[B2-A2]5	Instrumental leadership facilitates a rational corporate culture.
H[B2-A2]6	Instrumental leadership facilitates a hierarchical corporate culture.
B2-C	**Leadership Style and Corporate Success**
H[B2-C]1	Leadership Style is not directly linked to Business Performance (but is indirectly associated via Corporate Culture and Lean Six Sigma).

Table 3.29: Summary of Hypotheses - Assumed relationships between the five research concepts (Source: own analysis)

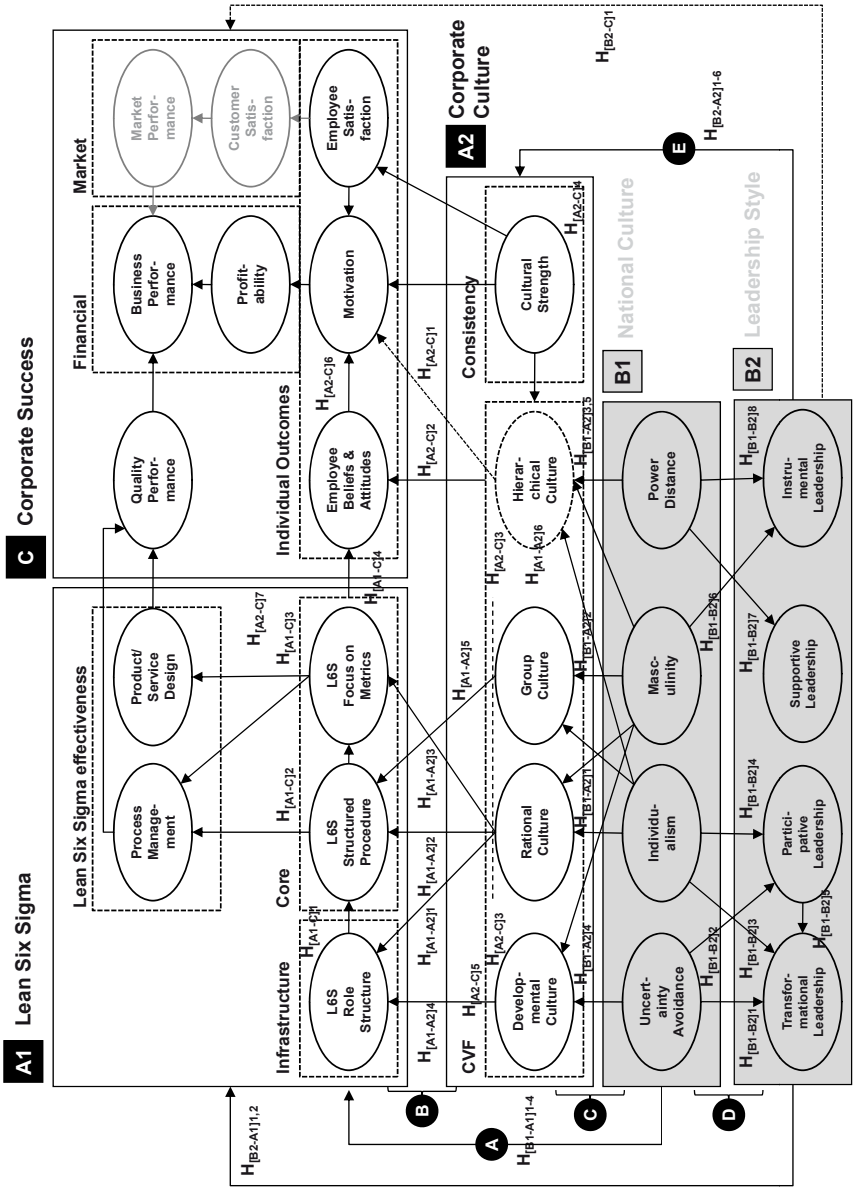

Figure 3.26: Hypothesized Model - Detailed research framework (Source: own figure)

As mentioned in section 3.4.2, this research takes an explicative, confirmatory design (see [Töpfer, 2009a, p. 124]). The following chapter will provide the methodological foundations with detailed operationalizations of the variables shown in figure 3.26, as a base for a complete structural equation model to be tested in this research.

4

Methodological Foundations

4.1 Structural Equation Modeling

4.1.1 Overview of SEM

In order to test a model with hypothesized relationships between variables, structural equation modeling (SEM) is used [see SPSS [2006]]. Originally described as "a class of methodologies that seeks to represent hypotheses about means, variances, and covariances of observed data in terms of a smaller number of 'structural' parameters defined by a hypothesized underlying model" ([Kaplan, 2000, p. 1]), this definition has been recently revised as to "a class of methodologies that seeks to represent hypotheses about summary statistics derived from empirical measurements in terms of smaller numbers of "structural" parameters defined by a hypothesized underlying model" ([Kaplan, 2008, p. 1]). Hoyle [1995] presents the alternative characterization, that SEM is "a comprehensive statistical approach to testing hypotheses about relations among observed and latent variables".[1] Though stemming from econometrics, SEM is increasingly applied in various disciplines such as psychology, sociology, political science, education, and in business-related disciplines such as marketing, strategy and management accounting research (see Nachtigall et al. [2003]; Schumacker and Lomax [1996]; Smith and Langfield-Smith [2004]). In comparison to more traditional quantitative techniques such as multiple regression analysis and path analysis, SEM provides the following benefits (see [Smith and Langfield-Smith, 2004, p. 50f.]:

[1] "A latent variable is not directly measured, but is inferred from a series of observed indicators." ([Smith and Langfield-Smith, 2004, p. 50])

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- The types of relations examined in SEM are not limited. **Multiple regression** focuses on one dependent variable and a number of independent (explanatory) variables.
- **Multiple regression analysis** assumes that all constructs (or the translation of latent variables into observable indicators) are free of measurement error.
- Although **path analysis** increases the sophistication of regression analysis by involving the analysis of a set of relation between variables (direct and indirect effects of independent on dependent variables), it is restricted to the assumption of an unidirectional flow of these relations. Reciprocal relationships between variables are not distinguished as in SEM.
- **Path analysis** misses the formal adjustment of the coefficient of each independent variable for estimated measurement error and assessment of a complete model fit.

Only SEM inhibits the ability to provide an assessment of which variables are important in explaining or predicting another variable (or more than one). As outlined in the sections above, the research questions of this thesis reflect causal relationships between multiple variables, that can be adequately tested with SEM. SEM is therefore used for the same reasons as stated by Prajogo and McDermott [2005] and Skerlavaj et al. [2007]: (1) to allow for the modeling of both observed and latent variables; and (2) to test several structural relationships simultaneously (see [Skerlavaj et al., 2007, p. 356]). "When the phenomena of interest are complex and multidimensional, SEM is the only analysis that allows complete and simultaneous tests of all the relations" ([Ullman, 2006, p. 38]).

As one of the benefits of SEM is its ability to incorporate other multivariate models,[1] SEM may be considered a meta-multivariate model (see [Hershberger, 2003, p. 44]). An other key benefit in comparison to multiple regression and path analysis is the integration of various measures for assessing the overall sufficiency of model fit (see [Jais, 2007, p. 99] and Jahn [2007]).

The methodology of SEM follows specific rules. Several conventions guide the analytical procedure and set up of a SEM (e. g., see [Ullman, 2006, p. 36f.]). First, **path diagrams** present the heart of SEM and allow the researcher to create the hypothesized

[1] SEM software integrates standard methods like correlation, multiple regression, (M)ANOVA (Multivariate Analysis of Variance), factor analysis etc. (see [Nachtigall et al., 2003, p. 11]).

set of relations. Extensive literature review is required to build a model, that is based on profound theoretical and logical thinking. **Variables** are differentiated according to their dependence and measurability. Independent or exogenous variables (which are expressed by the small greek letter ξ) are not explained by the model, but are included to explain the dependent, endogenous variables (expressed by the small greek letter η) (see [Töpfer, 2009a, p. 240]). Measured variables, which can be directly observed, are represented by squares or rectangles, while latent variables, constructs or unobserved variables are represented by circles or ovals. Latent variables require a break down into two or more measurable statements - as "we are unable to measure these constructs directly, ... we do the next best thing and measure indicators" ([Ullman, 2006, p. 37])). The indicators for exogenous latent variables are labeled with "X", while indicators for endogenous latent variables are labeled with "Y" (see [Backhaus et al., 2006, p. 348]). **Relationships** between variables are defined by lines. They have either one or two arrows. An arrow at both ends implies a (co-)variance between two variables (no implied direction of effect), while a line with one arrow represents a hypothesized direct relationship between two variables, with the arrow pointing towards the dependent variable. Lack of a line implies no direct relationship between variables.

Overall, SEM inhibits a distinct terminology which ensures the unity of modeling across studies and disciplines.

Figure 4.1 connects three latent variables[1] and shows that a SEM consists of two types of sub-models: the structural model,[2] representing the hypothesized relationships between variables, and the measurement model,[3] relating the measured indicators to the latent variables,[4] both for the latent exogenous variables and for the latent endogenous variables (see [Backhaus et al., 2006, p. 355]).

In figure 4.1, the only variable or concept not explained by the model is the latent variable "A". No line (with arrow) ends in this construct. Therefore "A" is labeled with the small greek letter ξ_1. The two remaining variables "B" and "C" are explained by one or more variables ("B" is explained by "A" and "C" is explained by "A" and "B") and are labeled with the small greek letters η_1 and η_2.

[1] Illustrative example, based on [Nachtigall et al., 2003, p. 5].

[2] PLS path modeling uses the term outer model (see [Henseler et al., 2009, p. 284].

[3] PLS path modeling uses the term inner model (see [Henseler et al., 2009, p. 284].

[4] The terms constructs or factors are a synonym for latent variables and could also be used in this context.

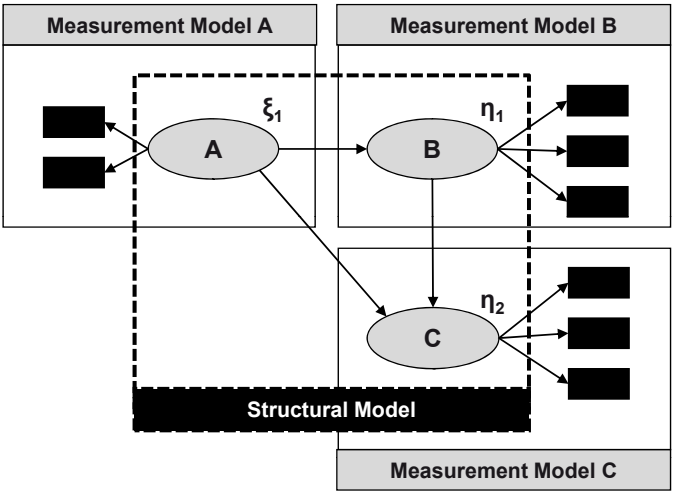

Figure 4.1: SEM Overview - Integration of Measurement Models and Structural Model (Source: [Nachtigall et al., 2003, p. 5])

To understand the methodological flow of conventional SEM as generally practiced in the social and behavioral sciences, the approach suggested by Kaplan [2008] is presented in the first column of figure 4.2. Structural equations are defined on the basis of theory, i.e., path diagrams represent the connection between theory and model specification. These path diagrams follow the conventions outlined above. As the third step, the hypothesized model is confronted with real data. A sample is selected and measures are obtained on the sample (see [Kaplan, 2008, p. 8]). A cyclical pattern of first model estimation, evaluation in terms of goodness-of-fit and modification follows, until the model meets defined standards of adequate fit. This final model and implied findings are then discussed at the very end. The second column in figure 4.2 illustrates, how these steps can be linked to the flow of this thesis. In total three model versions are developed as part of this research. The first model is version V0, which is displayed in figure 3.26 and which represents the complete theory, but does not consider SEM specific rules and conventions yet. The second version is V1, which will be the outcome of this chapter (theory translated into model following SEM conventions before data collection). The third and final model V2 presents the outcome of this research, a

re-defined version V1, which is modified into version V2 by the evaluation of pre-test and empirical survey.

Following the majority of studies investigating factors of (corporate) success (see [Albers and Hildebrandt, 2006, p. 5]), the process of conceptualization and operationalization of latent variables as complex constructs can be divided into seven sequent steps, which are outlined in the third column displayed in figure 4.2 (based on [Homburg and Giering, 1996, p. 11f.], [Kaplan, 2008, p. 9] and own thoughts; for a different version based on [Homburg and Giering, 1996, p. 11f.] see [Borth, 2004, p. 74] and [Töpfer, 2009a, p. 242]).

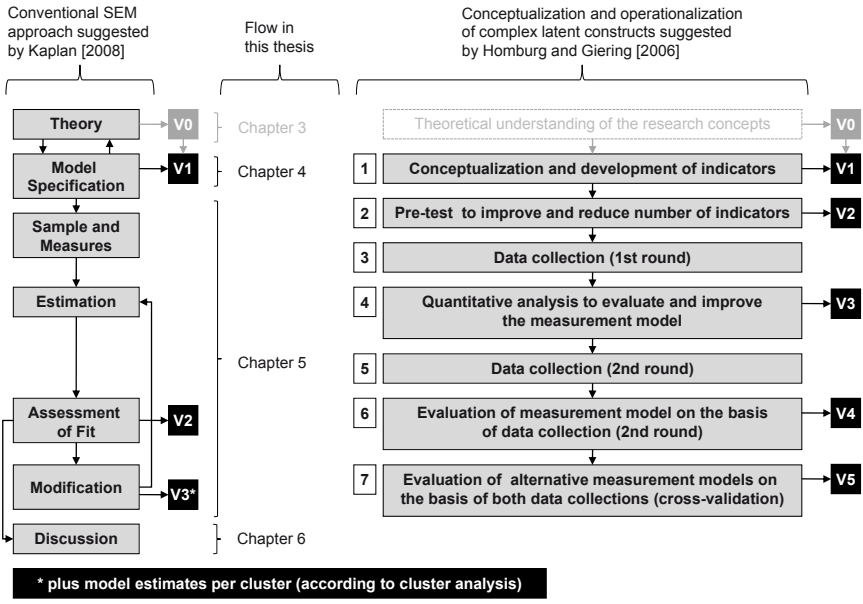

Figure 4.2: SEM Process - Recommended procedure according to Kaplan [2008] and Homburg and Giering [1996] linked to the research flow (Source: own figure)

Again, the goal of the first step is to reach a basic understanding of the concepts through, e.g., extensive literature review and expert interviews and to develop and define relevant indicators for the latent variables. Like any, the SEM in this research requires a profound theoretical base and in-depth logical thinking to determine, e.g., in

which way the two layers national and corporate culture may effect individual behavior and action in the context of Lean Six Sigma implementation (see [Janzer, 2007, p. 33]). The extensive literature review presented in chapters 2 and 3 has delivered a deep insight into the relationships and dynamics between the five research concepts Lean Six Sigma (A1), Corporate Culture (A2), National Culture (B1), Leadership Style (B2) and Corporate Success (C). The second step of the process presented in figure 4.2 seeks to improve and reduce this set of indicators through a pre-test.

On the basis of this reduced set of indicators, data collection takes place as the third step. The fourth step presents the quantitative data analysis based on this first data sample, which in turn can be divided into four phases.[1] As this analysis is targeted on evaluating and improving the defined measurement model, a second data collection is required in step five. This redefined measurement model is then evaluated in step six. Alternative models are considered, which could lead to a simplification of the improved measurement model developed in step four. The final step seven performs a cross-validation on the basis of the two data samples at hand, delivering a final model which turns out to have the best fit across the two data samples. To illustrate, how many model versions are actually developed throughout the process suggested by Homburg and Giering [1996], figure 4.2 also contains markers on the right side of the graphic (named V0 to V5). Again, model version V0 has been defined in section 3.7 (without conscious consideration of SEM specific rules and conventions), while model version V1 will be the outcome of this chapter. Version V2 according to Kaplan [2008] will be developed and evaluated in chapter 5, and findings of a pre-test (V2 according to Homburg and Giering [1996]) will be incorporated here at the same time (both pre-test findings and the results of the actual data collection will define the difference between version V1 and V2). As no second data collection is planned within the framework of this research, versions V3 to V5 according to Homburg and Giering [1996] are not linked to the flow of this thesis.

Although the process by Homburg and Giering [1996] is used by the majority of SEM applications focusing on softwares like LISREL[2] or AMOS[3] and it can be clearly linked to the flow of this thesis, it provides a too narrow approach for this research,

[1] The four phases of quantitative data analysis will be picked up again and described in detail in chapter 5.

[2] See Jöreskog and Sörbom [1996]

[3] See Arbuckle [1999]; SPSS [2006]

i.e., with limited or no explanatory power (see [Albers and Hildebrandt, 2006, p. 6]). Two different approaches in SEM modeling exits, namely covariance-based techniques (CBSEM) and variance-based techniques (PLS). The process suggested by Homburg and Giering [1996] is based on the evaluation process of CBSEM, but does not consider PLS, which will be used in this thesis.[1] Necessary refinements and additions to the processes presented in figure 4.2 will be developed in the following sections and the exact flow of statistical analysis will be summarized in section 4.2.3.

Many studies in cross-cultural management science wrongly assume or suggest causality, by just showing that two variables proceed into the same direction (see [Janzer, 2007, p. 32]). The work in chapters 2 and 3 has shown, that in order to capture the complexity of the five research concepts and their interdependencies, a great amount of latent variables and relationships need to be considered. However, numerous authors have raised concerns that SEM cannot be equated with causal modeling. This issue will be briefly covered in the following section. Afterwards the evaluation sequence of SEM will be presented, and the hypothesized model version V0, which has been summarized in figure 3.26, will be - one by one - and following the process presented in figure 4.2 translated into testable measurement constructs.[2]

4.1.2 SEM and Causal Modeling

Although SEM is sometimes described as "causal modeling" (see Hoyle and Panter [1995]), in most circumstances, SEM cannot be used to test causation and directionality between variables (see [Smith and Langfield-Smith, 2004, p. 59]). Drawn arrows may leave the fit of a model unaffected and testing the fit of a SEM is not a test of causality (see [Nachtigall et al., 2003, p. 6]). Unfortunately, this misinterpretation has not been eradicated in popular introductory textbooks such as Backhaus et al. [2006] (see [Nachtigall et al., 2003, p. 6]).

Three basic requirement have to be met in order to test causality (see [Smith and Langfield-Smith, 2004, p. 59]):

1. Association between two variables

[1] For the reasons why PLS is chosen, see the explanation provided in section 4.1.3 below.

[2] As outlined in section 3.7, figure 4.1 needs to be broken down into further variables, in order to capture the complexity of the five research concepts. This deeper view will be summarized in section 4.6 and presents the final hypothesized SEM (see marker V1 in figure 4.2) to be pre-tested in step two.

2. Isolation of the effect (ruling out extraneous variables)
3. Temporal ordering (the cause unambiguously precedes an effect)

If variables are measured at the same point in time (as will be the case in this research), SEM is no better equipped than any other technique to deal with causality (see [Smith and Langfield-Smith, 2004, p. 59]). This stresses the need for a profound theoretical analysis preceding the development of the SEM: "Claims to causality may be in the underlying theory that supports the development of a structural model, and may be inferred from the SEM analysis, but SEM itself cannot "prove" causality" ([Smith and Langfield-Smith, 2004, p. 59]). Cudeck and du Toit [2009] argue that "Using an SEM to describe a complicated set of associations is still useful scientifically even if the process being suggested to explain the correlations is not unambiguously causal."

4.1.3 Reflective and Formative Measurement Models

Depending on the direction of assumed causality between latent variables and manifest (measurable) indicators, reflective and formative measurement models are differentiated (e.g., see [Nitzl, 2010, p. 5]). In other words, the selection of the measurable indicators determines the meaning of the latent variables and the analysis of empirical results (see [Albers and Hildebrandt, 2006, p. 25]). As a misspecification of measurement models has led to many misleading results in literature,[1] the decision to use either formative or reflective measurement models is to be based on a profound conceptual discussion (see [Henseler et al., 2009, p. 291]), which is provided below. The evaluation of a measurement model depends on its type (reflective or formative) and will be described in section 4.2.1.

Reflective measurement models assume, that indicators are determined by and reflect the latent construct, i.e., the latent variable causes scores on the indicators (e.g., see [Cadogan et al., 2008, p. 1264]). With roots in classical test theory and economics (see Lord and Novick [1968]), this approach has been widely used in marketing and business research (see [Diamantopoulos, 2008, p. 1201]). As reflective indicators are determined by the construct to which they are assigned, they should positively correlate with each other (see [Jahn, 2007, p. 6]). With similar reliability indicators are also

[1] According to Jarvis et al. [2003], over one fourth of SEM applications in top-level marketing article have used misspecified measurement models and have biased the structural model (i.e., lead to incorrect assessment of relationships in the SEM application).

interchangeable and an elimination of a single item does not change the latent variable (see [Bollen and Lennox, 1991, p. 308] and [Diamantopoulos and Winklhofer, 2001, p. 271]. This perspective of internal consistency dominates in the social sciences (see [Jahn, 2007, p. 6]).

In **formative measurement models**, indicators are assumed to cause a latent variable or construct. "When a latent variable is defined as a linear sum of a set of measurements [...], the measures are termed formative indicators: the measures produce the construct to speak" ([Bagozzi, 1994, p. 332]). Adding or eliminating a formative indicator changes the content of the latent variable (see [Nitzl, 2010, p. 6] and [Jahn, 2007, p. 7]), e.g., with the elimination of single indicators key characteristics of the latent variable get lost (see [Bollen and Lennox, 1991, p. 308]).

To summarize, table 4.1 provides a decision support whether indicators are reflective (R) or formative (F) ([Jahn, 2007, p. 8]; for an extended checklist see [Christophersen and Grape, 2007, p. 110]).

	Characteristic	**Condition fulfilled?**	
		Yes	**No**
1.	Change of indicators results in change of construct	F	R
2.	Change in construct results in change of indicators	R	F
3.	Indicators do not belong to the same topic	F	R
4.	A change of an indicator's value results in a change of the other indicators' values	R	F

Table 4.1: Formative and Reflective Indicators - Decision support through four questions (Source: [Jahn, 2007, p. 8])

Focusing on either reflective or formative measurement models would not adequately reflect the five complex concepts of this research. Taking the example of National Culture, figure 4.3 (based on [Christophersen and Grape, 2007, p. 107]) illustrates that—deduced from theory presented in chapters 2 and 3—both measurement approaches need to be considered.

As National Culture according to Hofstede is multifaceted, it contains dimensions or latent constructs, which in turn contain different, if not even contrary, attitudes and beliefs. National Culture can be seen as a latent variable of second order, driven by four latent variables of first order (Uncertainty Avoidance, Individualism, Masculinity, and Power Distance; according to Hofstede [1980a]). In line with the discussion of Ruiz

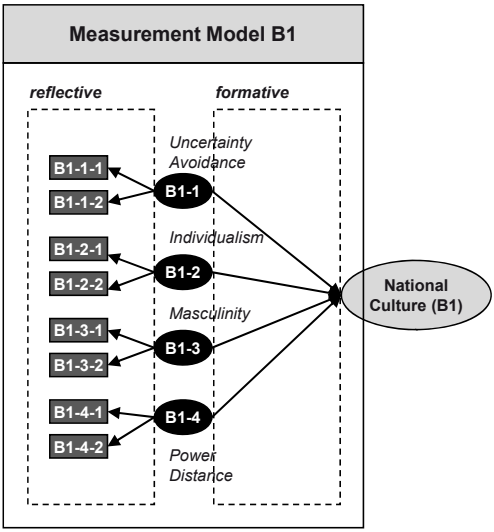

Figure 4.3: Multidimensional Construct for National Culture - Combination of reflective and formative indicators (Source: own figure)

et al. [2008] about quality, only a formative measurement model is able to capture that these four variables may correlate positively, negatively or not at all (see [Ruiz et al., 2008, p. 1264]; in figure 4.3 the formative approach is reflected by the arrows pointing towards National Culture). On the other hand, a dimension like Uncertainty Avoidance (latent variable of first order) can be measured by reflective indicators (in figure 4.3 the reflective approach is reflected by, e.g., the arrows pointing from Uncertainty Avoidance to the indicators). The same measurement complexity is considered for the remaining four concepts in focus of this research.[1]

[1]The operationalized combination of reflective and formative measurement models for all concepts can be found in appendix C. For each measurement model two versions are presented - one before data collection and one after (adapted measurement model according to data specifics, for detailed explanations see also section 5.2).

4.2 Partial Least Squares Path Modeling (PLS)

Independent of the increasing popularity of variance-based structural equation modeling, here presented by PLS path modeling (see [Henseler et al., 2009, p. 282]), the motivation for the use of this method is rooted in the particular strengths the method provides in comparison to the more widespread covariance-based techniques (e.g., LISREL). Table 4.2 summarizes they key advantages of the PLS technique for the purpose of the research as outlined in the previous sections (see also Jahn [2007]).

	Advantage
1.	Relationships between constructs not tested yet—study is exploratory
2.	Formative measurement exists
3.	Small sample size, scattered across multiple subgroups, which are probably skewed (normal distribution not assumed)
4.	Prognosis of results more important, than precise goodness-of-fit criteria

Table 4.2: PLS Characteristics - Advantages over CBSEM (Source: own analysis)

Figure 4.4 (based on Henseler et al. [2009]; Nitzl [2010]; Schloderer et al. [2009]) highlights, that the PLS Path Model Assessment can be divided into a two-step process, namely inner and outer model assessment (the analogue description for measurement and structural model, see section 4.1.1). These two steps and the underlying mathematics will be describes in more detail in the following sections.

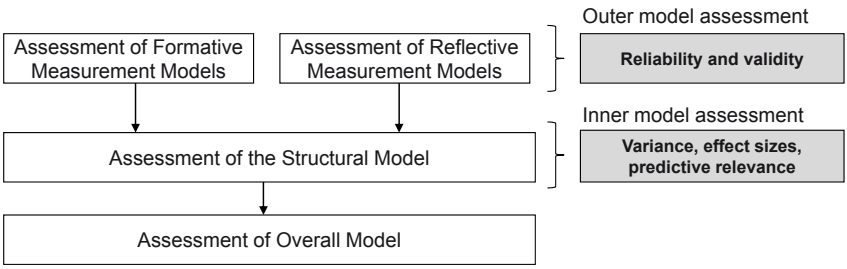

Figure 4.4: Evaluation of SEM-Models with PLS - Stepwise approach (Source: [Nitzl, 2010, p. 22] according to [Schloderer et al., 2009, p. 589] and [Henseler et al., 2009, p. 298])

4.2.1 Assessment of the Measurement Models with PLS

The assessment of the measurement models with PLS (here: SmartPLS) is typically divided into the assessment of formative and reflective measurement models as outlined by [Nitzl, 2010, p. 22f.] and [Schloderer et al., 2009, p. 589] and shown in figure 4.4. As stated in section 4.1.3 both measurement approaches are implemented and need to be assessed.

To assess **reflective measurement models**, the measured indicators themselves (indicator reliability) as well as their relationship to the latent variable they are supposed to measure (construct reliability) are examined. Measurement errors could be systematic or by coincidence, and are checked by a series of four criteria, in order define how reliable and valid the applied measurement models are.

As a first criteria all factor loadings are analyzed. The resulting indicator reliability defines how each individual indicator adequately reflects and therefore explains the underlying latent variable. More than half of each indicator's variance should be explained by the assigned latent variable, which means that the factor loading needs to be equal or higher than 0.7 ($\sqrt{0.7} \approx 0.5$).

The construct reliability requires all reflective indicators of one latent variable to strongly correlate. The four measures to assess this are Cronbachs Alpha, Composite reliability, AVE (average variance extracted) and Fornell/Larcker. Cronbachs Alpha and Composite reliability are required to be higher than 0.7, while AVE should be higher than 0.5. The Fornell/Larcker criterion requires the average variance of one factor to be higher than every squared correlation between this and all other constructs. "Cronbachs alpha tends to provide a severe underestimation of the internal consistency reliability of latent variables in PLS path models, it is more appropriate to apply [...] the composite reliability" (see [Henseler et al., 2009, p. 299] according to Werts et al. [1974]). For a deeper understanding of the underlying mathematics see, e.g., Jahn [2007] and Nitzl [2010].

Table 4.3 summarizes the assessment of reflective measurement models, with an illustrative example of possible outcomes for the construct Group Culture as part of Corporate Culture (based on [Jahn, 2007, p. 22] and Goetz et al. [2010]). All of these measures will be calculated for each latent variable of first order (i.e. the sub-constructs of the five research concepts; see sections 4.6 and 5.2.2).

Evaluation type	**Indicator reliability**	**Construct reliability**		**Convergent validity**	**Discriminant validity**
Construct (requirement)	**Factor loading** ($\geq$ 0.707)	**Cronbachs alpha** ($\geq$ 0.7)	**Composite reliability** ($\geq$ 0.7)	**AVE** ($\geq$ 0.5)	**Fornell/ Larcker** (AVE > Korr^2)
Group Culture		**0.88**	**0.83**	**0.588**	**0.59 > 0.41**
Cohesion and morale	0.745				
Personal and family	0.709				
Loyalty and tradition	0.763				
Manager is father/mother	0.843				

Table 4.3: Reflective Measurement Model Assessment - illustrative results for the construct Group Culture (Source: own analysis)

In **formative measurement models** indicators do not measure the same content. Therefore testing reliability becomes obsolete (e.g., see [Nitzl, 2010, p. 28]), or as Henseler et al. [2009] summarize "the concepts of reliability (i.e., internal consistency) and construct validity (i.e., convergent and discriminant validity) are not meaningful when a formative mode is employed" ([Henseler et al., 2009, p. 300f.]). The assessment is solely focused on testing validity, reflected by at least two measurement approaches, namely Significance of weights and Multicollinearity (presented by, e.g., VIF, Variance Inflation Factor).[1] For a better understanding illustrative results of all possible measures for the concept Corporate Culture are depicted in table 4.4. In line with the measures applied for reflective measurement models, all of these measures will be analyzed in chapter 5 (see table 4.5).

As the concepts of this research have been identified as a combination of reflective and formative indicators (see section 4.1.3), both reflective and formative measurement assessment criteria need to be included and analyzed. Table 4.5 summarizes the procedure being used for analyzing each of the five measurement models in chronological order.[2] In total, seven metrics will be analyzed for the assessment of each measurement

[1] Henseler et al. [2009] also highlight the need to use theoretic and expert opinion to secure validity. Further statistical criteria listed are Nomological validity and External validity, which evaluate whether the formative index carries the intended meaning. The outcome of any of these statistical measures should not lead the end decision for indicator elimination, if they are still conceptually (pre-)justified.

[2] The formative measurement model assessment on the indicator level applies in this research, although it is a "second order model", see figure 4.3. Factor scores calculated from the reflective measurement models are used as formative indicators for the five research concepts. Significance of weights and Multicollinearity are therefore calculated on the already aggregated factor scores, which

Construct	Indicator level		
	Significance of weights		Multicollinearity
	Weight	**Significance**	**VIF**
Method	Regression coefficients	Bootstrapping	Multiple Regression
Software	SmartPLS	SmartPLS	SPSS
(requirement)	(n/a)	t $\geq$ 1,65 or t $\geq$ 1,96	($\leq$ 10 or 5 or 3)
Corporate Culture		**2.1**	**4.3**
Developmental culture	0.2		
Rational culture	0.8		
Group culture	0.01		
Hierarchical culture	0.5		

Table 4.4: Formative Measurement Model Assessment - illustrative results for the construct Corporate Culture (Source: own analysis)

model.[1]

Measurement		Construct	Requirement	Software
Reflective		**Indicator reliability**		
	1.	Factor loading	($\geq$ 0.707)	SPSS
		Construct reliability		
	2.	Cronbachs alpha	($\geq$ 0.7)	SPSS, SmartPLS
	3.	Composite reliability	($\geq$ 0.7)	SmartPLS
	4.	AVE	($\geq$ 0.5)	SmartPLS
		Discriminant reliability		
	5.	Fornell/Larcker	(AVE > Korr^2)	SmartPLS
Formative		**Indicator level**		
	6.	Outer Weights/Significance	$t \geq 1,65 \sim$ error of 10% $t \geq 1,96 \sim$ error of 5%	SmartPLS
	7.	VIF (Multicollinearity)	($\leq$ 10 or 5 or 3)	SPSS

Table 4.5: Measurement Model Assessment - Chronological Order of Selected Assessment Criteria (Source: own analysis)

4.2.2 Assessment of the Structural Model with PLS

Following the assessment of the reflective and formative measurement models, the structural model is assessed.

The main indicator is the determination coefficient R^2, which explains the ratio of

in turn have been derived through reflective indicators.

[1] Supporting software packages for the complete analysis are SPSS and SmartPLS, see also section 5.2.

explained variance to total variance (see [Nitzl, 2010, p. 32]). It "therefore measures the regression function's "goodness of fit" against the empirically obtained manifest items" ([Goetz et al., 2010, p. 701]). R^2 can take values between 0 and 1, with 1 being the perfect match, i.e., the endogenous variables are completely explained by the exogenous variable(s). According to Backhaus et al. [2006] and Goetz et al. [2010] no generalizable statement can be made about acceptable threshold values of R^2. However, a majority of survey outcomes are classified according to [Chin, 1998, p. 323]: R^2 between 0.19 and 0.33 indicates a weak result, values between 0.33 and 0.67 are interpreted to show a medium effect and R^2 above 0.67 indicates a substantial relationship between the studied variables.

Weak R^2 results dominate in studies, where many other influences are left unexplained, i.e., other variables could have an impact on the studied causality, but have been consciously or unconsciously waived.

The second set of criteria taken for the assessment of the structural model with PLS is presented by the path coefficients, which represent standardized beta coefficients resulting from the least-squares method or estimation (see [Goetz et al., 2010, p. 702]). In line with the determination coefficients they can be interpreted according to regression analysis (see [Nitzl, 2010, p. 33]). Path coefficients can take values between 1 and -1. Values near 0 indicate a week and values near 1 or -1 indicate a strong causal relationship between two variables. Although no singular recommendation exists for cut off, values higher 0.2 or lower -0.2 are generally accepted as being significant (see Chin [1998] and Nitzl [2010]). The path coefficients can be tested for significance with the t-values extracted by using the bootstrapping procedure (see [Nitzl, 2010, p. 33]). Bootstrapping is a resampling method originally introduced by Efron [1979]. The objective is to generate multiple samples by repeated random selection of the existing (empirical) data (for further explanations see Reimer [2007]). As bootstrap samples are created by randomly drawing cases with replacement from the original sample, they have the same number of cases as the original sample (see [Henseler et al., 2009, p. 305]). As PLS estimates the path model for each bootstrap sample, the mean values and standard error for each path coefficient is computed as well. This permits a student's t-test to test for the significance of path model relationships (see [Henseler et al., 2009, p. 306]).

Similar to traditional partial F-tests, Cohen [1988] developed the so called "effect size" f_2 (see [Goetz et al., 2010, p. 702]). It informs, whether an exogenous latent variable has a substantial influence on an endogenous latent variable (see [Nitzl, 2010, p. 34]), meaning the total effect of the variable through all reflected effects in the model. The formula for f_2 is:

$$f_2 := \frac{R^2_{incl} - R^2_{excl}}{1 - R^2_{incl}} \tag{4.1}$$

The structural model is calculated twice, i.e., one time including (R^2_{incl}), and one time excluding (R^2_{incl}) the exogenous variable in focus. Values higher than 0.02, 0.15 or 0.35 indicate, whether an (exogenous) latent variable has a low, medium or high influence on the endogenous latent variable (see [Nitzl, 2010, p. 34]).

As a fourth assessment, the Stone-Geisser test criterion Q^2_j shows "how well the data collected empirically can be reconstructed with the help of the model and the PLS parameters" ([Goetz et al., 2010, p. 702] and [Fornell and Cha, 1994, p. 72]). This test measure is also referred to as "Predictive validity". Part of the empirical data is assumed to be missing, in order to estimate this missing part with the designed PLS-Model.[1] The procedure is repeated until every data point has been skipped and replaced by an estimate (see [Nitzl, 2010, p. 35] according to [Chin, 1998, p. 317])). The test criterion is formally displayed as:

$$Q^2_j := 1 - \frac{\sum_k E_{jk}}{\sum_k O_{jk}} \tag{4.2}$$

$\sum_k E_{jk}$ represents the squares of the prediction error (i.e., data points that are skipped and replaced by a PLS estimate), while $\sum_k O_{jk}$ represents the squares of the trivial prediction error provided by the mean of the remaining, original empirical data. Index j reflects the observed endogenous measurement model and k represents the index for all indicators of the measurement model. If $\sum_k E_{jk} > \sum_k O_{jk}$, the model does not give a better estimate of the raw data than a simple mean estimation.

[1] As part of the raw data matrix is assumed to be missing, the logic of this test is also called "blindfolding" procedure (see [Goetz et al., 2010, p. 702]).

In line with the estimation of the effect size f_2, changes in the test criterion Q_j^2 can be traced to determine the relative importance of one latent variable on an other endogenous latent variable (see [Nitzl, 2010, p. 36]). The corresponding formula is displayed as:

$$q_2 := \frac{Q_{incl}^2 - Q_{excl}^2}{1 - Q_{incl}^2} \tag{4.3}$$

Again, values higher than 0.02, 0.15 or 0.35 indicate, whether a latent variable has a low, medium or high influence on the estimate of the endogenous latent variable (see [Nitzl, 2010, p. 36]).

Table 4.6 summarizes the four criteria for the assessment of the structural model with PLS, and lists the recommended result areas ([Nitzl, 2010, p. 37] according to, e.g., [Henseler et al., 2009, p. 303] and [Schloderer et al., 2009, p. 595]).

Test criterion	Description	Requirement
Determination coefficient	Ratio of explained variance to total variance of an endogenous variable	$R^2 \geq 0.67$: "substantial" $0.33 \leq R^2 < 0.67$: "medium" $0.19 \leq R^2 < 0.33$: "weak"
Path coefficients	Significance of (causal) relationship between two latent variables	$t \geq 1,65 \sim$ error of 10% $t \geq 1,96 \sim$ error of 5%
Effect size	Total influence of exogenous latent variable on an endogenous latent variable	$f_2 \geq 0.35$: "high" $0.15 \leq f_2 < 0.35$: "medium" $0.02 \leq f_2 < 0.15$: "low"
Predictive validity	Reconstruction of empirically collected data (reflective indicators) with the help of the model and the PLS parameters	$Q_2 > 0$: "Model has predictive validity" $q_2 \geq 0.35$: "high" $0.15 \leq q^2 < 0.35$: "medium" $0.02 \leq q^2 < 0.15$: "low"

Table 4.6: Structural Model Assessment - Assessment Criteria (Source: [Nitzl, 2010, p. 37])

4.2.3 Assessment of the Overall Modell with PLS

As PLS path modeling does not provide any global goodness-of-fit criterion, only partial model structures can be assessed, following the catalog of specific criteria depicted in sections 4.2.1 and 4.2.2 (according to, e.g., Henseler et al. [2009]). The assessment of the overall model is achieved by the cumulation of the multiple test criteria (here: 11). Are all recommended requirements for the individual measures achieved, the overall model

is accepted to provide a valid estimation (see [Nitzl, 2010, p. 38]) and the proposed causality reflected in the model cannot be rejected.

For a better overview, all analytical steps are briefly summarized in table 4.7 (for a deeper understanding refer to the previous sections 4.2.1 and 4.2.2).

Assessment		Construct	Requirement
Measurement Model			
Reflective		**Indicator reliability**	
	1.	Factor loading	≥ 0.707
		Construct reliability	
	2.	Cronbachs alpha	≥ 0.7
	3.	Composite reliability	≥ 0.7
	4.	AVE	≥ 0.5
		Discriminant reliability	
	5.	Fornell/Larcker	AVE $>$ Korr^2
Formative		**Indicator level**	
	6.	Outer Weights/Significance	$t \geq 1,65 \sim$ error of 10% $t \geq 1,96 \sim$ error of 5%
	7.	VIF (Multicollinearity)	($\leq$ 10 or 5 (rule of thumb) or 3 (see Andreev et al. [2009]))
Structural Model			
	8.	Determination coefficient	$R^2 \geq 0.67$: "substantial" $0.33 \leq R^2 < 0.67$: "medium" $0.19 \leq R^2 < 0.33$: "weak"
	9.	Path coefficients	$t \geq 1,65 \sim$ error of 10% $t \geq 1,96 \sim$ error of 5%
	10.	Effect size	$f_2 \geq 0.35$: "high" $0.15 \leq f_2 < 0.35$: "medium" $0.02 \leq f_2 < 0.15$: "low"
	11.	Predictive validity	$Q_2 > 0$: "Model has predictive validity" $q_2 \geq 0.35$: "high" $0.15 \leq q^2 < 0.35$: "medium" $0.02 \leq q^2 < 0.15$: "low"

Table 4.7: Complete PLS Model Assessment - Chronological Order of Selected Assessment Criteria for both Measurement Models and Structural Model (Source: own compilation according to Nitzl [2010])

4.3 Level of Analysis

As already discussed in more detail in chapter 3, cross-cultural research requires caution with regard to the level of analysis. Hofstede admits that "culture is no king-size personality; cultures are formed through the interactions of different personalities, both

conflicting and complementary, which create a whole that is more than the sum of its parts" ([Hofstede, 2001, p. 463]).

As most efforts in cross-cultural research study values on the country-level (i.e., data is collected at the individual level, but can only be analyzed on the country level), all data collected in this research will be analyzed at an aggregated level as well. Taking this route considers Hofstede's remark, that most replications and extensions of his approach are "caught in the straitjacket of my model and therefore unlikely to make basic new contributions" ([Hofstede, 2001, p. 465]).

The decision for the level of analysis is critical for any study in management accounting research (see [Van der Stede et al., 2005, p. 666]) and has implications for the interpretation of empirical results. In cross-cultural research confusions in intra- and inter-country correlations could lead to an *ecological fallacy*, i.e., an erroneous interpretation of correlations between systems, e.g., on the country level as applied to individuals (see [Hofstede, 2001, p. 16]). If indexes at the country level are derived from variables correlated at the individual level, this kind of confusion is called *reverse ecological fallacy* (see [Hofstede, 2001, p. 16]).

To prevent these risks the data of the reflective measurement items (derived from data collection at the individual level) will be aggregated to mean (formative) factor scores (for further explanation see section 5.2).

4.4 Operationalization of the Concepts

4.4.1 Operationalization of Lean Six Sigma

As highlighted and summarized in sections 3.2.4 and 3.7, the construct Lean Six Sigma can be broken down into the five latent variables or factors role structure (Lean Six Sigma infrastructure), structured procedure and focus on metrics (Lean Six Sigma core), and process management and product/service design (Lean Six Sigma effectiveness). These latent variables can only be measured using related indicators. Table 4.8 summarizes which items will be used for each unobservable (latent) construct. The constructs of interest have been applied and tested in other surveys, so that the items taken are based on Jung et al. [2008] and Zu et al. [2010]. Following the recommendation by numerous authors (e.g., see [Jahn, 2007, p. 5] and [Hair et al., 2006, p. 783]), each variable consists of at least three items.

Item	Item description
Role structure	
A1-1-1	Our company employs a (full-time) black and (part-time) green belt role structure for continuous improvement.
A1-1-2	In our company, an employee's role in the black/green structure is considered when making compensation and promotion decisions.
A1-1-3	Our company uses differentiated training so that employees who have different roles in the black/green belt role structure can obtain the necessary knowledge and skills to fulfill their job responsibilities.
Structured procedure	
A1-2-1	In our company, continuous improvement projects are conducted by following a formalized procedure (such as DMAIC - Define, Measure, Analyze, Improve and Control).
A1-2-2	All improvement projects are reviewed regularly during the process.
A1-2-3	We keep records about how each continuous improvement project is conducted.
A1-2-4	We use scientific methods while making decisions.
Focus on metrics	
A1-3-1	Our company translates customers' needs and expectation into (Lean) Six Sigma quality goals.
A1-3-2	In our company, measures for (Lean) Six Sigma performance are connected with the company's strategic quality goals.
A1-3-3	Our company systematically uses a set of measures (such as defects per million opportunities, sigma level, process capability indices, defects per unit, and yield) to evaluate process improvements.
Process management	
A1-4-1	We constantly study and review our key business processes to make improvements.
A1-4-2	Clear work or process instructions are given to employees.
A1-4-3	We make extensive use of statistical techniques to reduce variance in processes.
Product/Service Design	
A1-5-1	Quality of new products/services is emphasized in relation to cost or schedule objectives.
A1-5-2	Multiple departments (such as R&D, marketing and sales, and manufacturing) coordinate in the product/service development process.
A1-5-3	Overall, in the product or service design process, we make an effort, to include only the steps which are clearly needed.

Table 4.8: Items for the measurement of Lean Six Sigma - Operationalization of five latent factors (Source: own analysis)

4.4.2 Operationalization of Corporate Success

"Using subjective measures of performance might be more appropriate when the research is conducted at the individual or work unit level" ([Van der Stede et al., 2005, p. 675f.]). The measurement items for Corporate Success therefore include both in-

dividual outcomes (e.g., job satisfaction) and company performance metrics (see table 4.9). The exact wording of the items is based on studies reviewed in chapter 3.

Item	Item description
Quality performance	
C-1-1	In comparison to competition, quality improvements of products/services/processes at my company are much better.
C-1-2	Customer Satisfaction with quality of our products and services has increased over the past 3 years.
Financial performance	
C-2-1	Our company's sales have grown faster than the competition in the last 3 years.
C-2-2	In terms of profitability, our ROI (return on investment) has improved over the last 3 years.
C-2-3	Overall the company I work for performs better than the competition financially.
Market performance	
C-3-1	Across the product portfolio our market share growth has outperformed the competition over the last 3 years.
C-3-2	Across the product portfolio, my company's image at customers is better than the competition.
Individual Outcomes	
C-4-1	I feel comfortable how we do things around here.
C-4-2	I have learned and personally grown with my company.
C-4-3	I am excited to go to work every morning.
C-4-4	My job makes good use of my skills and abilities.
C-4-5	My work gives me a feeling of personal accomplishment.
C-4-6	Considering everything, I am satisfied with my current job.

Table 4.9: Items for the measurement of Corporate Success - Operationalization of four latent factors (Source: own analysis)

4.4.3 Operationalization of Corporate Culture

The measurement of Corporate Culture is based on the CVF. All four culture types are measured on a set of four questions with a similar sentence structure (see table 4.10).

Item	Item description
Developmental culture	
A2-1-1	This company emphasizes growth and acquiring new resources. Readiness to meet new challenges is important.
A2-1-2	To what extent do you agree that your company places a high priority on the following? This company is dynamic and entrepreneurial. People are willing to take risks.
A2-1-3	The glue which holds this company together is a commitment to innovation and development. There is an emphasis on being first.
A2-1-4	In this company the best managers are considered to be entrepreneurs, innovators or risk takers.
Rational culture	
A2-2-1	This company emphasizes competitive actions and achievement. Measurable goals are important.
A2-2-2	To what extent do you agree that your company places a high priority on the following? This company is production oriented. The major concern is with getting the job done. People aren't very personally involved.
A2-2-3	The glue which holds this company together is an emphasis on tasks and goal accomplishment. A production orientation is shared.
A2-2-4	In this company the best managers are considered to be producers, technicians or hard-drivers.
Group culture	
A2-3-1	This company emphasizes human resources. High cohesion and morale in the firm are important.
A2-3-2	To what extent do you agree that your company places a high priority on the following? This company is personal. It's like an extended family.
A2-3-3	The glue which holds this company together is commitment to this firm runs high. Loyalty and tradition are important here.
A2-3-4	In this company the best managers are considered to be mentors, sages or father/mother figures.
Hierarchical culture	
A2-4-1	This company emphasizes permanence and stability. Efficient, smooth operations are important.
A2-4-2	To what extent do you agree that your company places a high priority on the following? This company is very formalized and structured. Established procedures generally govern what people do.
A2-4-3	The glue which holds this company together is formal rules and policies. Maintaining a smooth-running company is important here.
A2-4-4	In this company the best managers are considered to be co-ordinators, organizers or administrators.

Table 4.10: Items for the measurement of Corporate Culture - Operationalization of four latent factors (Source: own analysis)

4.4.4 Operationalization of National Culture

The items for measuring National Culture are based on Jung et al. [2008] (see table 4.11). They provide a useful abstract of the longer items originally provided by Hofstede [1980a, 2001] and replicated by, e.g., Blodgett et al. [2008] and Jais [2007]. Unlike Jais [2007], who leaves the 20 content questions of the Value Survey Module unchanged too assure comparability of his results with other surveys (see [Jais, 2007, p. 104]), a more pragmatic path is followed due to the following reasons:

- A replication of the VSM 94 in this research would not deliver a context-specific instrument with the measurement of Hofstede's cultural dimensions at the individual level (e.g., see Schlingensiepen et al. [2009] and the argumentation in section 4.3 above).
- Various problems could be involved with a replication of the VSM 94, e.g., as for most master's or doctoral researchers, sampling more than 10 countries with preferably 50 respondents per country bears logistical problems (see [Hofstede, 2001, p. 463f.]).
- National Culture presents one of five complex concepts in this research. Using two items per dimension according to Jung et al. [2008] is considered to be a fair compromise between exact alignment to Hofstede's instrument and the practicality of collecting national culture data through an online survey covering multiple industries.[1]

Item	Item description
Uncertainty Avoidance	
B1-1-1	I do not like taking risks in my life.
B1-1-2	I rather take path with more predictable/known outcomes.
Individualism	
B1-2-1	Teamwork is NOT always important for better performance.
B1-2-2	My work/company comes after myself and my immediate family.
Masculinity	
B1-3-1	I like to offer my opinions at company meetings.
B1-3-2	Businesses should be more aggressive in growth.
Power Distance	
B1-4-1	I can tolerate the fact that some people have more power and money.
B1-4-2	Successful people "got there" by working harder.

Table 4.11: Items for the measurement of National Culture - Operationalization of five latent factors (Source: own analysis)

[1] For a detailed overview of the data collection procedure and target population see section 5.1.

Focusing on an abstract of Hofstede's complete measurement instrument makes use of his recommendation that "researcher studying national and ethnic culture differences who can get access to sufficient number of cultures—at least ten—may borrow (some of) the IBM questions, but they should primarily develop their own survey instruments aimed at the particular populations studied and based on empathy with the respondents' situation" ([Hofstede, 2001, p. 465]).

4.4.5 Operationalization of Leadership Style

Item	Item description
Transformational leadership	
B2-1-1	S/he articulates and represents a vision, which s/he is optimistic and enthusiastic about.
B2-1-2	I am proud of my leader, have respect for him/her and can identify with his/her way of leading.
B2-1-3	I fully trust my supervisor. He/she is an energetic role model.
B2-1-4	My supervisor encourages me to question established ways of solving problems.
B2-1-5	S/he understands the needs and abilities of each follower and develops and empowers each and everyone individually.
Participative leadership	
B2-2-1	Before making decisions, s/he considers what her/his subordinates have to say.
B2-2-2	Before taking action s/he consults with subordinates.
B2-2-3	When faced with a problem, s/he consults with subordinates.
B2-2-4	S/he asks subordinates for their suggestions.
B2-2-5	S/he listens to subordinate's advice on which assignments should be made.
Supportive leadership	
B2-3-1	S/he helps people to make working on their tasks more pleasant.
B2-3-2	S/he looks out for the personal welfare of group members.
B2-3-3	S/he does little things to make things pleasant.
B2-3-4	S/he treats all group members as equals.
Instrumental leadership	
B2-4-1	S/he explains the way tasks should be carried out.
B2-4-2	S/he decides what and how things shall be done.
B2-4-3	S/he maintains definite standards of performance.
B2-4-4	S/he schedules the work to be done.

Table 4.12: Items for the measurement of Leadership Style - Operationalization of four latent factors (Source: own analysis)

The measurement of Leadership represents a combination of styles identified in section 3.6. The operationalizations of Ogbonna and Harris [2000], Bass [1985], Bass and

Avolio [1990] and Rowold and Heinitz [2007] served as the reference of the selected items (see table 4.12).

4.5 Statistical Survey Questions

In order to cluster the sample size later on, relevant statistical questions have been added to the overall survey (for a complete listing see appendix A.7). In combination with the answering pattern of the five latent variables, they also serve as sanity check per respondent. Random answers can be easily detected and eliminated, to increase the quality of the sample data.

The main purpose overall, is to add sufficient insight into each respondent's background and current situation. This will help to explain the "why" of each answer, although room for interpretation will still remain. Statistical questions in quantitative surveys can add the missing piece of information to understand specific results. On the other hand they will never catch up with qualitative methods, which are much more flexible and offer the possibility to dig deeper depending on an individual's answering pattern and behavior (see [Kaya, 2007, p. 54]).

4.6 Design of the Structural Equation Model

The findings of the previous sections in these chapter lead to a clearly defined model, which is not only based on an extensive literature and profound theoretical thinking as laid out in chapter 3. It also considers the layout conventions in SEM (see section 4.1.1), by clearly separating the measurement models from the structural model, and assigning the five exogenous and endogenous latent variables, namely National Culture, Leadership Style, Lean Six Sigma, Corporate Culture and Corporate Success to their respective indicators as outlined in section 4.4.

Referring to all necessary assessment criteria defined in section 4.2.3, a total of 11 analytical steps will be implemented and described in the following section 5.2. Throughout this complete data analysis procedure the Hypothesized SEM model as displayed in 4.5 will be confronted with reality, i.e., the model will be adapted if needed, to gain a better understanding of the research context at hand. At the same time

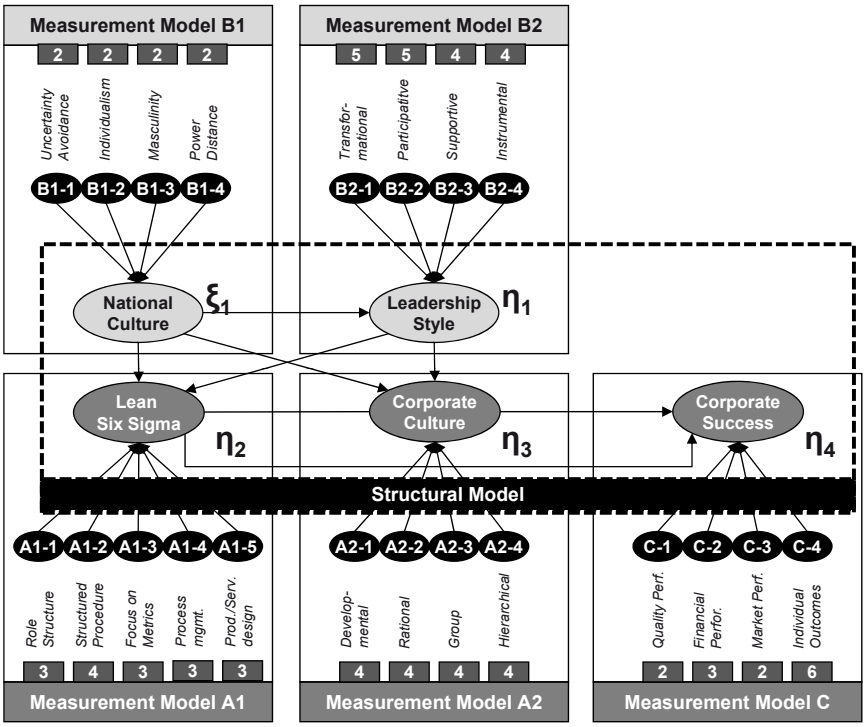

Figure 4.5: Hypothesized SEM - Five measurement models integrating formative and reflective variables (Source: own figure)

the 44 hypothesized relationships as summarized in section 3.7 are reflected in this Hypothesized SEM and will be tested through this procedure as well.

5

Empirical Study and Results

5.1 Data Collection Procedure

5.1.1 Target Population and Sample

A convenience sample was used to collect cross country data in order to answer the research questions outlined in section 1.2. As the objective of this research was to obtain reliable and accurate insights into the worldwide dynamics of Lean Six Sigma, data of multiple countries, industries and functions had to be included.

Problems of cross cultural empirical research as mentioned by [Genkova, 2009, p. 46] are considered, but not dealt with:

- How comparable are the answering patterns across countries?
- Is comparability warranted?
- Is the same phenomenon being studied?
- How can negative connotation be avoided?
- Can statistical methods help to solve these problems?

The survey[1] was distributed in English, and adequate proficiency in the English language was assumed for all respondents. Clear understanding of the questions, similar answering patterns, and comparability across surveyed country were therefore assumed prior to survey distribution. The pretest of the survey supported this view[2].

[1] The complete questionnaire can be found in appendix A.

[2] A pretest was performed within the European Market Research team of Eli Lilly. Market Research Managers in Lilly are considered to have high skill levels in survey design, cross cultural research and sampling. Ten market research colleagues tested the survey in the two weeks prior to the field work

M. Jacobs, *Cultural Impact on Lean Six Sigma and Corporate Success,* Forum Marketing,
DOI 10.1007/978-3-658-07340-4_5,

As the target group all business professionals, who have actively participated, contributed to or managed (Lean) Six Sigma efforts would qualify as respondents. The key pre-requisite is a profound understanding of the Lean and Six Sigma concepts, in order to understand the context and content of the survey questions. No limitation was imposed with regard to nationality, industry, company, function or breadth of experience in a certain job or function. A diverse team of (Lean) Six Sigma professionals and consultants around the globe - from beginner to experienced level - was encouraged to participate in the survey.

In general a representative sample of the target group characterized above should be achieved. Although the SEM method of choice is PLS (with the software package SmartPLS) and the sample size requirements are lower than for CBSEM (see section 4.2), a high sample size is needed in order to perform analysis across multiple countries. When comparing, e.g., country level or cluster level data, the sub-samples need to be great enough to allow for statistical testing.

5.1.2 Survey Distribution

The professional network LinkedIn was selected as the best medium to ask Lean Six Sigma professionals around the globe about their experience with Lean Six Sigma. The survey was announced in the two greatest professional networks for the (Lean) Six Sigma community, namely "Lean Six Sigma" and "Global Lean & Six Sigma network". A short characterization of these two groups can be found in table 5.1.

With the help of the moderators of each group, the announcement could be well placed and highlighted. Members, who accessed the group discussion page would find the announcement and invitation for the survey directly on the first page, under "Manager's choice". The complete invitation letter (how it was published and perceived by the members) is displayed in appendix B.1. If members signed up for the group newsletter, they would get the invitation as part of their weekly e-mail update as well.

For their participation in the survey respondents would get two incentives. First, they would get an aggregated overview of the survey results, to be used for their own purpose or within their company. Secondly, participants were granted the chance to win an Amazon voucher worth 100.- EUR.

(starting Sep. 26th, 2010) and gave valuable recommendations to enhance wording of the questions, improve questionnaire flow and defining the target population and sample size.

Group Name	Members at Survey Start (Members in April 2011)	Group creation	Group Description
Lean Six Sigma	52,061 (68,496)	17th Oct. 2007	Lean Six Sigma Professionals and Practitioners joining together to network, business development, business opportunities, best practice sharing and relationship building
Global Lean & Six Sigma Network	8,100 (10,012)	10th Mch. 2008	LinkedIn professional social network of global Lean & Six Sigma practitioners

Table 5.1: LinkedIn Target groups - Announcement platforms for the empirical survey (Source: own analysis)

The great advantage using LinkedIn existed in the opportunity to increase the personal connection list. People who responded to the survey would voluntarily get in touch and share additional thoughts on the topic. Two additional benefits were achieved by this effect:

- With an increasing number of connections the reach to the overall network grew (more and more Lean Six Sigma professionals could be directly contacted without charge).
- Qualitative data could be collected, delivering additional background information to the answering patterns of certain individuals who got directly into touch.

In the course of the survey and in parallel to the survey announcement on the two LinkedIn group sites, a number of 1,500 selected individuals could be contacted directly. This procedure enabled to influence the sample towards a more balanced representation of countries, industries, functions and level of seniority. Individual messages using a standard letter were composed and sent to selected individuals, representing countries or industries that had not responded to the survey so far (see appendix B.2). These selected "informants" are not claimed to be representative members of their organizations, but are chosen because they are considered to be knowledgeable about the five research concepts being studied and able and willing to communicate about them (see [Kumar et al., 1993, p. 1634]).

Therefore, in the course of survey distribution the sampling approach as described in section 5.1.1 was adapted. Figure 5.1 (see Kaya and Himme [2007]) shows which sampling methods applied to the field work. It was a mixture of random and conscious selection.

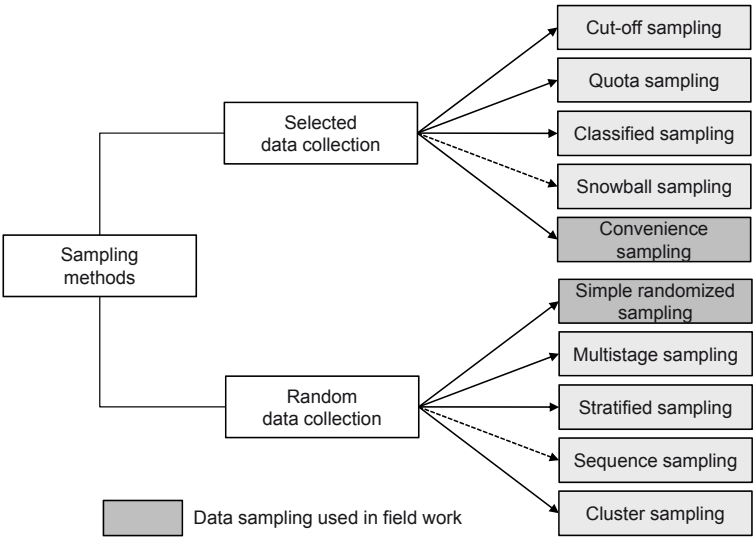

Figure 5.1: Sampling Overview - Integration of random and selected data collection (Source: see Kaya and Himme [2007])

The pre-requisites to reach a representative sample are a well-defined and in itself separated population and a random recruitment of respondents (see [Kaya and Himme, 2007, p. 80]). This is not the case in this study. Informant competence is considered more important than representativeness. Within the community of knowledgeable (Lean) Six Sigma professionals, the empirical data is claimed to reveal enough insight, that the hypothesized SEM model - if confirmed - could be further replicated and validated with larger and more representative studies in future research.

5.2 Analysis

As introduced in section 4.6 the flow of data analysis is very much determined by the SEM modeling approach, in this case PLS with the use of SmartPLS. In line with figure 4.4 in section 4.2, this data analysis section is organized into five parts (see figure 5.2).

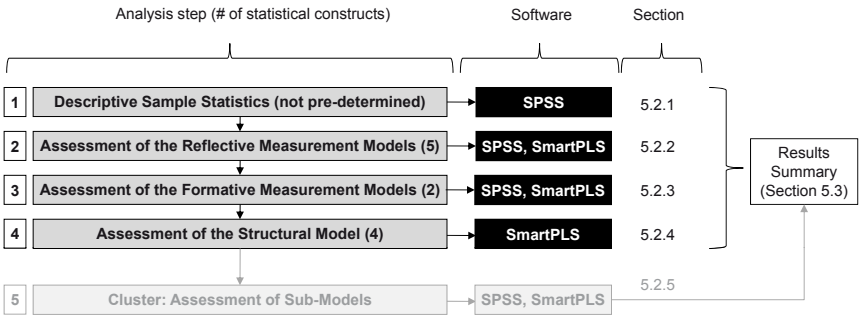

Figure 5.2: Flow of Data Analysis - Stepwise approach (Source: own figure)

After a brief review of the most important descriptive sample statistics (derived from the sample and answering patterns of the statistical questions), and the eleven analysis steps of PLS model assessment (covering the assessment of reflective (5) and formative (2) measurement models and the assessment of the structural model (4)) the hypotheses testing will be structured according to the five research concepts. On the one hand, this chapter is therefore organized according to the generally accepted analytical procedure of PLS (here: with a selection of eleven assessment criteria). On the other hand, data analysis results are displayed in the same structure as the literature review in chapter 3, focusing on the relationship between at least two concepts and the corresponding hypotheses at a time. This enables the direct comparison with previous findings[1], and maximizes transparency across the multiple theoretical and empirical findings. Section 5.3 will bring the findings all together, and will conclude if all assessment criteria have met the requirements and if the Hypothesized PLS model is valid. As Cluster analysis will be performed in this chapter as well, relevant sub-group analyses are provided on top of the PLS model assessment.

[1] As outlined by the literature review in chapter 3.

5.2.1 Descriptive Sample Statistics

The anonymous web-based survey[1] started on 26th of Sep. 2010 and was closed on 31st of Dec. 2010. During the 96 field days a total of 882 interested participants entered the survey. However almost half of them dropped the survey without completing it, leading to a completion rate of 52% with a total of 459 responses. Table 5.2 displays the complete field report including the key characteristics.

Field report: Lean Six Sigma Survey		
The displayed data refers to the field period between 09/26/2010 and 12/31/2010 - Activated for 96 days		
Sample characteristics		
Universe	**Total count**	**Percent**
Total sample	882	100.00%
Net participation	774	87.76%
Response rate		87.76%
Completion rate		52.04%
Statistical characteristics		
Mean processing time (arithm. mean)	0h 22m 30.88s	
Mean processing time (Median)	0h 14m 5s	
Average number of participants per day	10.26	
Average number of participants per week	58.80	
Page with most drop-outs	Page: Lean Six Sigma Count 187	
Drop-outs by page		
Page	**Drop-outs**	**proceeded to page**
Introduction	132 (14.97%)	882 (100.00%)
Lean Six Sigma	187 (21.20%)	750 (85.03%)
Corporate Success	27 (3.06%)	563 (63.83%)
Corporate Culture	48 (5.44%)	536 (60.77%)
Leadership Style	19 (2.15%)	488 (55.33%)
National Culture	2 (0.23%)	469 (53.17%)
Statistics	8 (0.91%)	467 (52.95%)
Last Page	0 (0.00%)	459 (52.04%)
Total	Break off	423 (47.96%)
Total	Completed	420 (47.62%)
Total	Completed after break	39 (4.42%)

Table 5.2: Field Report - Sample statistics of the empirical survey (Source: own analysis)

The majority of interested participants dropped the survey right in the beginning, on the first answering page after the introduction (187 respondents). This means, that 774 out of 882 interested participants started answering the items on the Lean

[1] The survey software used was EFS Survey (Enterprise Feedback Suite 8.0 by Unipark/Globalpark), a well-established survey engine in the academic community (see http://www.unipark.info).

Six Sigma concept (net participation), but then over 20% of them decided to quit. A couple of direct feedbacks helped to explain why: some interested informants did not feel that they had the right level of experience or knowledge to answer the questions. Others felt they would disclose company confidential information. In general the high drop out rate at the beginning of the survey is not uncommon for a web based survey at this level of detail (e.g., in their meta-analysis of web-based surveys, Cook et al. [2000] report a mean response rate between 35 and 40%, see [Cook et al., 2000, p. 829]).

One response needed to be deleted, as a PhD student from Ireland randomly answered all items, in order to test and understand the survey structure (shared learning for her own research to a similar topic).

Zooming in on the statistical questions of the 458 remaining responses, 376 respondents are male (82.1%) and 82 respondents are female (17.9%). Almost 80% (363) of respondents chose Lean Six Sigma as the dominant method implemented in their company, while a little over 20% chose Six Sigma (95).

Nationality Region		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Europe	173	37.8	37.9	37.9
	North America	131	28.6	28.7	66.5
	South America	34	7.4	7.4	74.0
	Asia/Pacific	115	25.1	25.2	99.1
	Africa	4	.9	.9	100.0
	Total	457	99.8	100.0	
Missing	System	1	.2		
Total		458	100.0		

Table 5.3: Nationality Region - Frequency of responses per region (Source: own analysis)

In terms of geographic representation, the majority of responses come from Europe, followed by North America and Asia/Pacific (see table 5.3). These three regions are adequate in size, in order to enable sub-group analysis on this level (>100 responses per region). The age distribution follows a normal distribution, with three quarters of the respondents being between 31 and 50 years old (see table 5.4).

Although the distribution in number of projects suggests a balanced representation of small, medium and large companies (see table 5.5), frequencies of responses per company size indicate, that there is a strong bias towards large (multinational) companies

Age (groups)		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	≤ 30	58	12.7	12.7	12.7
	31 - 40	220	48.0	48.4	61.1
	41 - 50	135	29.5	29.7	90.8
	51+	42	9.2	9.2	100.0
	Total	455	99.3	100.0	
Missing	System	3	.7		
Total		458	100.0		

Table 5.4: Age distribution - Frequency of responses per age group (Source: own analysis)

(see table 5.6).

Number of Projects (groups)		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	≤ 30	117	25.5	25.5	25.5
	31 - 200	126	27.5	27.5	53.1
	201 - 1000	113	24.7	24.7	77.7
	1001+	102	22.3	22.3	100.0
	Total	458	100.0	100.0	

Table 5.5: Project volume - Frequency of responses per number of projects group (Source: own analysis)

Looking at the sectors, Pharmaceuticals and Biotechnology represents the sector with the highest number of respondents (see table 5.7). This does not surprise, considering that the researcher is based in the Pharmaceutical industry, and interested participants promise themselves benchmark data from an industry insider[1]. Although a lot of sectors were covered in the drop-down list of the survey, 46 respondents chose "Other" and the sector of these respondents can not be further disclosed.

What functions do the respondents in these sectors own? Table 5.8 shows the distribution of top 5 functions across the top 5 sectors. Areas with highest responses are Manufacturing in the Pharmaceutical Industry and Industrial Goods and Services.

For some statistical questions missing values show up (e.g., see tables 5.3 and 5.4, or the "Please choose" count in table 5.6). The answering patterns of the underlying responses were checked for consistency and did not have to be eliminated, as the patterns did not reveal any abnormal distribution.

[1]This interpretation has been validated by a number of respondents, giving this direct feedback.

Company size (number of employees)		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Please choose...	10	2.2	2.2	2.2
	less than 250	35	7.6	7.6	9.8
	between 251 and 500	26	5.7	5.7	15.5
	between 501 and 1,000	19	4.1	4.1	19.7
	more than 1,000	368	80.3	80.3	100.0
	Total	458	100.0	100.0	

Table 5.6: Company Size - Frequency of responses per company size group (Source: own analysis)

Sector		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Please choose	7	1,5	1,5	1,5
	Pharmaceuticals and Biotechnology	84	18,3	18,3	19,9
	Industrial Goods and Services	62	13,5	13,5	33,4
	Financial Services	50	10.9	10.9	44.3
	Other (not specified)	46	10.0	10.0	54.4
	Automotive	34	7.4	7.4	61.8
	Chemicals	23	5.0	5.0	66.8
	Energy and Environment	22	4.8	4.8	71.6
	Computers and Software	19	4.1	4.1	75.8
	Consulting	19	4.1	4.1	79.9
	Health Care	16	3.5	3.5	83.4
	Aerospace and Defence	15	3.3	3.3	86.7
	Electronics and Semiconductors	15	3.3	3.3	90.0
	Telecommunications	12	2.6	2.6	92.6
	Transportation and Logistics	10	2.2	2.2	94.8
	Food and Beverage	5	1.1	1.1	95.9
	Government and Trade	4	.9	.9	96.7
	Advertise and Marketing	3	.7	.7	97.4
	Human Resources	3	.7	.7	98.0
	Management	3	.7	.7	98.7
	Agriculture	2	.4	.4	99.1
	Accounting	1	.2	.2	99.3
	Internet and Online	1	.2	.2	99.6
	Real Estate and Constructions	1	.2	.2	99.8
	Small Business	1	.2	.2	100.0
	Total	458	100.0	100.0	

Table 5.7: Sector - Frequency of responses per sector (Source: own analysis)

Sector * Functional area: Crosstabulation								
Count				**Functional area**				
	Other*	Manu-facturing	R&D	Strategy	Mar-keting	*Top 5*	*Total*	*% Top 5 of Total*
Pharma & Biotech	18	24	11	4	12	*69*	*84*	*82*
Ind. Goods & Services	19	24	3	5	2	*53*	*62*	*85*
Financial Services	16	3		10	1	*30*	*50*	*60*
Other (not specified)	18	9	2	8	2	*39*	*46*	*85*
Automotive	10	10	12	1		*33*	*34*	*97*
Top 5	*81*	*70*	*28*	*28*	*17*	*224*	*276*	**81**
Total	*137*	*109*	*43*	*58*	*22*	*369*	**458**	*81*
% Top 5 of Total	*59*	*64*	*65*	*48*	*77*	**61**	*60*	

Table 5.8: Sector and functional area - Crosstabulation of frequency of responses per sector and functional area (top 5) (Source: own analysis)

Linking the descriptive statistics of the sample data together, respondents represent the following eight key characteristics[1]:

- the majority of respondents are **male**
- the majority of respondents were born in **Europe**, **North America** or the **Asia/Pacific** region
- the majority of respondents are **between 31 and 50 years old**
- the majority of the respondents' companies focus on **Lean Six Sigma**
- number of (Lean) Six Sigma **projects vary greatly** across companies
- the majority of the respondents' **companies are large** and multinational
- the majority of the respondents stem from the **Pharmaceutical Industry**
- top functional areas represented in the sample are **Manufacturing**, **Marketing** and **Other (not specified)**

5.2.2 Assessment of the Reflective Measurement Models

5.2.2.1 Reflective Measurement Models for Lean Six Sigma

The analysis of all factor loadings for the concept Lean Six Sigma revealed, that the originally five hypothesized latent variables should be reduced to three[2].

[1] Although more statistics were collected, only the most relevant have been included in the descriptive sample statistics.

[2] Principal component analysis with rotation was used to extract the factors from the indicators. For a detailed explanation of this method, and why it should be used see Jolliffe [2002].

Instead of Role Structure (RS), Structured Procedure (SP), Focus on Metrics (FoM), Process Management (PM) and Product/Service Design (PD) (suggested by Zu et al. [2010]), factor loadings suggest to classify the indicators into three latent variables (see table 5.9). Analyzing the content of the individual indicators, these three variables were re-classified into "Core Practices" (A1-1), "Effectiveness" (A1-2) and "Infrastructure" (A1-3) (based on the more high level classification suggested by [Zu et al., 2008, p. 633]).

Rotated Component Matrix[a]
Measurement Model A1 (Lean Six Sigma)

	Component		
	1 *Core Practices (A1-1)*	2 *Effectiveness (A1-2)*	3 *Infrastructure (A1-3)*
(SP) Scientific Methods	**.740**		
(SP) Project Record	**.736**		
(PM) Statistical Techniques	**.689**	.429	
(SP) Project Review	**.684**		.428
(FoM) Customer Input	**.618**		
(FoM) Connection L6S & Strategy	**.601**		
(FoM) Systematic Measures	**.577**		
(PD) Prioritisation		**.800**	
(PD) Multiple Departments		**.777**	
(PD) Quality vs. Cost		**.722**	
(PM) Process Review	.534	**.605**	
(PM) Work Instructions	.538	**.573**	
(RS) BB & GB structure			**.780**
(RS) BB & GB training			**.699**
(RS) BB & GB compensation			**.625**
(SP) DMAIC Procedure	.553		**.585**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
[a]Rotation converged in 14 iterations.
loadings <0.4 are suppressed

Table 5.9: Factor Analysis Lean Six Sigma - Results of Principal Component Analysis (Source: own analysis)

Each indicator is very close to the required factor loading of 0.7, so that no indicator was dropped.

As the next step, Cronbachs alpha, R^2, Composite reliability and AVE were tested for all indicators of each reflective Measurement Model within the overall Measurement Model A1. Cronbachs alpha and Composite reliability were considered to evaluate whether the indicators strongly correlate with the three latent variables or components

(for the explanation and formula of this test see section 4.2.1). AVE (average variance extracted) evaluates, whether half of the variance of the indicators stem from the latent variable vs. from the measurement error (see [Nitzl, 2010, p. 27]). It presents the more strict measure in comparison to composite reliability. R^2 was not covered in chapter 4 and is an other way of proving construct reliability. This criteria indicates, whether the mean of the indicators point into the same direction as the latent variable factor score. Table 5.10 displays that the requirements for all of these measures for indicator and construct reliability as well as discriminant validity are met. The reflective indicators can be assumed to adequately measure the same construct. The measurement model A1 (for the concept Lean Six Sigma) is valid and reliable.

Construct (requirement) software package used	**Items**	**Cronbachs alpha** (≥ 0.7) SPSS (SmartPLS)	**R^2** (≥ 0.67) SPSS	**Composite reliability** (≥ 0.7) SmartPLS	**AVE** (≥ 0.5) SmartPLS	**Fornell/ Larcker** (AVE $>$ Korr^2) SmartPLS
Core Practices (A1-1)	7	**0.906 (0.896)**	**0.688**	**0.919**	**0.617**	fulfilled (0.786 $>$ 0.712)
Effectiveness (A1-2)	5	**0.872 (0.838)**	**0.751**	**0.885**	**0.606**	fulfilled (0.778 $>$ 0.712)
Infrastructure (A1-3)	4	**0.753 (0.748)**	**0.791**	**0.841**	**0.570**	fulfilled (0.755 $>$ 0.670)

Table 5.10: Assessment of Reflective Measurement Models A1-1 to A1-3 - results for the sub-constructs of the concept Lean Six Sigma (Source: own analysis)

5.2.2.2 Reflective Measurement Models for Corporate Success

Similar to the positive outcomes of the concept Lean Six Sigma, the factor structure for Corporate Success can be reduced as well. The indicators Market Performance (MP) and Financial Performance (FP) are loading on the same factor, so they are integrated into one factor, namely Financial and Market Performance (see table 5.11). Considering a close link between both performance constructs, this aggregation seems reasonable.

Overall, the factor loadings are close to the requirement of (≥ 0.707) and therefore the reflective measurement models for the three sub-constructs of Corporate Success

Rotated Component Matrix[a] **Measurement Model C (Corporate Success)**			
	Component		
	1 *Individual Outcomes (C-3)*	2 *Financial and Market Performance (C-2)*	3 *Quality Performance (C-1)*
(IO) Job & Skills	**.899**		
(IO) Personal Accomplishment	**.889**		
(IO) Job Satisfaction	**.888**		
(IO) Work Excitement	**.849**		
(IO) Personal Growth	**.676**		
(IO) Feeling Comfortable	**.650**		
(MP) Market Share		**.842**	
(FP) Sales Growth		**.835**	
(FP) Overall Financial Performance		**.800**	
(FP) ROI		**.739**	
(MP) Company Image		**.718**	
(QP) Quality Improvements			**.796**
(QP) Customer Satisfaction			**.795**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
[a]Rotation converged in 5 iterations.
loadings <0.4 are suppressed

Table 5.11: Factor Analysis Corporate Success - Results of Principal Component Analysis (Source: own analysis)

(C-1, C-2 and C-3) are all accepted to be valid. Turning the attention to the remaining measures, table 5.12 displays that the requirements for all measures are met. The best results are achieved for the third construct individual outcomes. As for the concept Lean Six Sigma interpreted above, the reflective indicators are assumed to adequately measure the same construct. The measurement model C (for the concept Corporate Success) is valid and reliable.

Construct (requirement) software package used	**Items**	**Cronbachs alpha** (≥ 0.7) SPSS (SmartPLS)	**R^2** (≥ 0.67) SPSS	**Composite reliability** (≥ 0.7) SmartPLS	**AVE** (≥ 0.5) SmartPLS	**Fornell/ Larcker** (AVE $>$ Korr^2) SmartPLS
Quality Performance (C-1)	2	**0.704 (0.618)**	**0.819**	**0.840**	**0.723**	fulfilled (0.850 $>$ 0.449)
Financial and Market Performance (C-2)	5	**0.900 (0.869)**	**0.871**	**0.905**	**0.657**	fulfilled (0.810 $>$ 0.449)
Individual Outcomes (C-3)	6	**0.920 (0.917)**	**0.919**	**0.936**	**0.712**	fulfilled (0.844 $>$ 0.334)

Table 5.12: Assessment of Reflective Measurement Models C-1 to C-3 - results for the sub-constructs of the concept Corporate Success (Source: own analysis)

5.2.2.3 Reflective Measurement Models for Corporate Culture

In contrast to the concepts Lean Six Sigma (A1) and Corporate Succes (C) the structure of the concept of Corporate Culture (A2) can be confirmed by factor analysis. The four culture types as defined by the CVF are clearly mirrored by the factors resulting from the principal component analysis (see table 5.13). The item "This company emphasizes competitive actions and achievement. Measurable goals are important" (Competition and Achievement) which was assumed to load on Rational Culture, did load on Developmental Culture, and is therefore highlighted in bold letters. This insight underlines that according to the sample data developmental corporate cultures own rational, goal-oriented traits.

Shifting the Competition and Achievement indicator to the construct Developmental Culture returns the reflective measurement model assessment results summarized

Rotated Component Matrix[a] **Measurement Model A2 (Corporate Culture)**				
	Component			
	1 *Developmental (A2-1)*	2 *Hierarchical (A2-4)*	3 *Group (A2-3)*	4 *Rational (A2-2)*
(Dc) Dynamic & Entrepreneurial	**.817**			
(Dc) Innovation & Development	**.772**			
(Dc) Innovators & Risk Takers	**.761**			
(Dc) Growth & Resources	**.723**			
(Rc) Competition & Achievement	**.664**			
(Hc) Rules & Policies		**.882**		
(Hc) Formalized & Structured		**.858**		
(Hc) Organizers & Administrators		**.666**		
(Hc) Permanence & Efficiency		**.637**		
(Gc) Personal & Family			**.828**	
(Gc) Loyalty & Tradition			**.815**	
(Gc) Mentors & Sages			**.669**	
(Gc) Cohesion & Morale	.427		**.633**	
(Rc) Production Orientation				**.788**
(Rc) Producers & Technicians				**.760**
(Rc) Tasks & Goals				**.627**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
[a]Rotation converged in 5 iterations.
loadings <0.4 are suppressed

Table 5.13: Factor Analysis Corporate Culture - Results of Principal Component Analysis (Source: own analysis)

in table 5.14.

Construct (requirement)	**Items**	**Cronbachs alpha** (≥ 0.7)	**R^2** (≥ 0.67)	**Composite reliability** (≥ 0.7)	**AVE** (≥ 0.5)	**Fornell/ Larcker** (AVE $>$ Korr^2)
software package used		SPSS (SmartPLS)	SPSS	SmartPLS	SmartPLS	SmartPLS
Developmental (A2-1)	5	**0.851 (0.841)**	**0.898**	**0.888**	**0.614**	fulfilled (0.784 $>$ 0.574)
Rational (A2-2)	3	**0.609 (0.616)**	**0.943**	**0.773**	**0.543**	fulfilled (0.737 $>$ 0.369)
Group (A2-3)	4	**0.820 (0.822)**	**0.834**	**0.882**	**0.653**	fulfilled (0.808 $>$ 0.574)
Hierarchical (A2-4)	4	**0.797 (0.795)**	**0.928**	**0.868**	**0.623**	fulfilled (0.789 $>$ 0.393)

Table 5.14: Assessment of Reflective Measurement Models A2-1 to A2-4 - results for the sub-constructs of the concept Corporate Culture (Source: own analysis)

Again, all analyzed measures return satisfactory results, so that the reflective indicators are assumed to adequately measure their assigned construct. The measurement model A2 (for the concept Corporate Culture) is valid and reliable.

5.2.2.4 Reflective Measurement Models for Leadership Style

The results of factor analysis and reliability assessment for the concept Leadership Style (B2) are similar to the results for Corporate Culture (A2). Tables 5.15 and 5.16 summarize the respective statistics.

Although the factor structure is confirmed, a few further insights are revealed by table 5.15. The indicator (TL) Empowerment ("S/he understands the needs and abilities of each follower and develops and empowers each and everyone individually.") loads on transformational as well as on participative and supportive leadership style. And the indicator (SL) Pleasance ("S/he does little things to make things pleasant.") contributes to both supportive and participative leadership style. What is also striking is, that "S/he maintains definite standards of performance" (IL, Defining Standards) is not only linked to instrumental leadership style, but also to transformational. Em-

Rotated Component Matrix[a] **Measurement Model B2 (Leadership Style)**				
	Component			
	1 *Participative (B2-2)*	2 *Transformational (B2-1)*	3 *Supportive (B2-3)*	4 *Instrumental (B2-4)*
(PL) Problem Solving	**.822**			
(PL) Consultation	**.815**			
(PL) Asking for Suggestions	**.792**			
(PL) Considering Subordinates	**.780**			
(PL) Listening to Advice	**.765**			
(TL) Vision		**.769**		
(TL) Pride		**.745**		
(TL) Energy		**.716**	.407	
(TL) Questioning		**.709**		
(TL) Empowerment	.404	**.615**	.518	
(SL) Little Things			**.779**	
(SL) Personal Welfare			**.746**	
(SL) Treating Equal			**.736**	
(SL) Pleasance	.425		**.645**	
(IL) Decision				**.889**
(IL) Scheduling Work				**.819**
(IL) Explaining Tasks				**.782**
(IL) Defining Standards		.469		**.595**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
[a]Rotation converged in 5 iterations.
loadings <0.4 are suppressed

Table 5.15: Factor Analysis Leadership Style - Results of Principal Component Analysis (Source: own analysis)

powerment and Vision are therefore counterbalanced by this instrumental leadership trait, adding more "hard facts" to the transformational leadership style.

Construct	**Items**	**Cronbachs alpha**	**R^2**	**Composite reliability**	**AVE**	**Fornell/ Larcker**
(requirement)		($\geq$ 0.7)	($\geq$ 0.67)	($\geq$ 0.7)	($\geq$ 0.5)	(AVE > Korr^2)
software package used		SPSS (SmartPLS)	SPSS	SmartPLS	SmartPLS	SmartPLS
Transformational (B2-1)	5	**0.925 (0.924)**	**0.655**	**0.943**	**0.769**	fulfilled (0.877 > 0.775)
Participative (B2-2)	5	**0.954 (0.954)**	**0.747**	**0.964**	**0.884**	fulfilled (0.919 > 0.775)
Supportive (B2-3)	4	**0.889 (0.888)**	**0.713**	**0.922**	**0.749**	fulfilled (0.865 > 0.765)
Instrumental (B2-4)	4	**0.840 (0.851)**	**0.881**	**0.898**	**0.687**	fulfilled (0.829 > 0.539)

Table 5.16: Assessment of Reflective Measurement Models B2-1 to B2-4 - results for the sub-constructs of the concept Leadership Style (Source: own analysis)

The measures displayed in table 5.16 return satisfactory results for the measurement model B2 as well, i.e., the reflective indicators used to measure Leadership Style are adequately measuring their assigned construct. The measurement model B2 is valid and reliable.

5.2.2.5 Reflective Measurement Models for National Culture

Taking a four factor solution for National Culture, the dimensions Individualism and Power Distance would have to be dropped, and dimensions like "Personal Achievement" and "Tolerance" could be created (see table 5.17). The item "Successful people "got there" by working harder" (PD, Working Hard) shows a high negative loading (-.725) on the factor "Personal Achievement". In this respect, it seems that Hofstede's dimensions are out of date.

Favoring a five factor solution, however, returns a results, where the dimension Individualism is split into the two factors Family and Tolerance (see table 5.18). Looking at the two indicators that had been applied for Individualism, their content is in fact

Rotated Component Matrix[a] **Measurement Model B1 (National Culture)**				
	Component			
	1 *Uncertainty Avoidance (B1-1)*	2 *Masculinity (B1-3)*	3 *Personal Achievement (B1-2)*	4 *Tolerance (B1-4)*
(UA) Taking Risk	**.895**			
(UA) Predictable Outcomes	**.877**			
(M) Business Aggressive		**.849**		
(M) Own Opinion		**.760**		
(PD) Working Hard			**-.725**	
(I) No Teamwork			**.600**	
(PD) Tolerating Power				**.804**
(I) Family			.499	**.625**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
[a]Rotation converged in 6 iterations.
loadings <0.4 are suppressed

Table 5.17: Preliminary Factor Analysis National Culture - Results of Principal Component Analysis (Source: own analysis)

so different (priority of the family is independent of the attitude towards teamwork), that this split seems to be reasonable.

Taking the five factor solution as the base for the reliability tests, all measures return satisfactory results for the majority of reflective measurement models for B1 (see table 5.19). Cronbachs alpha for Power Distance is quite low (≤ 0.3). For Family and Teamwork most of the measures cannot be calculated (marked with "n/a", i.e., not applicable), as only one item stands behind each of these factors.

5.2.3 Assessment of the Formative Measurement Models

Following the confirmation, that the measurement of reflective indicators to measure the latent variables of first order is valid and reliable, these latent variable should form and feed into the five overarching concepts Lean Six Sigma, Corporate Success, Corporate Culture, National Culture and Leadership Style. E.g., every single of the three factors defined for Lean Six Sigma (Core Practices, Effectiveness and Infrastructure) is assumed to measure a specific facet of the greater latent construct Lean Six Sigma. Weight and

Rotated Component Matrix[a] **Measurement Model B1 (National Culture)**					
	Component				
	1 *Uncertainty Avoidance (B1-1)*	2 *Masculinity (B1-2)*	3 *Personal Distance (B1-3)*	4 *Family (B1-4)*	5 *Teamwork (B1-5)*
(UA) Predictable Outcomes	**.906**				
(UA) Taking Risk	**.875**				
(M) Business Aggressive		**.862**			
(M) Own Opinion		**.765**			
(PD) Tolerating Power			**.870**		
(PD) Working Hard			**.588**		
(I) Family				**.926**	
(I) No Teamwork					**.945**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
[a]Rotation converged in 6 iterations.
loadings <0.4 are suppressed

Table 5.18: Factor Analysis National Culture - Results of Principal Component Analysis (Source: own analysis)

Construct	**Items**	**Cronbachs alpha**	**R^2**	**Composite reliability**	**AVE**	**Fornell/ Larcker**
(requirement)		($\geq$ 0.7)	($\geq$ 0.67)	($\geq$ 0.7)	($\geq$ 0.5)	(AVE > Korr^2)
software package used		SPSS (SmartPLS)	SPSS	SmartPLS	SmartPLS	SmartPLS
Uncertainty Avoidance (B1-1)	2	**0.793 (0.787)**	**0.956**	**0.943**	**0.769**	fulfilled (0.908 > 0.229)
Masculinity (B1-2)	2	**0.527 (0.546)**	**0.976**	**0.964**	**0.884**	fulfilled (0.826 > 0.242)
Power Distance (B2-3)	2	**0.275 (0.305)**	**0.863**	**0.922**	**0.749**	fulfilled (0.759 > 0.242)
Family (B2-4)	1	**n/a**	**0.857**	**n/a**	**n/a**	**n/a**
Teamwork (B2-5)	1	**n/a**	**0.893**	**n/a**	**n/a**	**n/a**

Table 5.19: Assessment of Reflective Measurement Models B1-1 to B1-5 - results for the sub-constructs of the concept National Culture (Source: own analysis)

significance of the outer weights determine the relative contribution to the construct[1]. This test is crucial, as "all facets of the formative construct should be considered" ([Goetz et al., 2010, p. 697]). Furthermore, the statistical construct of multicollinearity needs to be tested, in order to confirm, that the formative indicators' information is not redundant (see [Henseler et al., 2009, p. 302]). As soon as there exists a linear dependency between formative indicators, assigned to different constructs (e.g., an indicator assigned to Leadership style shows a strong linear dependency on an indicator assigned to Corporate Culture), results and interpretation of the model can be strongly and falsely biased (see [Schneider, 2007, p. 183]).

Running the modified hypothesized model in SmartPLS (with the same structure being evaluated for the reflective measurement of first order so far), almost all outer weights are significant. Figure 5.3 presents the full path model diagram extracted from SmartPLS and includes the outer weights, assigned to the arrows pointing from each formative indicator (here: the factor score of the reflective indicators) to each of the five concepts (e.g., Core Practices to Lean Six Sigma). Table 5.20 lists the corresponding and complete information on the significance of these weights (based on the idea by [Helm, 2005, p. 103], weights that are not significant at $p = 0.05$ are marked), derived by bootstrapping procedure with 500 samples (BT 500; almost equal to the sample size with n = 458) and 5000 samples (BT 5000).[2]

Only two formative indicators lack a significance path coefficient. These are Rational Culture as part of Corporate Culture, and Uncertainty Avoidance as part of National Culture. For the revised Structural Model Assessment of the total sample later on (version 3) these two indicators will still be kept in the model.[3]

The VIF scores[4] for all formative indicators are below the minimum requirement of

[1]The formative indicators' weights should not be interpreted as factor loadings (see [Goetz et al., 2010, p. 698]. In reflective mode, these are named "outer loadings." The fact that they are often smaller should not be misinterpreted as a poor formative measurement model (see [Chin, 1998, p. 307]).

[2]Higher bootstrapping samples are supposed to give more stable results. There is no clear recommendation in literature how big the bootstrapping sample should be. However, SmartPLS users discuss to use at least the size of the collected sample, while others recommend to use much higher rates. To account for both perspectives and see the possible difference, the two procedures where run.

[3]Indicator deletion is problematic as part of the construct would get lost and a new construct would be formed (see [Helm, 2005, p. 105]).

[4]Little literature exists for the exact VIF calculation procedure and which software to use. However, different approaches have been discussed in the SmartPLS Forum under http://www.smartpls.de/. The approach taken here is based on the recommendation, to put all formative indicators as indepen-

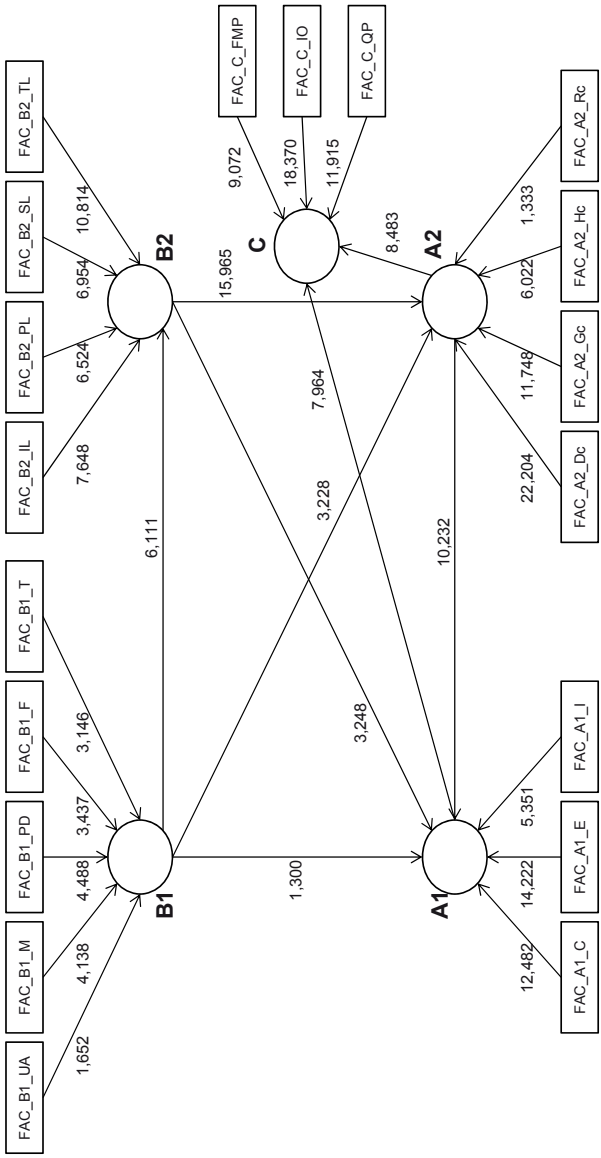

Figure 5.3: Path Model in SmartPLS (Bootstrap 5000) - Hypothesized SEM based on collected data (Source: own figure)

Concept	Indicator	Description	Weight[1]	t-value (BT 500)	t-value (BT 5000)	VIF
Software	SmartPLS	SPSS	SmartPLS	SmartPLS	SmartPLS	SPSS
A1	FAC_A1_C	L6S Core	0.652	13.063	12.482	1.270
	FAC_A1_E	L6S Effectiveness	0.672	14.399	14.222	1.444
	FAC_A1_I	L6S Infrastructure	0.347	5.292	5.351	1.139
A2	FAC_A2_Dc	Developmental Culture	0.817	21.766	22.204	1.888
	FAC_A2_Rc	Rational Culture	0.022	1.353***	1.333***	1.065
	FAC_A2_Gc	Group Culture	0.433	11.608	11.748	1.375
	FAC_A2_Hc	Hierarchical Culture	0.326	5.904	6.022	1.271
B2	FAC_B2_TL	Transformational Leadership	0.668	11.403	10.814	1.439
	FAC_B2_PL	Participative Leadership	0.380	6.428	6.524	1.179
	FAC_B2_SL	Supportive Leadership	0.393	6.794	6.954	1.202
	FAC_B2_IL	Instrumental Leadership	0.473	8.007	7.648	1.212
B1	FAC_B1_UA	Uncertainty Avoidance	0.206	1.617***	1.652	1.041
	FAC_B1_M	Masculinity	0.498	4.265	4.138	1.073
	FAC_B1_PD	Power Distance	0.571	4.554	4.488	1.079
	FAC_B1_F	Family	-0.453	3.499	3.437	1.051
	FAC_B1_T	Teamwork	-0.434	3.264	3.146	1.059
C	FAC_C_QP	Quality Performance	0.543	12.224	11.915	n/a
	FAC_C_FMP	Financial & Market Performance	0.390	9.249	9.072	n/a
	FAC_C_IO	Individual Outcomes	0.752	18.897	18.370	n/a

[1] according to path weighting scheme
***t $<$ 1.65, not significant (10% error)

Table 5.20: Significance of Weights - Assessment of outer weights in the formative measurement models (Source: own analysis)

< 3 as suggested by Andreev et al. [2009]. This means that multicollinearity between the formative indicators does not exist, i.e., there is no linear dependency between them. The PLS model results are not biased and the model does not need to be modified. The formative measurement models are valid.

5.2.4 Assessment of the Structural Model

To assess the structural (inner) model of the Hypothesized SEM in PLS, four criteria need to be analyzed. These are the determinant coefficients (R^2), the path coefficients, effect size and predictive validity (see section 4.2.2). The first two are a direct output included in the PLS path model in SmartPLS (see figure 5.4). The figures within the latent variables reflect R^2, while the figures assigned to the arrows between the latent variables present the path coefficients.

In line with the significance of the outer weights for the formative indicators, the significance of the path coefficients are shown in the same graph on the same position, after running the bootstrapping procedure (see figure 5.3). Effect size and predictive validity are not a direct output as they are determined by alternating and running the model several times.

Analyzing the path coefficients of the first (base) model, Leadership Style (B2) and Corporate Culture (A2) stick out to have the highest total effects on Corporate Success (C), while only a small effect is determined by National Culture (B1). These findings suggested to change the base model (version 2) into a revised model (version 3), which is shown in figure 5.5. The link from National Culture to Lean Six Sigma was deleted, as it was not significant. At the same time a new direct link between National Culture and Corporate Success was introduced, to see whether this could be significant and improve the model. As Leadership Style (B2) had such a significant effect on Corporate Culture (A2), an other direct connection between Leadership Style (B2) and Corporate Success (C) was created as well.

For a better overview, the determination coefficients and total effects (i.e., the aggregated effect of direct and indirect connections from each of the four latent variables to Corporate Success) for the two alternative model structures evaluated with SmartPLS are summarized in table 5.21.

dent, and any (outcome) variable as dependent variable in the SPSS procedure (see also the detailed documentation provided by [Andreev et al., 2009, p. 11] and Niketta [2009]).

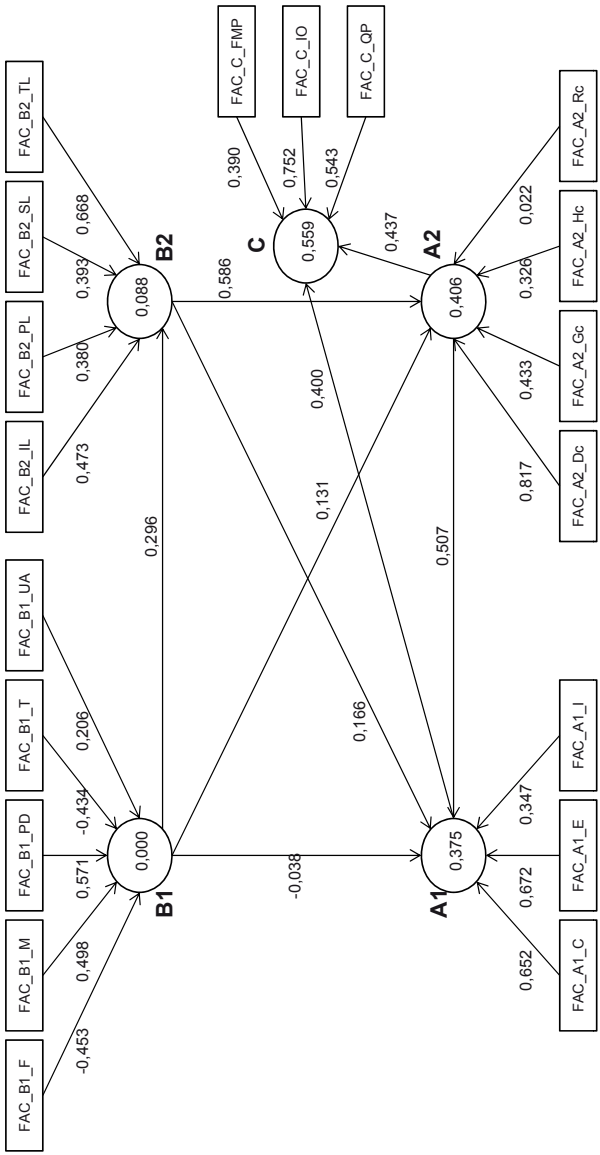

Figure 5.4: Path Model (Version 2) in SmartPLS (PLS Algorithm) - Hypothesized SEM based on collected data (Source: own figure)

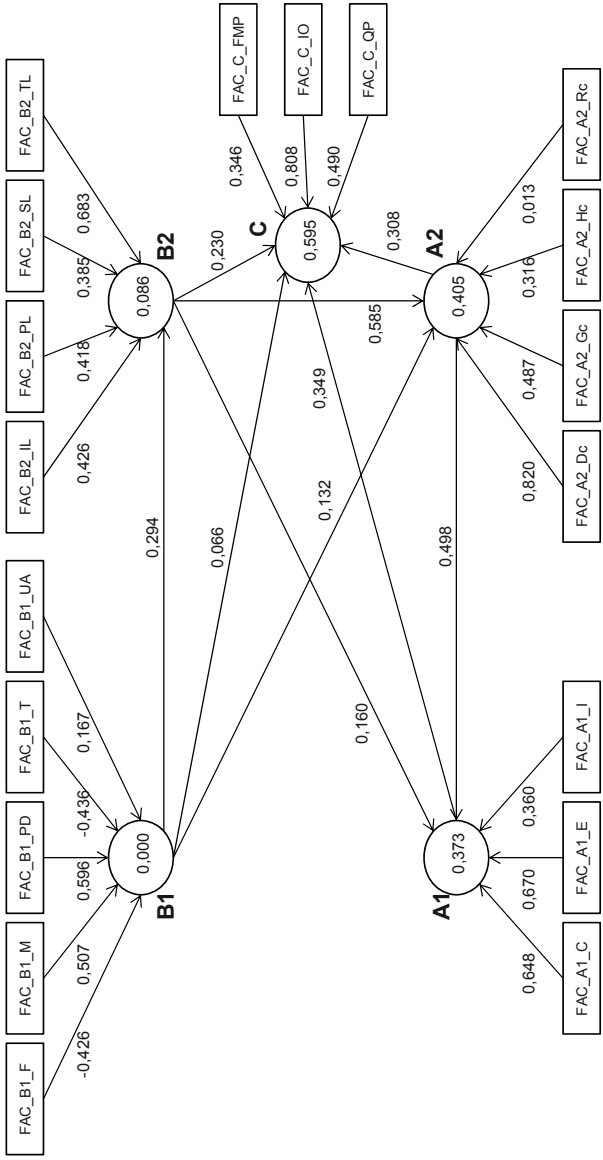

Figure 5.5: Revised Path Model (Version 3) in SmartPLS (PLS Algorithm) - Improved SEM based on collected data (Source: own figure)

Latent Variable	Model V2 (Base)			Model V3 (Revised)		
	R^2	Total effect on C	Total effect Rank	R^2	Total effect on C	Total effect Rank
A1	0.375	0.400	3	0.373	0.349	3
A2	0.406	0.639	1	0.405	0.481	2
B1	n/a	0.199	4	n/a	0.297	4
B2	0.088	0.441	2	0.086	0.568	1
C	**0.559**	n/a		**0.595**	n/a	

Table 5.21: Structural Model Assessment - Key metrics of model versions 2 and 3 (Source: own analysis)

The determination coefficient for Corporate Success changes only marginally from 0.559 to 0.595. A medium effect is modeled in both model structures. At the same time the total effect rank switches between Leadership Style and Corporate Culture when changing from the base model version 2 to the revised model version 3. When as in the base model, no direct link between Leadership Style (B2) and Corporate Success (C) is assumed, Corporate Culture (A2) has the strongest total effect on Corporate Success (C). When introducing the direct link between Leadership Style (B2) and Corporate Success (C), Leadership Style (B2) turns out to be the most important determinant of Corporate Success.

In order to compare the relative importance between Corporate Culture (A2) and Leadership Style (B2) the effect size for both latent variables for both models were assessed. As shown in table 5.22, Corporate Culture has a medium influence on Corporate Success in comparison to Leadership having no or a low impact on Corporate Success according to the effect size metric. Therefore Corporate Culture is substantially more important to achieve Corporate Success, although Corporate Culture in turn is strongly influenced by Leadership Style. The key insight is, that **the "right" leadership style would probably not drive Corporate Success without the mediator Corporate Culture in between**.

Latent Variable	**Model V2 (Base)** f_2	**Model V3 (Revised)** f_2
Corporate Culture (A2)	**0.24**	0.10
Leadership Style (B2)	0.00	0.07

Table 5.22: Effect Size of A2 and B2 - Relative importance of Corporate Culture and Leadership Style in model versions 2 and 3 (Source: own analysis)

For the evaluation of the predictive relevance, the Stone and Geisser Q^2 test was performed using the blindfolding procedure in SmartPLS. This test was conducted with omission distance equal to 7.[1]. As the Q^2 values for all endogenous latent variables are positive, the omitted observations are well-constructed and predictive relevance is achieved (see table 5.23).

Latent Variable	**Model V2 (Base)** Q^2	**Model V3 (Revised)** Q^2
Lean Six Sigma (A1)	0.1198	0.1198
Corporate Culture (A2)	0.1065	0.1063
Leadership Style (B2)	0.0235	0.0231
Corporate Success (C)	**0.1829**	**0.1939**

Table 5.23: Predictive Relevance - Stone-Geisser test for all endogenous latent variables in model versions 2 and 3 (Source: own analysis)

Aggregating the findings from the structural model assessment, **the proposed hypothesized SEM model is confirmed to be valid**. This means that all metrics in the model can be used to test the hypotheses. On the base of the measurement and structural model assessment, the relationship between at least two latent variables will be discussed one by one in the following sections. Selected assessment criteria will be linked to the hypotheses framed in section 3.7 in order to decline or verify the propositions derived from the theoretical findings in more detail.

5.2.4.1 Lean Six Sigma and Corporate Success

Connecting the PLS model with the hypothesized relationships between Lean Six Sigma and Corporate Success, the original hypotheses need to be re-phrased to account for the findings of the measurement model assessments and the modified factor structure. The improved hypotheses and their corresponding tests are displayed in table 5.24.

Lean Six Sigma has a positive impact on Corporate Success. However, infrastructure is not, as originally assumed, more important than core practices. The outer weights of the three formative indicators (all significant) representing Lean Six Sigma Core Practices, Effectiveness and Infrastructure show, that it is even the other way

[1] This is the recommended number (see [Andreev et al., 2009, p. 13]). The number of cases in the data sample should not be a multiple of the omission distance. This requirement is met as well, as n = 458 divided by 7 gives 65.43, which is not an integer number.

Hypothesis	Assumed Relationship	Test result*/Metric**
H[A1-C]1 to H[A1-C]3	Lean Six Sigma core practices*** are positively related to overall business performance.	(+) (PC)
H[A1-C]4	L6S infrastructure practices*** have more impact on individual outcomes (employee attitudes and motivation) than L6S core practices***.	(-) (OW)

* Hypothesis confirmed (+), rejected (-), not applicable (n/a) or not considered (n/c)
** Outer weights (OW), path coefficients (PC) or cluster analysis (CA)
*** Re-phrased according to new formative indicator structure

Table 5.24: Evaluation of the Hypothesized Relationship between Lean Six Sigma and Corporate Success - Overview of hypotheses (Source: own analysis)

around. Core Practices and Effectiveness are equally two times more important than Infrastructure.

Linking back to first research question (R1) (see section 1.2), the question remains, whether this effect of Lean Six Sigma differs across different clusters (e.g., with different Corporate Cultures). Section 5.2.5 will clarify this further.

5.2.4.2 Corporate Culture and Corporate Success

Although a selection of the hypotheses defining the relationship between Corporate Culture and Corporate Success has been defined in section 3.3.3, not all of them are actually tested (see table 5.25).[1] The four hypotheses which are tested, can all be confirmed.

Referring back to the second research question (R2), the most valuable cultural profile is clearly Developmental Culture, strongly impacted by Transformational Leadership, Masculinity and Power Distance. In other words, companies with a certain "drive" promise to be more successful:

- The Developmental Culture is characterized to be innovative, dynamic, and willing to take risks. Companies with this culture are competitive.[2]

[1] Due to the nature of the data sample measuring strength of Corporate Culture is not considered, as respondents stem from different companies and assigning respondents to these companies to define congruence in attitudes is not possible.

[2] This trait is nurtured by the one item of the reflective measurement model of Rational Culture that was moved to Developmental Culture following the results of the principal component analysis (see table 5.13).

Hypothesis	Assumed Relationship	Test result*/Metric**
H[A2-C]1	A hierarchical corporate culture does not contribute to corporate effectiveness and thus negatively impacts Corporate Success.	(+) (OW)
H[A2-C]2	The more the individual values are congruent with the corporate values (as part of the existing Corporate Culture), the higher the individual/employee outcomes.	n/c
H[A2-C]3	Relatively open, externally oriented (developmental) corporate cultures relate to better performance, while relatively closed, internally (hierarchical) oriented corporate cultures relate to poorer performance.	(+) (CA)
H[A2-C]4	A Corporate Culture's strength mediates the relationship between Corporate Culture and Corporate Success.	n/c
H[A2-C]5	Companies with strong, well-balanced cultures will achieve higher levels of performance than companies with unbalanced cultures.	(+) (CA)
H[A2-C]6	Employee attitudes and motivation will mediate the relationship between corporate culture and corporate performance.	n/c
H[A2-C]7	The relationship between Corporate Culture and Corporate Success is (partly) mediated by Lean Six Sigma.	(+) (PC)

* Hypothesis confirmed (+), rejected (-), not applicable (n/a) or not considered (n/c)
** Outer weights (OW), path coefficients (PC) or cluster analysis (CA)
*** Re-phrased according to new formative indicator structure

Table 5.25: Evaluation of the Relationship between Corporate Culture and Corporate Success - Overview of hypotheses (Source: own analysis)

- Transformational Leaders provide a vision, are energetic, they represent pride and empower their subordinates. According to the PLS model, this has a strong impact on the Corporate Culture, and therefore probably acts as an enabler to develop into a Developmental Culture.
- The impact from National Culture to Leadership is much higher than from National Culture to Corporate Culture directly. The strongest contributors are Masculinity and Power Distance. These two represent values like working hard, and being ambitious, which could be well shared by transformational leaders, who are striving to impact and grow themselves as well as their companies. At the same time these values are more likely to translate into a Developmental Culture, which underlines the aggressiveness of working hard and being first.

If other combinations of Corporate Culture, Leadership Style and National Culture could be successful as well, will be evaluated in section 5.2.5. Table 5.25 indicates already, that this is the case, e.g., for hypothesis H[A2-C]5 it can be confirmed that a balanced Corporate Culture drives Corporate Success.

5.2.4.3 Corporate Culture and Lean Six Sigma

The PLS model clearly shows that the formative indicator for Rational Culture is not significant. Therefore, all hypotheses assuming a causality between Rational Culture and Lean Six Sigma can be rejected (see table 5.26). On the other hand hierarchical culture does have an impact on Lean Six Sigma, and the assumption that it is not associated with Lean Six Sigma at all needs to be rejected as well.

Considering, that Corporate Culture shows the highest total effect on Corporate Success and has a strong effect on Lean Six Sigma, a developmental, group or hierarchical Corporate Culture could function as an “amplifier” for a positive effect of Lean Six Sigma on Corporate Success. Answering the third research question (R3) a Developmental Culture with focus on the Lean Six Sigma core practices and effectiveness promises to be more successful than any other combination. Again, this proposition will be further validated by the cluster analysis in section 5.2.5.

Hypothesis	Assumed Relationship	Test result*/Metric**
H[A1-A2]1	A corporation's emphasis on the *rational* corporate culture will be positively associated with the level of Lean Six Sigma infrastructure***.	(-) (OW/PC)
H[A1-A2]2	A corporation's emphasis on the *rational* corporate culture will be positively associated with the level of Lean Six Sigma core practices***.	(-) (OW/PC)
H[A1-A2]3	A corporation's emphasis on the *rational* corporate culture will be positively associated with the level of Lean Six Sigma core practices***.	(-) (OW/PC)
H[A1-A2]4	A corporation's emphasis on the *developmental* corporate culture will be positively associated with the level of Lean Six Sigma infrastructure***.	(+) (OW/PC)
H[A1-A2]5	A corporation's emphasis on the *group* corporate culture will be positively associated with the level of Lean Six Sigma core practices***.	(+) (OW/PC)
H[A1-A2]6	A corporation's emphasis on the *hierarchical* corporate culture will not be associated with any element of Lean Six Sigma.	(-) (OW/PC)

* Hypothesis confirmed (+), rejected (-), not applicable (n/a) or not considered (n/c)
** Outer weights (OW), path coefficients (PC) or cluster analysis (CA)
*** Re-phrased according to new formative indicator structure

Table 5.26: Evaluation of the Relationship between Lean Six Sigma and Corporate Culture - Overview of hypotheses (Source: own analysis)

5.2.4.4 The Impact of National Culture

The impact of National Culture on all remaining concepts has multiple facets (see section 3.5.4). The tested PLS model reveals, that not all of them are relevant and significant (see table 5.27). The assumed direct relationship between National Culture and Lean Six Sigma does not exist, i.e., the path coefficient between B1 and A1 is not significant.[1]

That a certain profile of national culture leads to a certain profile of Corporate Culture was tested with Cluster Analysis (section 5.2.5). Table 5.27 already indicates, that only part of the original hypotheses for this proposition can be confirmed.

5.2.4.5 The Impact of Leadership Style

In line with the proposition developed in chapter 3, a key driver of Lean Six Sigma implementation and Corporate Success is Transformational Leadership. When analyzing

[1] For the revised model version, the relationship between National Culture (B1) and Lean Six Sigma (A1) is therefore deleted.

Hypothesis	Assumed Relationship	Test result*/Metric**
B1-A1	**National Culture and Lean Six Sigma**	
H[B1-A1]1to H[B1-A1]4	A high level of national culture trait will be positively related with the level of L6S component.	(-) (PC)
B1-A2	**National Culture and Corporate Culture**	
H[B1-A2]1to H[B1-A2]5	Companies with a high characteristic in certain value dimensions of national culture orientation are characterized by a certain Corporate Culture.	(+/-) (CA)
B1-B2	**National Culture and Leadership Style**	
H[B1-B2]1	A high level of uncertainty avoidance will give rise to transformational leadership (weak situation).	(-) (OW)
H[B1-B2]2	A high level of family or teamwork*** will be positively associated with and supportive of transformational leadership.	(-) (OW)
H[B1-B2]3	A high level of uncertainty avoidance will be positively associated with and supportive of participative leadership.	(-) (OW)
H[B1-B2]4	A low level of family or teamwork*** will be positively associated with and supportive of participative leadership.	(+) (OW)
H[B1-B2]5	A high level of participative leadership will be positively related to the level of transformational leadership.	(+) (OW)
H[B1-B2]6	A high level of masculinity will be positively associated with and supportive of the level of instrumental leadership.	(+) (OW/PC)
H[B1-B2]7	A high level of power distance will relate to lower levels of supportive leadership.	n/c
H[B1-B2]8	A high level of power distance will be positively associated with and supportive of the level of instrumental leadership.	(+) (OW/PC)

* Hypothesis confirmed (+), rejected (-), not applicable (n/a) or not considered (n/c)
** Outer weights (OW), path coefficients (PC) or cluster analysis (CA)
*** Re-phrased according to new formative indicator structure

Table 5.27: Evaluation of the Hypothesized Impact of National Culture - Overview of hypotheses (Source: own analysis)

the total sample data, this style surpasses, e.g., participative and supportive leadership in impacting company performance. Lean Six Sigma implementation with this Leadership Style is by far more successful, although other styles lead to success as well (see section 5.2.5).

Also striking is the fact, that Transformational Leadership is not – as originally assumed – connected to a Group Culture, but rather to a Developmental Corporate Culture.

Overall, table 5.28 summarizes the confirmed and rejected hypotheses for the selected constellations of Leadership Style with the other research concepts. If a constellation can be confirmed depends on the data in focus: while for the total sample data not all combinations can be confirmed, the picture changes when analyzing per Cluster. This task will be the content of the following section.

5.2.5 Cluster Analysis

Although the results of Cluster Analysis have been partly discussed to evaluate the individual hypotheses in the sections above, this section provides a detailed explanation of the methodology and outcomes. The main goal of performing a Cluster Analysis on top of the revised PLS model (see figure 5.5), was to define adequate clusters of the sample data, in order to evaluate this model for the cluster sub-samples. In line with the fourth research question, critical constellation of National Culture, Leadership Style, Corporate Culture and Lean Six Sigma are identified, for which the SEM (PLS path model) is tested again.

Performing the Cluster Analysis in SPSS, a total of four clusters were extracted from the sample data.[1] All factors of the three concepts Corporate Culture, Leadership Style and National Culture were included in the analysis, as they represent the "soft" characteristics, i.e., which cannot be directly measured in any way.[2]

Appendix D displays each of the four clusters in a grid, comparing their mean factor loading per included "soft" factor (13 in total) with the average of all clusters. From

[1] The ward method was chosen as one type of hierarchical clustering. For a detailed explanation of this method and its advantages see [Backhaus et al., 2006, p. 522].

[2] In contrast Corporate Success could be measured, e.g., by monetary factors and Lean Six Sigma implementation could be measured by, e.g., number of projects.

Hypothesis	Assumed Relationship	Test result*/Metric**
B2-A1	**Leadership Style and Lean Six Sigma**	
H[B2-A1]1	In successful L6S organizations (superior overall business performance) transformational leadership is more important than participative, supportive and instrumental leadership (because the success of L6S depends on all employees sharing a common vision or goal).	(+) (OW/PC)
H[B2-A1]2	In successful L6S organizations (superior overall business performance) a leadership style supporting empowerment and teamwork (participative and supportive leadership) is more important than instrumental leadership (because L6S emphasizes timely responses to customer concerns by having all employees take a leadership role as well as share information and expertise).	(+) (OW/PC/CA)
B2-A2	**Leadership Style and Corporate Culture**	
H[B2-A2]1	Transformational leadership is more likely to shape a clan mode of governance (group culture) than either a market (developmental culture) or bureaucratic mode of governance (hierarchical culture).	(-) (OW/PC)
H[B2-A2]2	Transformational leadership is more likely to shape an adaptive (developmental) than a non-adaptive (hierarchical) corporate culture.	(+) (OW/PC)
H[B2-A2]3	Participative leadership shapes a clan mode of governance (group culture).	(+) (CA)
H[B2-A2]4	Supportive leadership shapes a clan mode of governance (group culture).	(+) (CA)
H[B2-A2]5	Instrumental leadership facilitates a rational corporate culture.	(-) (OW)
H[B2-A2]6	Instrumental leadership facilitates a hierarchical corporate culture.	(+) (CA)
B2-C	**Leadership Style and Corporate Success**	
H[B2-C]1	Leadership Style is not directly linked to Business Performance (but is indirectly associated via Corporate Culture and Lean Six Sigma).	(-) (PC***)

* Hypothesis confirmed (+), rejected (-), not applicable (n/a) or not considered (n/c)
** Outer weights (OW), path coefficients (PC) or cluster analysis (CA)
*** revised PLS model (see figure 5.5)

Table 5.28: Evaluation of the Hypothesized Impact of Leadership Style - Overview of hypotheses (Source: own analysis)

these grids, meaningful names and characterizations were given to each of the clusters:[1]

- **"The transformational driver" (Cluster 1)**: the company of this person has a transformational and participative leadership style, combined with a Developmental Corporate Culture and strong group coherence (Group Culture). Structure and formal rules are almost absent. People believe in the success of their own efforts (high degree of Power Distance).
- **"The disappointed rationalist" (Cluster 2)**: a very specific profile with outstanding above average score on rational culture (which in the PLS model does not have any effect, i.e., is not significant in driving Corporate Success or any other latent variable). As Family and Teamwork scores are high as well (while all other dimensions are below average), this Cluster gives the impression, that the underlying attitude could be that "passion for work does not pay off". Respondents belonging to this cluster clearly work according to instructions and achieve their self-fulfillment in private (family) life.
- **"The balanced professional" (Cluster 3)**: this Cluster reveals an equal balance across Corporate Culture dimensions and Leadership Styles, the variables with the greatest total effect on Corporate Success. As the Family and Teamwork dimensions score low and Masculinity scores high, a person belonging to this cluster is clearly dedicated to his or her work, believes in power and growth (high score on masculinity) and can easily deal with an Instrumental Leadership Style and Hierarchical Corporate Culture as it serves progression and competitiveness (high score on Developmental Culture).
- **"The risk-averse team player" (Cluster 4)**: Similar to cluster 3 this cluster shows an above average balance between a couple of dimensions. The key characteristic is the extremely high score on Uncertainty Avoidance. People belonging to this cluster prefer predictable outcomes at work and in life. At the same time high scores on hierarchical and group culture and a transformational leadership style give these people the guidance, security and protection they need.

[1] For better imagination, the clusters were treated as human beings, owning certain values and traits. This approach helps to explain more vividly how an individual belonging to a certain cluster would probably think and behave.

But how successful is each cluster, i.e., how mature is the Lean Six Sigma implementation and how good is company performance across the four groups? Analyzing the mean values for Lean Six Sigma and Corporate success, three of four clusters are more successful than the average while one Cluster is clearly below the average (see table 5.29).

Cluster (Total n = 458)	The transformational driver 1 n = 110	The disappointed rationalist 2 n = 180	The balanced professional 3 n = 118	The risk-averse team player 4 n = 50
Lean Six Sigma implementation*	+(+)	– –	++	+
Corporate Success*	+	– –	+(+)	+
R^2**	0.456	0.545	0.526	0.558
LV with highest total effect[1]	A2 (0.465)	B2 (0.549)	B2 (0.548)	A2 (0.696)
Indicator with highest outer weight[2]	FAC_A2_Dc	FAC_B2_TL	FAC_B2_SL	FAC_A2_Dc

* assessed from ++ (high value) to – – (low value) based on mean factor scores per cluster
** for the dependent latent variable Corporate Success (C) in the revised PLS path model version V3
[1] latent variable with the greatest total effect on Corporate Success (C)
[2] of the latent variable with the greatest total effect on Corporate Success (C)

Table 5.29: Cluster Analysis - Evaluation of key metrics (Source: own analysis)

The most successful cluster in terms of both Lean Six Sigma implementation and outcome (Corporate Success) is Cluster 3 ("The balanced professional"). The latent variable with the greatest total effect on Corporate Success is Leadership Style. Supportive Leadership Style has the highest outer weight and is the key driver of Corporate Success for Cluster 3.[1] Although Cluster 1 and 4 own different traits than Cluster 3, they are also successful. This insight provides the answer to the question raised in section 1.2 "Which level of benefits can be reached if Corporate Culture and Lean Six Sigma implementation are shaped in a certain way with a combination of critical components or determinants in a positive setting of national culture and leadership style". "The transformational driver" can be as successful as "the risk averse team player". Corporate Success in these two clusters is most strongly influenced by Corporate Culture, and more specifically a Developmental Corporate Culture. The "black sheep" among the four clusters is Cluster 2. The majority of respondents belong to

[1] The grid in figure D.3 in appendix D cannot provide this information, as it is just a visualization of mean factor loading differences between the cluster sample data and the total sample data.

this cluster. A rational Corporate Culture prevents companies from leveraging the full benefits from Lean Six Sigma.

5.3 Results Summary

The survey contributed by improving understanding of how National Culture, Leadership Style, Lean Six Sigma and Corporate Culture affect Corporate Success. A total of 17 hypotheses could be confirmed by proving the reliability and validity of the SEM. These are listed in table 5.30.

Hypothesis	**Assumed Relationship**	**Test result*/ Metric****
H[A1-C]1 to H[A1-C]3	Lean Six Sigma core practices*** are positively related to overall business performance.	(+) (PC)
H[A2-C]1	A hierarchical corporate culture does not contribute to corporate effectiveness and thus negatively impacts Corporate Success.	(+) (OW)
H[A2-C]3	Relatively open, externally oriented (developmental) corporate cultures relate to better performance, while relatively closed, internally (hierarchical) oriented corporate cultures relate to poorer performance.	(+) (CA)
H[A2-C]5	Companies with strong, well-balanced cultures will achieve higher levels of performance than companies with unbalanced cultures.	(+) (CA)
H[A2-C]7	The relationship between Corporate Culture and Corporate Success is (partly) mediated by Lean Six Sigma.	(+) (PC)
H[A1-A2]4	A corporation's emphasis on the *developmental* corporate culture will be positively associated with the level of Lean Six Sigma infrastructure***.	(+) (OW/PC)
H[A1-A2]5	A corporation's emphasis on the *group* corporate culture will be positively associated with the level of Lean Six Sigma core practices***.	(+) (OW/PC)
H[B1-A2]1 to H[B1-A2]5	Companies with a high characteristic in certain value dimensions of national culture orientation are characterized by a certain Corporate Culture.	(+/-) (CA)
H[B1-B2]4	A low level of family or teamwork*** will be positively associated with and supportive of participative leadership.	(+) (OW)
H[B1-B2]5	A high level of participative leadership will be positively related to the level of transformational leadership.	(+) (OW)
H[B1-B2]6	A high level of masculinity will be positively associated with and supportive of the level of instrumental leadership.	(+) (OW/PC)
H[B1-B2]8	A high level of power distance will be positively associated with and supportive of the level of instrumental leadership.	(+) (OW/PC)
H[B2-A1]1	In successful L6S organizations (superior overall business performance) transformational leadership is more important than participative, supportive and instrumental leadership (because the success of L6S depends on all employees sharing a common vision or goal).	(+) (OW/PC)

Hypothesis	Assumed Relationship	Test result*/ Metric**
H[B2-A1]2	In successful L6S organizations (superior overall business performance) a leadership style supporting empowerment and teamwork (participative and supportive leadership) is more important than instrumental leadership (because L6S emphasizes timely responses to customer concerns by having all employees take a leadership role as well as share information and expertise).	(+) (OW/PC/CA)
H[B2-A2]2	Transformational leadership is more likely to shape an adaptive (developmental) than a non-adaptive (hierarchical) corporate culture.	(+) (OW/PC)
H[B2-A2]3	Participative leadership shapes a clan mode of governance (group culture).	(+) (CA)
H[B2-A2]4	Supportive leadership shapes a clan mode of governance (group culture).	(+) (CA)
H[B2-A2]6	Instrumental leadership facilitates a hierarchical corporate culture.	(+) (CA)

* Hypothesis confirmed (+) or partly confirmed (+/-)
** Outer weights (OW), path coefficients (PC) or cluster analysis (CA)
*** revised PLS model (see figure 5.5)

Table 5.30: Summary of Evaluation - Overview of confirmed hypotheses

In order to find out whether critical constellations exist and success factors differ between companies of different culture (encompassing National Culture, Leadership Style and Corporate Culture), the collected data was compared between different clusters.

The structural equation modeling combined with the cluster analysis allows to define three key propositions:

- Companies with a **balanced Corporate Culture and Leadership Style** are most successful (equally distributed across the three outcome dimensions). Focusing on leadership and driving a supportive leadership style promises to take them even further.
- For either **risk-averse companies or adventurous, transformational companies** the main driver for Corporate Success is Corporate Culture. Continuously supporting a Developmental Corporate Culture drives improved individual outcomes in the short-term (already high scores on this dimension) and quality performance and financial and market performance in the long-term (higher scores achieved by "the balanced professional").
- Companies who may characterize themselves as **"the disappointed rationalist"** are likely to have failed with their Lean Six Sigma implementation and do probably not get the expected return on investment (like the majority of respondents in the empirical survey). Only a transformational leadership style

could drive a turn-around from Lean Six Sigma-immune, disinterested employees (probably already driven by decreasing individual outcomes and company performance) towards motivated and balanced professionals, who are passionate to make a difference with the quality management concept Lean Six Sigma.

Table 5.31 links these findings to the cluster profiles and to publications with same or similar results.

All modeled relationships between the five research concepts were significant, except the influence of National Culture on Lean Six Sigma which was eliminated in the revised model version.

In terms of methodology, the empirical survey fills a gap which has not been closed in literature yet. For the first time, data from multiple industries and countries was gathered in a way, that a valid SEM with Lean Six Sigma at the center could be created. The risk of the new modeling approach with PLS was counterbalanced by an extensive literature review and structured, customized evaluation approaches.[1]

[1] When discussing the empirical study and its results with peers being experts in statistics or SEM (PLS), they were often surprised about the good test results. However, as soon as they found out about the extensive pre-work leading to the hypothesized model and survey structure, they were convinced, that this has led to the successful data collection and analysis at hand.

Cluster	The transformational driver*	The disappointed rationalist*	The balanced professional*	The risk-averse team player*
Corporate Culture				
Developmental Culture	•		•	•
Hierarchical Culture			•	•
Group Culture	•		•	•
Rational Culture		•	•	•
Leadership Style				
Participative Leadership	•		•	•
Transformational Leadership	•		•	•
Supportive Leadership	•		•	•
Instrumental Leadership			•	•
National Culture				
Uncertainty Avoidance				•(+)
Masculinity			•	•
Power Distance	•			•
Family	•	•		
Teamwork	•	•		•
Success**	**2**	**4**	**1**	**3**
Supporting References	Waldman [1993] Dellana and Hauser [1999] Al-khalifa and Aspinwall [2000] Rosenstiel [2006] Rowold and Heinitz [2007]	Zu et al. [2010]	Quinn [1988] Denison [1990] Chang and Wiebe [1996] Prajogo and McDermott [2005] Yilmaz and Ergun [2008] Gregory et al. [2009] Zu et al. [2010]	Hofstede [1980a, 2001] Tata and Prasad [1998] Mathews et al. [2001] Lagrosen [2002, 2003] Kull and Wacker [2010] Williams and van Triest [2009] Ergeneli et al. [2007]

* factor score clearly above Cluster average (mean factor scores, see also appendix D) are marked with •
** rank based on evaluation in table 5.29 for Lean Six Sigma implementation and Corporate Success

Table 5.31: Cluster Profiles - Comparison of characteristics and relevant studies (Source: own analysis)

6

Summary and Conclusion

6.1 Summary of Key Findings

The starting point of this research was the disproportion between theoretical statements about the importance of National Culture, Corporate Culture and Leadership Style as determinants of Lean Six Sigma implementation and Corporate Success and the lack of empirical surveys actually examining the complex relationships between these variables.[1]

Accordingly, the fundamental purpose of this research was to deepen understanding about the influence of the "soft" accumulation of human desires and actions on Lean Six Sigma and Corporate Success. Therefore, four research questions were derived:

1. *In which way does Lean Six Sigma increase Corporate Success (R1)?*
2. *In which form does Corporate Culture lead to Corporate Success (R2)?*
3. *How does Corporate Culture affect the relationship between Lean Six Sigma and Corporate Success (R3)?*
4. *In which form does the surrounding setting of National Culture and Leadership Style positively affect the relationship between Corporate Culture, Lean Six Sigma, and Corporate Success (R4)?*

[1] The summary of key findings are presented in the same way as the vivid summary provided by [Jais, 2007, p. 185f.].

M. Jacobs, *Cultural Impact on Lean Six Sigma and Corporate Success,* Forum Marketing,
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An empirical survey was conducted to answer the research questions. Data was collected in multiple countries across the globe by means of a web-based questionnaire distributed over the social professional network platform LinkedIn. Usable responses were received from 458 Lean Six Sigma professionals, yielding a completion rate of 52.04% of a total sample of 882 interested participants. Representativeness cannot be assured for the target population, however informants are considered to possess profound knowledge about Lean Six Sigma and the other research concepts in focus. Due to the existing research of the analyzed concepts, an extensive set of hypotheses were generated in advance. A confirmatory research design, using Structural Equation Modeling (PLS), was applied. The key findings of this research will be summarized as follows, directly linking them to the four research questions that were posed in section 1.2.

In which way does Lean Six Sigma increase Corporate Success (R1)?

Following the literature review for Lean Six Sigma, five types of components were identified, which have been reduced to three based on the empirical survey results. Contrary to the original proposition, Lean Six Sigma Infrastructure is not more important then Lean Six Sigma Core Practices and Lean Six Sigma Effectiveness, but the other way around.

The definition of Corporate Success contained multiple facets covering individual outcomes as well as company performance and quality performance metrics. All of these three components are significantly and directly influenced by the three components of Lean Six Sigma.

In which form does Corporate Culture lead to Corporate Success (R2)?

Research questions R2 to R4 could be answered all in one, as they are closely linked and the results of the SEM analysis answer them all together. To be able to relate the results to the research purpose framed in the beginning in a more plausible way, findings are nevertheless sliced per imposed research questions.

Not solely one specific profile of Corporate Culture leads to Corporate Success, but the analysis of the empirical data suggests that either a well-balanced or a developmental Corporate Culture generate increased performance for a company. A developmental culture is characterized by being externally oriented, and contrary to initial propositions also contains rational, goal-oriented traits and competitive actions and achievement. A well-balanced Corporate Culture keeps an equal occurrence of different culture types,

i.e., it unifies a set of diverse values and behaviors. A pure hierarchical or rational Corporate Culture turned out to have no significant or positive effect on Corporate Success (see tables 5.20 and 5.25), with rational Corporate Culture supposably having a more negative effect than hierarchical traits (see tables 5.29 and 5.31).

How does Corporate Culture affect the relationship between Lean Six Sigma and Corporate Success (R3)?

Corporate Culture partly mediates the relationship between Lean Six Sigma and Corporate Success. This means that next to the direct effect Corporate Culture has on Corporate Success (developmental and well-balanced Corporate Cultures suggested to be more successful), Corporate Culture also impacts Corporate Success with Lean Six Sigma in between. As a result, Corporate Culture presents a latent variable of high relative importance in the model versions being assessed (see table 5.22). According to the superior impact of Corporate Culture on Corporate Success in the analyzed data an adaption or specific focus of Lean Six Sigma in this combination does not promise an additionally positive influence on Corporate Success.

In which form does the surrounding setting of National Culture and Leadership Style positively affect the relationship between Corporate Culture, Lean Six Sigma, and Corporate Success (R4)?

Corporate Culture and Leadership Style exert the strongest influence on Lean Six Sigma. To tie in with the outcomes for R2 above, either a combination of Transformational Leadership Style and Developmental Culture lead to increased Corporate Success (Cluster 1, "The transformational driver"), or an equal balance across leadership styles and corporate culture dimensions. For the first combination individual outcomes will be driven, while for the second type all dimensions of Corporate Success are impacted.[1] At the same time, Cluster 3 confirms the proposition, that in order to lead to success, leadership style needs to be pluralistic, flexible, and visionary (see section 3.6.4).

The hypothesized direct impact of National Culture on Lean Six Sigma was not significant. This means that values which have been learned early in life (see section 2.5.1) do not directly influence Lean Six Sigma implementation. However, Corporate

[1] This conclusion applies to both Cluster 3 ("The balanced professional") and Cluster 4 ("The risk-averse team player") although in Cluster 3 the culture and leadership balance has a stronger effect on individual outcomes and quality performance than on financial and market performance.

Culture and Leadership Style are influenced by National Culture. No specific combination of National Culture traits can be defined of being more successful. E.g., values of high Masculinity indirectly drive Corporate Success for "The transformational driver" (Cluster 1), while a combination of high Masculinity and Power Distance indirectly increase Corporate Success for Cluster 3 ("The balanced professional"). As National Culture does not explain a whole lot of Leadership Style and Corporate Culture though (low determination coefficient R^2 for these two latent variables, e.g. see figure 5.5), National Culture can be safely treated as an influence of second priority. From the empirical evidence in this research National Culture only partly explains Leadership Style and Corporate Culture, and by this has a low indirect impact on Lean Six Sigma implementation.

6.2 Limitations and Directions for Future Research

Although this research makes important theoretical and methodological contributions to the existing literature, several limitations must be kept in mind when drawing conclusions from the reported results. In the following, these limitations will be highlighted and directions for future research identified (for an overview see table 6.1).

Research Limitation	Biased results	Improvement for future research
Data sample	single-respondent-bias, underrepresentation of Asian countries	improve sampling technique, mitigate access barriers to increase response rate
Collection method	restriction of quantitative survey, collection only at one point in time	deepen insight through qualitative methods, expand target group and frame a longitudinal study
Operationalization	selected references for concepts are outdated or not complete	expand existing concepts based on exploratory research
Quality of SEM results	limitation to five concepts and to subjective measurement	account for additional contingency factors, maturity of Lean Six Sigma implementation and objective performance indicators
Up-to-dateness	literature review based on studies until 2010	integrate recent studies to improve hypothesized model and verify empirical results

Table 6.1: Research Limitations - Biased results and suggested directions for future research (Source: own analysis)

The first limitation lies in the sample used for the empirical survey. As highlighted in section 5.1.2, only Lean Six Sigma professionals involved in the professional virtual network LinkedIn were included in the survey. As Lean Six Sigma implementation affects more than just the quality management "experts" in a company, who actively network over the internet, the study could be expanded to a wider target group including employees who do not directly manage or participate in (Lean) Six Sigma projects, but are equally influenced by the concept in their function or daily routine. The empirical results are biased towards the perception of the selected key informants who probably share a more positive preference towards change.

The descriptive sample statistics showed, that the majority of respondents come from Europe and North America. As the majority of respondents in the Asia/Pacific group come from India, other Asian countries are underrepresented. A few connections in the LinkedIn network highlighted that, e.g., Chinese Lean Six Sigma professional were not always able to access the survey, as the communist government of China prohibits access to certain sites from the Western world. This has obviously led to a bias in the sample and could only be solved by future research, capturing target respondents in China (and other countries with access restrictions) by alternative suitable channels.

In terms of methodology the survey owns constraints which are typical for quantitative web-based data collections of this type (e.g., see Kaya [2007]). Although additional voluntary (written) e-mail messages supported the understanding of the data, a full understanding of the respondents' environment could only be achieved by means of qualitative personal interviews (see also [Borth, 2004, p. 222]).

Although the tested SEM already included a great number of variables, the integration of further variables offers room for further analysis. As the determinant coefficients of Corporate Success in all alternative models being evaluated never became "substantial", more influencing variables need to be identified and integrated in order to increase the explanation of Corporate Success. In parallel the stability of the estimated parameters should be validated using another, larger sample.

As pointed out in section 4.1.2 the key critique that is leveling against Structural Equation Modeling is its often careless use of causal terminology. As data was collected in a single wave, causal conclusions cannot be drawn. Future research efforts can use multiple data collections over time, to increase the reliability and validity of the proposed model further (longitudinal study).

If the SEM is replicated in the future, figure 6.1 illustrates four possible modifications and enhancements that could be pursued to improve the model further based on the current findings. These are:

- **deletion of the latent variable National Culture** and therefore reduction to a model with four latent constructs (to focus on the key variables driving Corporate Success and to test whether the determinant coefficient (R^2) for the dependent latent variable Corporate Success would significantly drop or not)
- **running the adapted model with and without the latent variable Lean Six Sigma** (to evaluate the relative importance of Lean Six Sigma towards Corporate Success and to test whether the determinant coefficient (R^2) for the dependent latent variable Corporate Success would significantly change)
- **changing the type of relationship between Corporate Culture and Leadership Style** (to evaluate if a reverse link would increase the determinant coefficient (R^2) for the dependent latent variable Corporate Success, i.e., if the direction from Corporate Culture to Leadership Style would function as an additional amplifier)
- **deletion of the Corporate Culture type Rational Culture** and therefore reducing the construct of Corporate Culture from four to three cultural value types (as for deletion of latent variable National Culture, effect on overall model is assumed to be minor, as outer weight for Rational Culture is not significant in current model)

Going back to the theoretical foundations and the literature review, the great number of examined studies emphasize the fast pace, at which new findings around the five research concepts National Culture, Leadership Style, Corporate Culture, Lean Six Sigma and Corporate Success are created. Sources published until end of 2010 are included in this work, although relevant research efforts are continuously updated.[1] A key task for future researchers will be, to take more and more studies into account, while at the same time not loosing key insights of the older ones. The literature review has shown, that a lot of studies present a mere replication of an idea, that was created some decades ago. Linking the findings of this study to other research efforts going

[1] As an example and to emphasize the amount and speed of research efforts around the topic of this thesis, appendix E.2 contains a short review of recent studies investigating the relationship between (Lean) Six Sigma and Corporate Success.

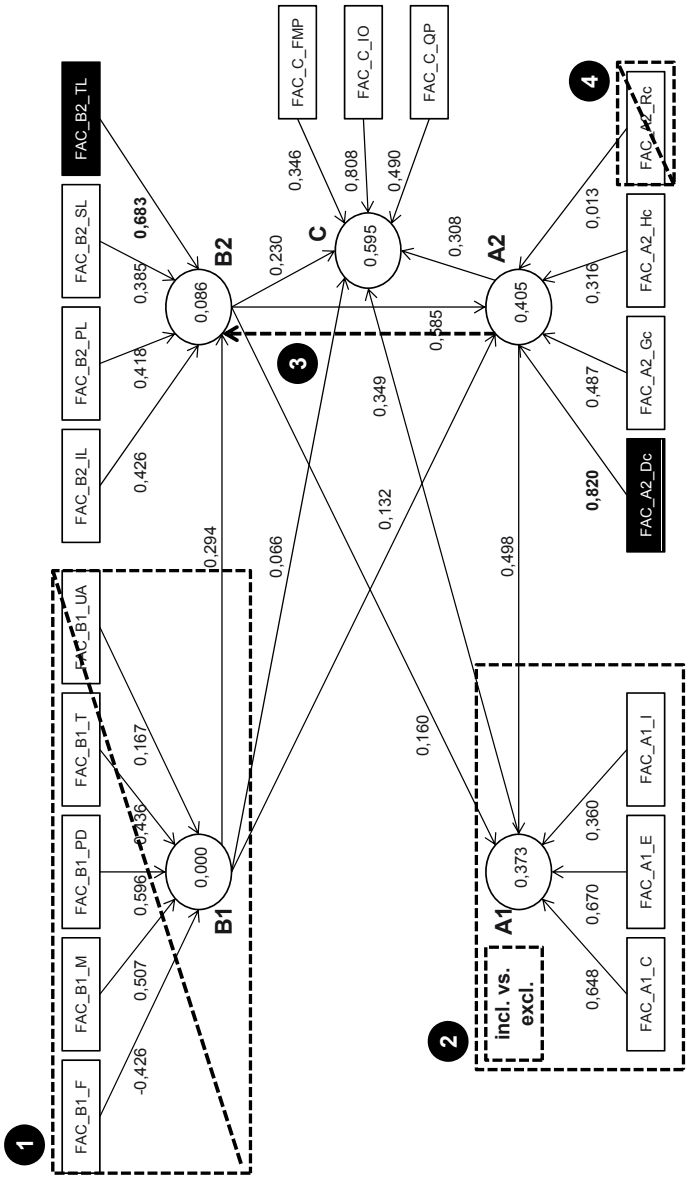

Figure 6.1: Suggested Modifications of Revised Path Model (Version 3) - Directions for Future Research (Source: own figure)

on in parallel[1] will increase the need to frame a meta-analysis at some point, to keep track of the research progress being made. The operationalizations of the five research concepts need to be improved to account for emerging findings.

6.3 Practical Implications and Final Conclusions

In addition to the theoretical and methodological contributions, this study has several interesting managerial implications.

As Jais [2007] specifically noted "the increasing globalization of the world economy has put immense pressure on traditionally national companies to operate on a multinational level. At the same time, it is becoming more difficult to control these large and increasingly complex organizations" ([Jais, 2007, p. 190]). Thus, managers are relying more and more on standardized (quality) management systems like Lean Six Sigma, they focus on certain Leadership Styles to create a motivated global community of employees, or they favor certain elements of Corporate Culture to improve their company's performance. To favor certain cultural elements or traits however prove to be misleading according to the results found in this research. Following recommendations and rationales can be imposed:

Recommendation 1: *Strategic HR management[2] needs to be an integral element of every Lean Six Sigma implementation. It needs to be in place up front.*

Rationale: If Leadership Style does not "fit" to the Corporate Culture or is headed towards conflicting directions, the potentially positive effect on Lean Six Sigma and Corporate Success is lost. To influence an existing Leadership Style is a long-term initiative and investment. At the same time Leadership is the main

[1] Over the virtual network LinkedIn, academic fellows could be identified, working on very similar topics to this thesis.

[2] "Proactive management of the employees of a company or organization. Strategic human resource management includes typical human resource components such as hiring, discipline, and payroll, and also involves working with employees in a collaborative manner to boost retention, improve the quality of the work experience, and maximize the mutual benefit of employment for both the employee and the employer." Source: http://www.businessdictionary.com/definition/strategic-human-resource-management.html

shaper of Corporate Culture, and together with Corporate Culture exerts the strongest influence on Lean Six Sigma implementation and Corporate Success. Furthermore independent of Lean Six Sigma a company's Corporate Success is strongly impacted by Leadership Style directly.

Recommendation 2: *Consciousness of a company's character: Corporate Culture and Leadership Style need to be measured up front (before Lean Six Sigma is implemented) in order to identify key issues and challenges that could hinder a Lean Six Sigma implementation.*

Rationale: As no single constellation of variables in this research turned out to be successful, and there are multiple options and combinations of Culture and Leadership which can lead to Corporate Success, only a detailed analysis of the current setting can lead to the right conclusions and actions to be taken.

Recommendation 3: *For a multinational company Lean Six Sigma should be implemented on a global level and focus needs to be given on shaping the overall Corporate Culture.*

Rationale: Against the assumption by Karahanna et al. [2005] the SEM has revealed that certain traits of National Culture **do not** override Corporate Culture (also not in certain situations, as evaluated by cluster analyses). National Culture has an impact on Lean Six Sigma and Corporate Success, but only indirectly and fully mediated by Leadership Style and Corporate Culture. National Cultures reflected within one company should therefore not falsely become a challenge of first priority when implementing Lean Six Sigma.

Recommendation 4: *In a given Corporate Culture values of diversity should be prioritized over direction.*

Rationale: Although Lean Six Sigma is a very standardized and at first glance would be assumed to fit well with an instrumental or rational Corporate Culture, the Cluster named "well-balanced professional" turned out to be most successful. This means that the full benefit of Lean Six Sigma can be achieved by

diversity in both Leadership Style and Corporate Culture. As soon as a company allows for and supports multiplicity in the organization, it unfolds and maximizes the benefit through the quality management concept Lean Six Sigma as a focused and structured approach.

Recommendation 5: *Managers should focus on developing and supporting an authentic and realistic company's core instead of changing and adapting the concept of Lean Six Sigma.*

Rationale: Lean Six Sigma works with very different settings of National Culture, Corporate Culture and Leadership Style. It is more important to track and manage the interdependencies between the "soft" factors than jeopardizing and falsifying the idea and nature of Lean Six Sigma. If the question is whether or not the standardized approach of the concept Lean Six Sigma should be adapted to a given profile of the local (national) culture, the data of this research does not support this idea.

Recommendation 6: *The personal "heartbeat" of a company should match the implementation speed of Lean Six Sigma.*

Rationale: Expectation management about Corporate Success, i.e., do the intended objectives match the Corporate Culture and which goals are realistic in which timeframe, is vital to gain credibility in the organization. As said, Lean Six Sigma works with very different settings of National Culture, Corporate Culture and Leadership Style. But it does neither work when changes are made to quickly, nor too fast. Each constellation has its own requirement, e.g., transformational leaders are thinking and acting at a different pace than a hierarchical culture would favor - so in line with recommendation 2, clear consciousness is necessary to choose the right speed. Setting realistic targets will pay off as employees are not attacked by unusual values and behaviors, but it is more pleasant to participate in the change in line with their Corporate Culture.

Additional explanation for recommendation 2 needs to be pointed out. From the SEM analysis it can be said that a direct effect of National Culture on Lean Six Sigma does not exist. However, National Culture influences the Leadership Style and Corporate Culture of a company, both of these variables having a profound effect on Lean Six Sigma implementation and Corporate Success. This leads to the key challenge that managers need to account for the complex interdependencies between the "soft factors" within their organization in order to successfully implement Lean Six Sigma. Just looking at one of the three components would not be enough, and could lead to false conclusions. A detailed analysis of the internal company situation and how it would compare to the clusters derived in this research provides practical guidance for managers, where and how to influence the agglomeration of their existing National Culture, Corporate Culture and Leadership Styles.

Based on these recommendations and for companies owning similar characteristics than those of the four identified clusters, table 6.2 gives a brief guidance of the key challenges and recommended procedures.

Cluster	The transformational driver	The disappointed rationalist	The balanced professional	The risk-averse team player
Success**	**2**	**4**	**1**	**3**
Key Challenge	Lack of focus on standards	Lack of motivation	Keeping high performance	Exaggerated need for security
Leadership Style	Expand Leadership Style for more structure (instrumental)	Transformational leaders for a turnaround (strategic HR management)	Keep balance	Keep balance and mitigate anxiety
Corporate Culture	Focus on rational elements, such as rules and metrics	Support a developmental, innovative and enthusiastic atmosphere (show vision and benefit)	Appreciate and leverage diversity	Transparent communication about success and prospects (mission and storytelling) to increase psychological safety

** rank based on evaluation in table 5.29 for Lean Six Sigma implementation and Corporate Success

Table 6.2: Cluster Challenges - Comparison of issues and recommendations per Cluster (Source: own analysis)

The cluster analysis suggests that certain constellations of the "soft factors" en-

hance performance in some cultures, while the same types could diminish performance in others. As already emphasized in the recommendations this means that every situation is unique and a key task for managers lies in achieving clear consciousness of the current circumstances for their company. As the two factors Corporate Culture and Leadership Style have a tremendous effect in any situation, choosing the right combination of these two concepts determine the success of any Lean Six Sigma implementation. Taking into account the functionalist perspective that leadership is the main shaper of Corporate Culture (see section 3.6.2) would again put HR management at the center and make it a key driver of successful Lean Six Sigma implementation (see Tsui et al. [2006]). Ignoring the influence of weaknesses in leadership style and not considering the role of HR management could lead to a development towards a type of "disappointed rationalist" segment, probably a one-way street towards decreasing individual and corporate performance. A turn-around in this segment could supposably only be achieved by transformational leaders, who are passionate enough to develop a company into a competitive, dynamic and innovative unit heading towards greater Corporate Success in the future. In order to achieve improvement excellence with Lean Six Sigma (see Burton [2011]) identifying, developing and retaining charismatic change agents (Black Belts, Master Black Belts) will become the top priority (see also Hilton and Sohal [2012]). The change agents will help to step back and increase consciousness about the true nature of their company to consider suitable recommendations for the specific situation.

The identified clusters allow to visualize two contrary scenarios a company could be in.[1] These scenarios and their corresponding characteristics and recommended actions are portrayed in table 6.3. The purpose of this overview is to condense the findings listed in the recommendations and cluster challenges above into a more detailed and specific but at the same time pragmatic and simple guidance for managers findings themselves in one of the described scenarios or a sort of fraction or mix in between them.

To zoom in on the recommendations of one of the two scenarios depicted in table 6.3, figure 6.2 illustrates what managers affected by Scenario 2 could learn from this

[1] These scenarios are selected examples that do not claim to be representative of any empirical data or situations in practice. They serve as a screen or suggestion to look at the research findings in a plausible way.

	Scenario 1	**Scenario 2**
Corporate Culture	developmental	rational
Leadership Style	transformational	instrumental
Atmosphere	enthusiastic and ambitious	careful and structured
Probability of Success	high	low
Leadership priorities	(1) retain key talent, (2) ensure diverse and sustainable talent pipeline	(1) recruit transformational leaders, (2) mitigate island position of production-oriented thinking
Implementation approach	**Mobilize internal forces:** (1) rely on internal talent, make them change agents to keep high standards and competitiveness; (2) support and reward diversity	**Wise implementation:** (1) get external experts on board (credibility), (2) favor stepwise approach (to account for risk-averse mindset), (3) create goal-oriented communication plan (get buy in from all employees); (4) understand and leave enough time for change (set appropriate subgoals along the way)
Speed of implementation	fast	slow
Risk of implementation	frustration, if high expectations not met (risk to loose euphoria)	high hurdle to convince people (change resistance)
Strategy slogan	**"Boost the balance"**	**"Dig for the emotional drive"**

Table 6.3: Practical guidance - Priorities and approaches of L6S implementation in two scenarios (Source: own analysis)

study and what they should do with the results. The depicted flow presents how current and updated belief could differ according to the key findings.

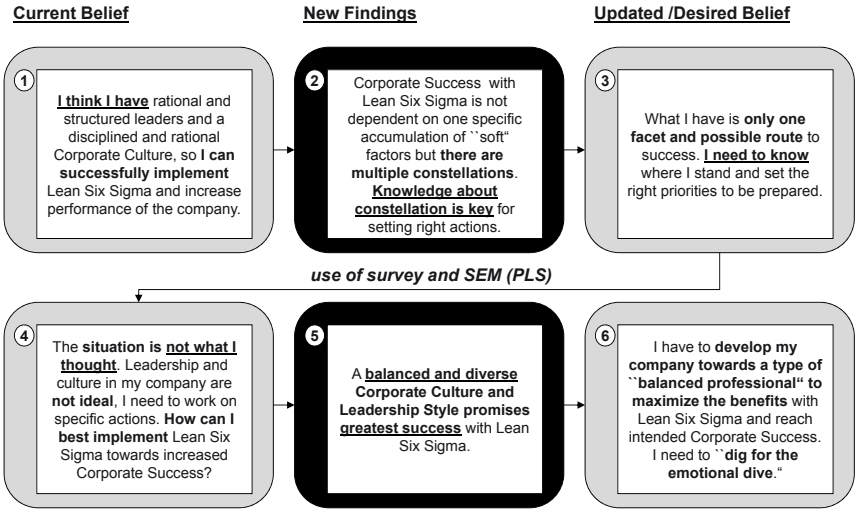

Figure 6.2: Summary of Key Recommendations - Updated belief for a manager according to the research findings (Source: own analysis)

As a final conclusion this research has shown how complex the dynamics between the five analyzed research concepts Lean Six Sigma, Corporate Culture, National Culture, Leadership Style and Corporate Success are. It has contributed to understand mechanisms that appear more and more in practice, but have not yet been sufficiently studied to give profound knowledge and informed decisions to practitioners. The recommendations in this work have been derived from a specific set of empirical data and present a first step in improving consciousness if, when and how to implement Lean Six Sigma for greater success. Practical implications will change and expand with continuous research being pursued around the topic.[1] The survey and chosen methodology can be replicated in practice at reasonable cost. As all evaluations and analytical steps are made transparent, new findings can be easily embedded. This is even more important, as many gaps remain unknown and those findings conflicting with other literature pose

[1] Appendix E.2 gives a brief summary of developments in current literature around the topic of this research.

new questions demanding for answers. Hopefully SEM (PLS) will play an important role in any future efforts, as it keeps the balance between scientific rigor, intuitive application and comprehensible results. The methodology and findings of this work may encourage other researchers to continue to explore innovative approaches to build on the promising results at hand.

Appendix A

Survey Questionnaire

A.1 Introduction

Culture, Leadership and Lean Six Sigma - Survey

Dear participant, dear highly interested in this topic,

tackling the question whether success and speed of Lean Six Sigma implementation differs across nations and companies, the idea for my PhD thesis with the title "Corporate Success through Lean Six Sigma and Corporate Culture" was born in 2008.

With this survey I aim to obtain a most realistic view of Lean Six Sigma implementation in multiple industries and companies across nations and societies. I kindly ask you to share your personal experiences and opinion to help understand both the positive dynamics and the improvement areas needed for a successful Lean Six Sigma implementation around the world.

The following questionnaire is 6 pages long. Filling it out takes about 10 minutes. Please respond until the deadline of Dec. 31st, 2010.

Your answers will be treated with absolute confidentiality. The results of this survey will be displayed in anonymous form only and the statistical questions will be analyzed separately from the rest of the questionnaire so no conclusion can be drawn to a single person at any time.

If you decide to leave your email address at the end of the survey, you have the chance to win an Amazon voucher worth 100.- EUR and an aggregated results summary will be sent to you shortly afterwards.

For any questions or doubts please do not hesitate to contact me via Linked In.

Thank you in advance for your participation and support in this exciting research project!

M. Jacobs, *Cultural Impact on Lean Six Sigma and Corporate Success,* Forum Marketing,
DOI 10.1007/978-3-658-07340-4, © Springer Fachmedien Wiesbaden 2015

A.2 Lean Six Sigma

Item	Item description
Role structure	
A1-1-1	Our company employs a (full-time) black and (part-time) green belt role structure for continuous improvement.
A1-1-2	In our company, an employee's role in the black/green structure is considered when making compensation and promotion decisions.
A1-1-3	Our company uses differentiated training so that employees who have different roles in the black/green belt role structure can obtain the necessary knowledge and skills to fulfill their job responsibilities.
Structured procedure	
A1-2-1	In our company, continuous improvement projects are conducted by following a formalized procedure (such as DMAIC - Define, Measure, Analyze, Improve and Control).
A1-2-2	All improvement projects are reviewed regularly during the process.
A1-2-3	We keep records about how each continuous improvement project is conducted.
A1-2-4	We use scientific methods while making decisions.
Focus on metrics	
A1-3-1	Our company translates customers' needs and expectation into (Lean) Six Sigma quality goals.
A1-3-2	In our company, measures for (Lean) Six Sigma performance are connected with the company's strategic quality goals.
A1-3-3	Our company systematically uses a set of measures (such as defects per million opportunities, sigma level, process capability indices, defects per unit, and yield) to evaluate process improvements.
Process management	
A1-4-1	We constantly study and review our key business processes to make improvements.
A1-4-2	Clear work or process instructions are given to employees.
A1-4-3	We make extensive use of statistical techniques to reduce variance in processes.
Product/Service Design	
A1-5-1	Quality of new products/services is emphasized in relation to cost or schedule objectives.
A1-5-2	Multiple departments (such as R&D, marketing and sales, and manufacturing) coordinate in the product/service development process.
A1-5-3	Overall, in the product or service design process, we make an effort, to include only the steps which are clearly needed.

A.3 Corporate Success

Item	Item description
Quality performance	
C-1-1	In comparison to competition, quality improvements of products/services/processes at my company are much better.
C-1-2	Customer Satisfaction with quality of our products and services has increased over the past 3 years.
Financial performance	
C-2-1	Our company's sales have grown faster than the competition in the last 3 years.
C-2-2	In terms of profitability, our ROI (return on investment) has improved over the last 3 years.
C-2-3	Overall the company I work for performs better than the competition financially.
Market performance	
C-3-1	Across the product portfolio our market share growth has outperformed the competition over the last 3 years.
C-3-2	Across the product portfolio, my company's image at customers is better than the competition.
Individual Outcomes	
C-4-1	I feel comfortable how we do things around here.
C-4-2	I have learned and personally grown with my company.
C-4-3	I am excited to go to work every morning.
C-4-4	My job makes good use of my skills and abilities.
C-4-5	My work gives me a feeling of personal accomplishment.
C-4-6	Considering everything, I am satisfied with my current job.

A.4 Corporate Culture

Item	Item description
Developmental culture	
A2-1-1	This company emphasizes growth and acquiring new resources. Readiness to meet new challenges is important.
A2-1-2	To what extent do you agree that your company places a high priority on the following? This company is dynamic and entrepreneurial. People are willing to take risks.
A2-1-3	The glue which holds this company together is a commitment to innovation and development. There is an emphasis on being first.
A2-1-4	In this company the best managers are considered to be entrepreneurs, innovators or risk takers.
Rational culture	
A2-2-1	This company emphasizes competitive actions and achievement. Measurable goals are important.
A2-2-2	To what extent do you agree that your company places a high priority on the following? This company is production oriented. The major concern is with getting the job done. People aren't very personally involved.
A2-2-3	The glue which holds this company together is an emphasis on tasks and goal accomplishment. A production orientation is shared.
A2-2-4	In this company the best managers are considered to be producers, technicians or hard-drivers.
Group culture	
A2-3-1	This company emphasizes human resources. High cohesion and morale in the firm are important.
A2-3-2	To what extent do you agree that your company places a high priority on the following? This company is personal. It's like an extended family.
A2-3-3	The glue which holds this company together is commitment to this firm runs high. Loyalty and tradition are important here.
A2-3-4	In this company the best managers are considered to be mentors, sages or father/mother figures.
Hierarchical culture	
A2-4-1	This company emphasizes permanence and stability. Efficient, smooth operations are important.
A2-4-2	To what extent do you agree that your company places a high priority on the following? This company is very formalized and structured. Established procedures generally govern what people do.
A2-4-3	The glue which holds this company together is formal rules and policies. Maintaining a smooth-running company is important here.
A2-4-4	In this company the best managers are considered to be co-ordinators, organizers or administrators.

A.5 Leadership Style

Item	Item description
Transformational leadership	
B2-1-1	S/he articulates and represents a vision, which s/he is optimistic and enthusiastic about.
B2-1-2	I am proud of my leader, have respect for him/her and can identify with his/her way of leading.
B2-1-3	I fully trust my supervisor. He/she is an energetic role model.
B2-1-4	My supervisor encourages me to question established ways of solving problems.
B2-1-5	S/he understands the needs and abilities of each follower and develops and empowers each and everyone individually.
Participative leadership	
B2-2-1	Before making decisions, s/he considers what her/his subordinates have to say.
B2-2-2	Before taking action s/he consults with subordinates.
B2-2-3	When faced with a problem, s/he consults with subordinates.
B2-2-4	S/he asks subordinates for their suggestions.
B2-2-5	S/he listens to subordinate's advice on which assignments should be made.
Supportive leadership	
B2-3-1	S/he helps people to make working on their tasks more pleasant.
B2-3-2	S/he looks out for the personal welfare of group members.
B2-3-3	S/he does little things to make things pleasant.
B2-3-4	S/he treats all group members as equals.
Instrumental leadership	
B2-4-1	S/he explains the way tasks should be carried out.
B2-4-2	S/he decides what and how things shall be done.
B2-4-3	S/he maintains definite standards of performance.
B2-4-4	S/he schedules the work to be done.

A.6 National Culture

Item	Item description
Uncertainty Avoidance	
B1-1-1	I do not like taking risks in my life.
B1-1-2	I rather take path with more predictable/known outcomes.
Individualism	
B1-2-1	Teamwork is NOT always important for better performance.
B1-2-2	My work/company comes after myself and my immediate family.
Masculinity	
B1-3-1	I like to offer my opinions at company meetings.
B1-3-2	Businesses should be more aggressive in growth.
Power Distance	
B1-4-1	I can tolerate the fact that some people have more power and money.
B1-4-2	Successful people “got there” by working harder.

A.7 Statistics

Which concept has been implemented in your company?
Please choose the method that dominates in your company.
Six Sigma
Lean Six Sigma

Approximately how many Lean Six Sigma projects have been implemented in your company (since launch)?
Put in the total number of implemented projects, according to your own estimation (max. 4 digits).

What is your nationality?
Please choose the country in which you grew up. If you grew up in multiple nations, choose the country you spent most time in. *Drop down list*

What is your location, meaning in which country do you currently work?
Please choose the country of the affiliate your are currently based in. *Drop down list*

What is the location of your immediate supervisor, meaning in which country does he/she currently work?
Please choose the country of the affiliate your supervisor is currently based in.

Which industry sector does your current company belong to?
Please choose the sector which applies the most to your current employer.
Please choose...
Accounting
Advertise and Marketing
Aerospace and Defence
Agriculture
Automotive
Chemicals
Computers and Software
Consulting
Electronics and Semiconductors
Energy and Environment
Financial Services
Food and Beverage
Government and Trade
Health Care
Human Resources
Industrial Goods and Services
Internet and Online
Law
Management
Media and Entertainment
Pharmaceuticals and Biotechnology
Real Estate and Constructions
Retail and Consumer Services
Small Business
Telecommunications
Transportation and Logistics
Other

How many employees does your company have?
Please select your company size from the list.
Please choose...
less than 250
between 251 and 500
between 501 and 1,000
more than 1,000

What is your functional area?
Choose the area which describes your current position the most.
Please choose. . .
Corporate Affairs
Financial
Human Resources
Information Technology
Legal
Manufacturing
Marketing
Procurement
Research and Development
Sales
Strategy
Other

What best describes your position?
Choose your current position in the organizational hierarchy.
Please choose. . .
Assistent or Coordinator
Associate or Specialist
Teamleader
Manager (without direct reports)
Manager (with direct reports)
Director
Executive Director and higher

Please indicate your position with regard to the project management organization of (Lean) Six Sigma in your company.
Please choose all positions that apply to you (multiple answers possible).
Champion
Sponsor
Master Black Belt
Black Belt
Green Belt
Core Team Member
Extended Team Member
No specific Lean Six Sigma Position
Other:. . .

What is your gender?
Male
Female

What is your professional experience in years?
Put in the total number of years you have worked in your professional career.

How many years have you been employed at your company?
Put in the total number of years you have worked for your current company.

What is your highest education?
Please choose your highest educational level from the list.
Please choose...
Not a high school graduate
High school graduate only
Some college, no degree
Bachelor
Master
MBA
Doctorate

What is your age in years?

Are you a member of the following LinkedIn Groups?
Please choose all groups you are a member of (multiple answers possible).
Global Lean & Six Sigma Network
iSixSigma Network
Lean Six Sigma

If you are interested in winning the Amazon voucher and being kept updated on the progresses of this research, please put your email address below.
Please note: your email address would be saved separately for the purpose of voucher and/or report distribution and could never be linked to the other answers in this survey.

Appendix B

Letters for Survey Distribution

B.1 Discussion Thread in LinkedIn groups

Survey: Lean Six Sigma – hype or a hidden champion? Win an Amazon voucher worth 100.- EUR!

"What's the story behind the hype? Is there really some muscle in the methodology, or is Six Sigma simply, as many believe, PR-enhanced total quality management?"

These questions raised by Quality Digest in 2001 (see http://www.qualitydigest.com/nov01/html/ sixsigmaarticle.html) are more present than ever. Most textbooks describe (Lean) Six Sigma as "an improvement engine" (see "What is Lean Six Sigma" by the George Group 2004), and admit that factors like culture and leadership also play a role (see "The Six Sigma Leader" by Pande 2007).

What is your opinion about Lean Six Sigma? Does it improve performance by itself? Or do we need to consider who we are and how we work in our company to be successful with this concept?

For my PhD thesis with the topic "Corporate Success through Lean Six Sigma and Corporate Culture" I kindly ask for 15 minutes of your time to share your personal experiences in an online survey (if clicking the link is disabled in your browser, please copy and paste it in your browser's address bar):

http://ww2.unipark.de/uc/LSS_survey_anonym/

The survey is open until October 31st, 2010.

Participate today as you have the chance to win an Amazon voucher worth 100.- EUR and the unique chance to gain great insight for you and your company by receiving an aggregated report of the survey results!

Thank you in advance for your collaboration in this exciting research project.

M. Jacobs, *Cultural Impact on Lean Six Sigma and Corporate Success,* Forum Marketing,
DOI 10.1007/978-3-658-07340-4, © Springer Fachmedien Wiesbaden 2015

B.2 Individual Invite to LinkedIn Members

Survey about Lean Six Sigma - what is your experience?

Dear [first name of target person],

I found you through the group Lean Six Sigma on LinkedIn and I am very interested in your experience with and opinion about Lean Six Sigma! Does it improve performance by itself? Or do we need to consider who we are and how we work in our company to be successful with this concept?

For my PhD thesis with the topic "Corporate Success through Lean Six Sigma and Corporate Culture" I kindly ask you for 10 minutes of your time to share your personal experiences in an online survey (if clicking the link is disabled in your browser, please copy and paste it in your browser's address bar):

http://ww2.unipark.de/uc/LSS_survey_anonym/

If you choose to leave your email address at the end of the survey, you have the chance to win an Amazon voucher worth 100.-EUR, plus you will receive an aggregated report of the survey results.

Please forward the link to everybody in your Linked In network, who also has experience with (Lean) Six Sigma and might be interested in participating, as I am interested in opinions from multiple countries, industries and functions. (Under contacts you can select up to 50 contacts to send them this message at the same time.)

For any questions please do not hesitate to contact me.

Thank you in advance for your collaboration in this exciting research project!

Best regards,
Miriam

B.3 Reminder of October 23rd, 2010

Reminder: Survey about Lean Six Sigma

Dear LinkedIn fellow,

this is a kindly reminder, that the online survey for my PhD thesis with the topic "Corporate Success through Lean Six Sigma and Corporate Culture" is going to close end of October. For those of you, who have already shared their experiences and filled out the survey, a big big thanks! You are contributing to a unique research project and your opinion is greatly appreciated!

If you have entered the survey, but did not have the opportunity to finish it, here is the link again (if clicking the link is disabled in your browser, please copy and paste it in your browser's address bar):

http://ww2.unipark.de/uc/LSS_survey_anonym/

You should be automatically re-directed to the page where you left the survey.

Do not miss the chance to leave your email address at the end of the survey, so you will receive an aggregated report of the survey results, and you will be included in the drawing to win an Amazon voucher worth 100.-EUR!

If you know anybody in your LinkedIn network, who also has experience with (Lean) Six Sigma and might be interested in participating in my survey, please forward the link! I have received opinions from multiple countries, industries and functions already, but the more voices I get, the deeper the insights will be! (Tip: under contacts you can select up to 50 of your contacts to send them the link at the same time.)

Again, for any questions please do not hesitate to contact me, I get back to you as soon as possible!

Thank you in advance for your collaboration in this exciting research project!

Best regards,
Miriam

B.4 Reminder of December 11th, 2010

Last Chance: Survey about Lean Six Sigma

Dear LinkedIn fellow,

do not miss to contribute to one of the most promising research efforts about Lean Six Sigma this year! Due to the great response and the very interesting results so far, my online survey has been extended to Dec. 31st, 2010! This is the last chance, to make sure, that your voice is included as well!

If you have entered the survey, but did not have the opportunity to finish it, here is the link again (if clicking the link is disabled in your browser, please copy and paste it in your browser's address bar):

http://ww2.unipark.de/uc/LSS_survey_anonym/

Thank you in advance for your collaboration in this exciting research project! If you leave your e-mail address at the end, I will be in touch with the results soon!

Best regards,
Miriam

Appendix C

Operationalization of Measurement Models

C.1 Measurement Model Lean Six Sigma (A1)

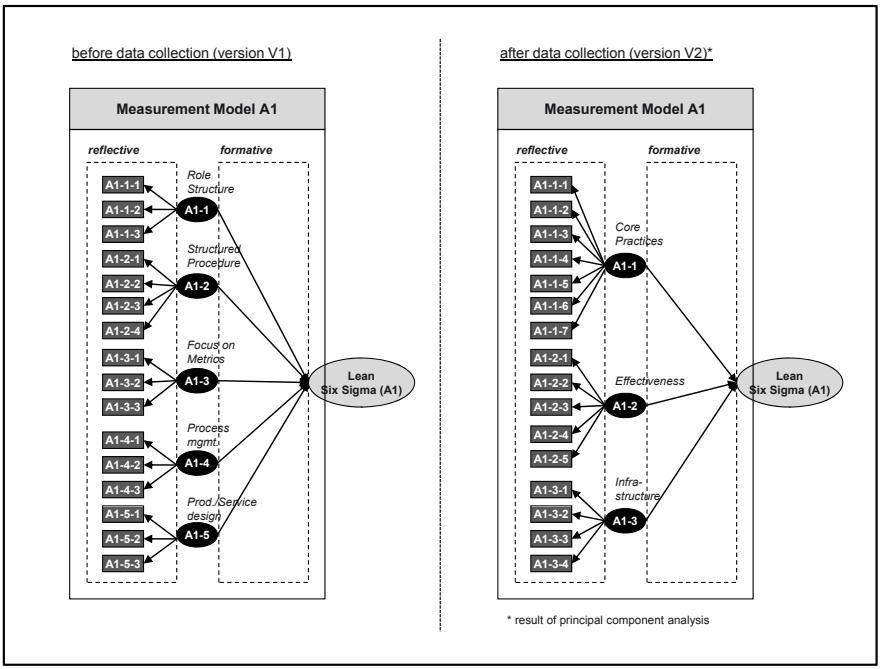

Figure C.1: Measurement Model Lean Six Sigma (A1) - before and after data collection (Source: own figure)

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C.2 Measurement Model Corporate Success (C)

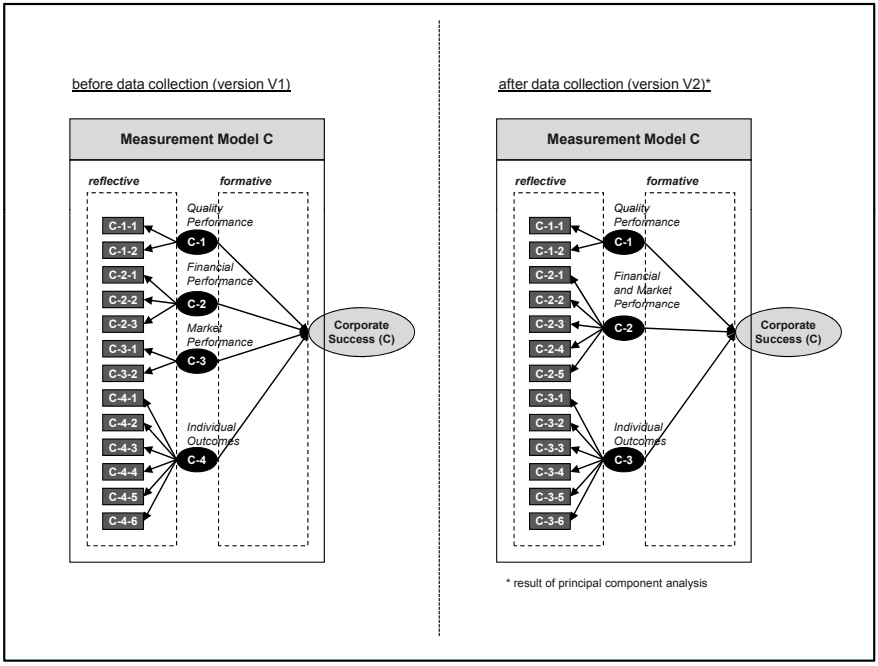

Figure C.2: Measurement Model Corporate Success (C) - before and after data collection (Source: own figure)

C.3 Measurement Model Corporate Culture (A2)

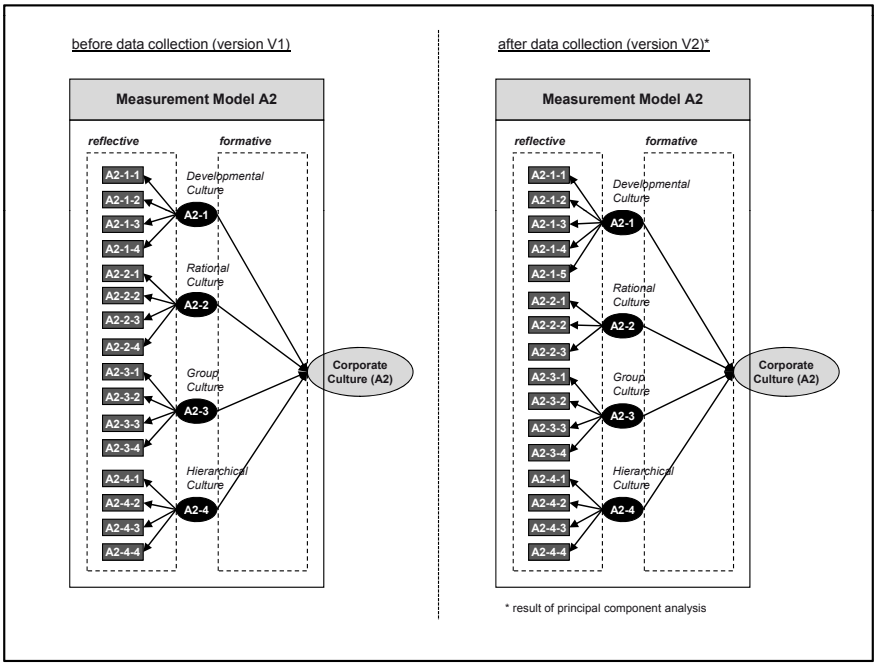

Figure C.3: Measurement Model Corporate Culture (A2) - before and after data collection (Source: own figure)

C.4 Measurement Model National Culture (B1)

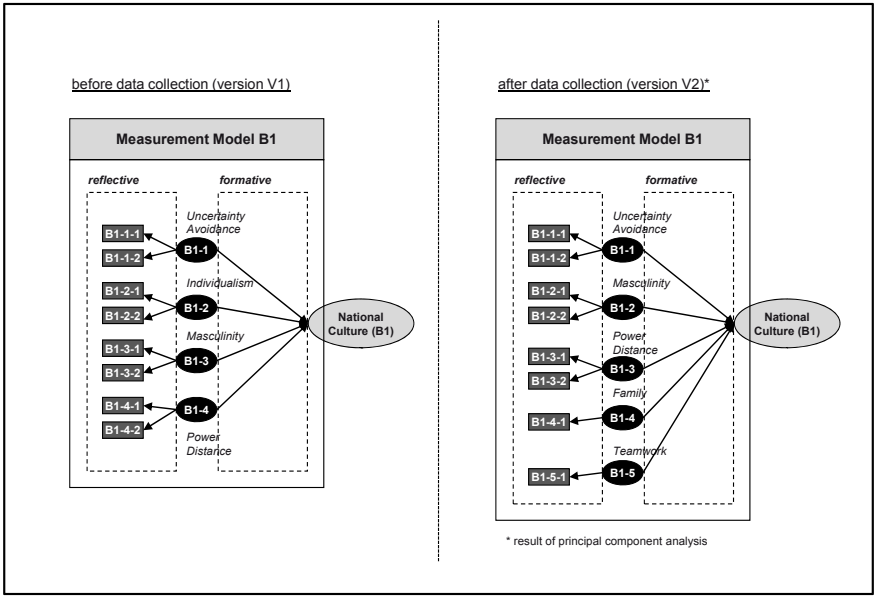

Figure C.4: Measurement Model National Culture (B1) - before and after data collection (Source: own figure)

C.5 Measurement Model Leadership Style (B2)

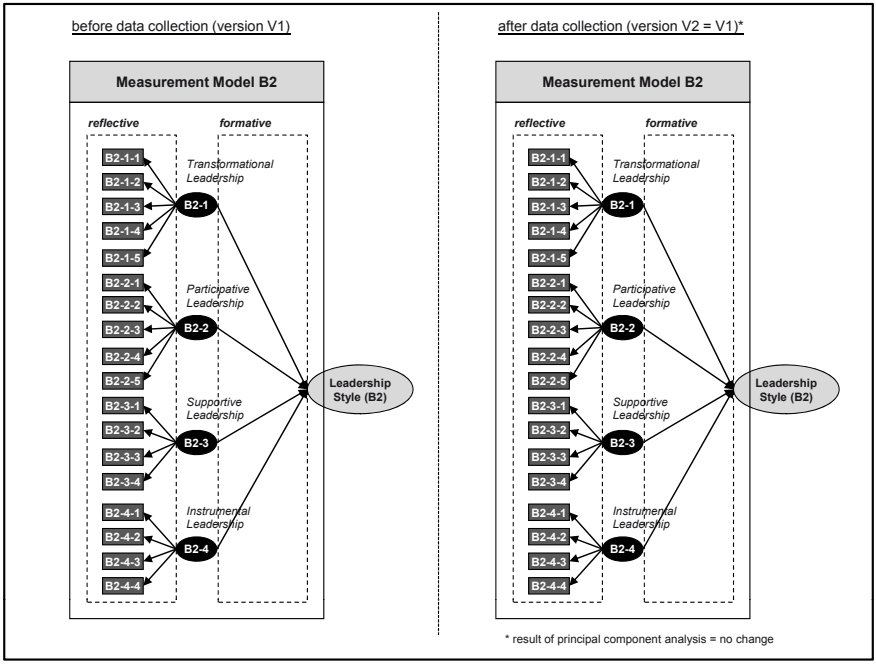

Figure C.5: Measurement Model Leadership Style (B2) - before and after data collection (Source: own figure)

Appendix D

Clusters

D.1 Cluster 1

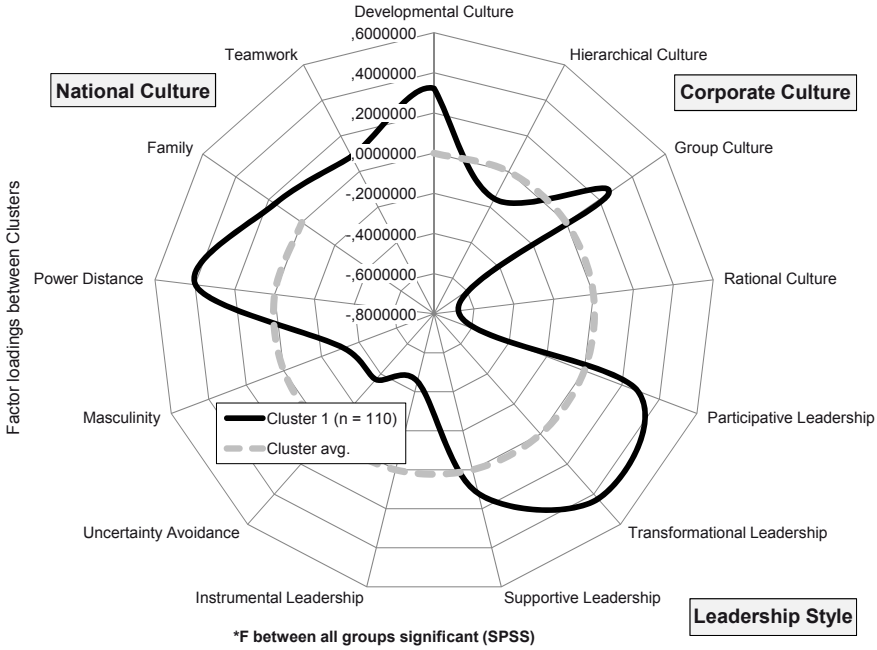

Figure D.1: Cluster 1 - "The transformational driver" (Source: own figure)

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D.2 Cluster 2

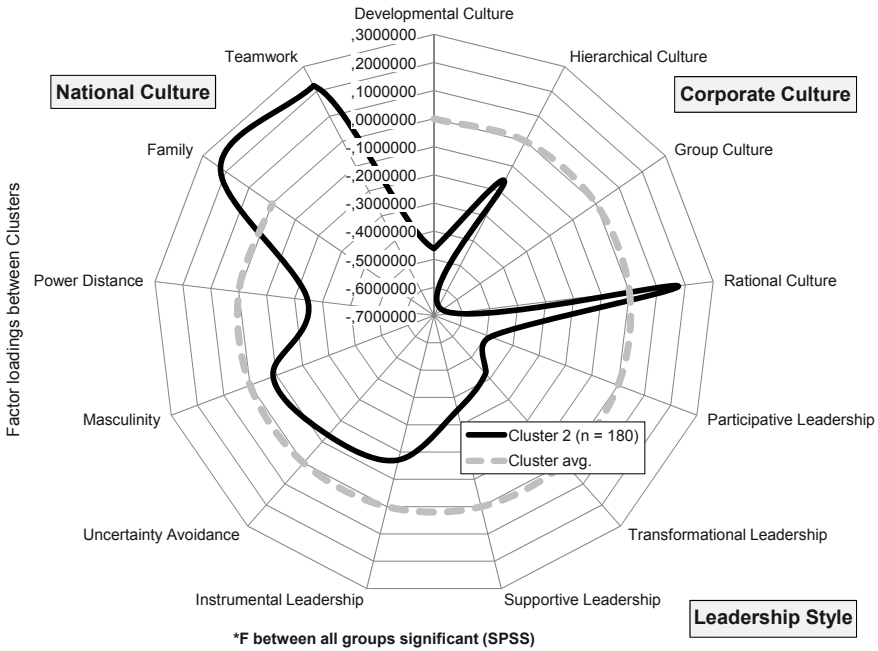

Figure D.2: Cluster 2 - "The disappointed rationalist" (Source: own figure)

D.3 Cluster 3

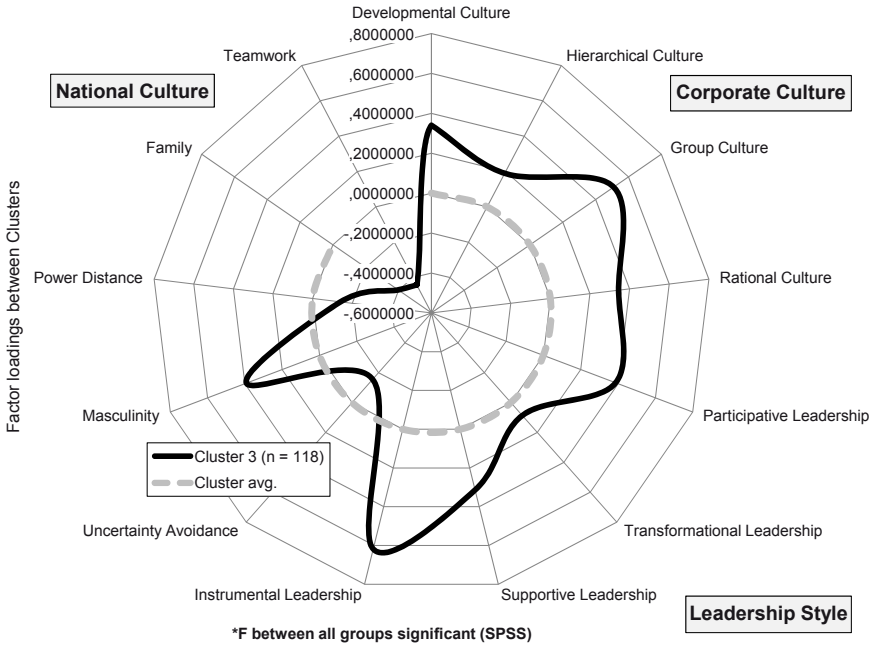

Figure D.3: Cluster 3 - "The balanced professional" (Source: own figure)

D.4 Cluster 4

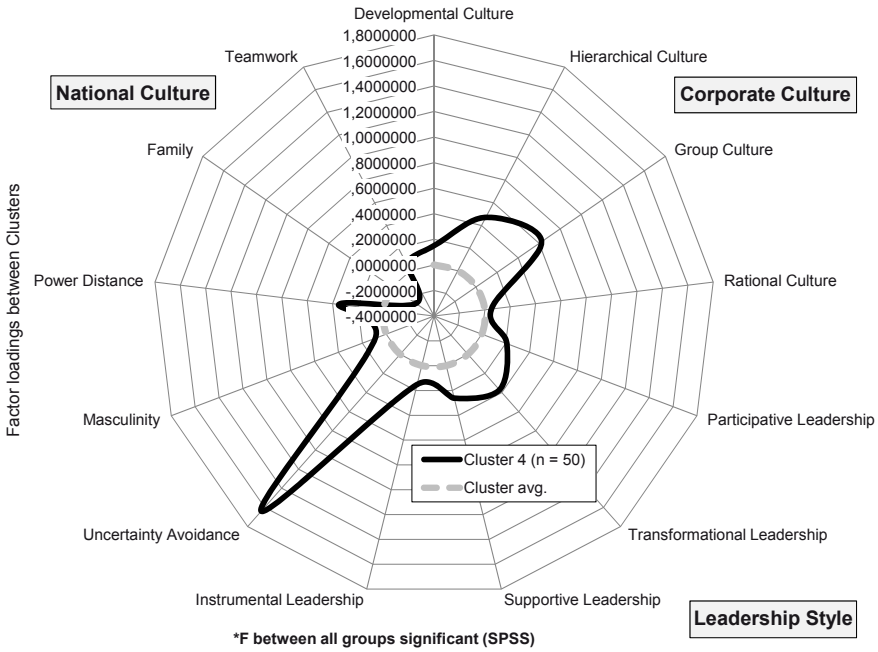

Figure D.4: Cluster 4 - "The risk-averse team player" (Source: own figure)

Appendix E

Details of Research Analysis

E.1 Levels of Research Analysis

Level of analysis[1]	Questions	Findings[2]	Section[3]
1. Definition: What are we talking about?	What is meant by the concepts?	**Lean Six Sigma** (A1): instrumental management philosophy; **Corporate Culture** (A2): aggregated attitudes and beliefs of employees in a public company; **National Culture** (B1): societal values; **Leadership Style** (B2): ability and approach of an individual to influence by shaping values, beliefs and goals of others; **Corporate Success** (C): sustainable result and end-point of a company's achieved efficiency, effectiveness and performance (for complete definitions see table 2.11)	2.7

[1] see [Töpfer, 2009a, p. 58ff.]

[2] Answers to the questions, own analysis

[3] Section in which analysis is presented, questions are answered and findings are presented in this thesis

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Level of analysis	Questions	Findings	Section
2. Classification: What are we not talking about? What can be differentiated?	Which subgroups/ elements of the concepts can be differentiated? What is not part of the research focus?	**Lean Six Sigma** (A1): Role Structure, Structured Procedure, Focus on Metrics, Process management, Product/Service Design (not: cultural or leadership characteristics); **Corporate Culture** (A2): CVF, i.e., developmental, rational, group and hierarchical culture (not: other multidimensional or unidimensional constructs); **National Culture** (B1): abstract of framework by Hofstede [1980a] based on Jung et al. [2008]: Uncertainty Avoidance, Individualism, Masculinity, Power Distance (not: other frameworks or complete framework by Hofstede [1980a]); **Leadership Style** (B2): Transformational, Participative, Supportive, Instrumental (not: other far-from-action or close-to-action concepts); **Corporate Success** (C): subjective measurement on four dimensions of performance: quality, financial, market and individual outcomes (not: restriction to financial measures or measurement of existing data)	3.7 (4.4)
3. Description: Conceptualization and Operationalization: What is happening in detail?	How are key elements of the concepts connected? What can be observed? How do characteristics of objects change?	All five concepts are connected, observed types and strengths of relationships depend on publication purposes and are scattered across many disciplines and studies, none of them covering all of them in one research (for detailed description of observed and studied dynamics see chapters 2 and 3)	2.7 3.7

Level of analysis	Questions	Findings	Section
4. Theory: Explanation and Prognosis: Which factors caused which effects in the past? What can be expected for the future?	Which plausible cause-and-effect chains can be identified? Which results can be forecasted on which basis?	**a. Explanation**: Successful companies (C) implement **Lean Six Sigma** (A1) and manage their **Corporate Culture** (A2) in a setting of positive **National Culture** (B1) and **Leadership Style** (B2). **b. Prognosis**: If companies implement **Lean Six Sigma** (A) and manage their **Corporate Culture** (A2) in a setting of positive **National Culture** (B1) and **Leadership Style** (B2), they are **successful** (C).	3.7 4.6 5.2.4 5.2.5
5. Technology: Practical Implications: Which conclusions can be drawn for practical implementations?	Under which circumstances and with which actions can targeted results be achieved?	**Leadership Style** (B2) and **Corporate Culture** (A2) have the highest impact on **Corporate Success** (C), i.e., according to the balanced culture hypothesis an equal balance across **Corporate Culture** (A2) dimensions and **Leadership Styles** (B2) have the greatest effect on **Corporate Success** (C). **National Culture** (B1) has a low indirect influence and no certain profile is stronger.	5.2.4 5.2.5
6. Philosophy: Value Judgments: Which value judgments are important for which target groups?	Which value judgments can be identified for selected target groups? Which priorities can be derived from this?	Complex interdependencies between the "soft" factors (**National Culture** (B1), **Corporate Culture** (A2), **Leadership Style** (B2)) need to be identified and managed in order to successfully implement **Lean Six Sigma** (A1). **Corporate Success** (C) depends on a certain profile of **National Culture** (B1), **Corporate Culture** (A2) and **Leadership Style** (B2) with **Corporate Culture** (A2) having the greatest impact. Managers can shape **Corporate Culture** (A2) into a certain direction (i.e., to be balanced) to lead their company to **Corporate Success** (C). At the same time this needs to be done with a balanced **Leadership Style** (B2) to earn the trust of the employees.	6.3

Table E.1: High Level Summary of Research Findings - Levels of Research Analysis (Source: own analysis)

E.2 Current Literature on (Lean) Six Sigma

Table E.2 lists the latest effort studying the link between Lean Six Sigma and performance. All publications have in common, that they are based on descriptions rather than causal modeling. For the majority of the listed studies, the performance variable is restricted to the results of the projects (Q), rather than the effect on overarching performance variables or Corporate Success.

Author and Year	Variables	Method	Strength	Relevance	Influences	RQ
Burton [2011]	L6S, P/A/Q	D	+	++	A2, B2	R1, R3, R4
Quinn [2011]	L6S, A	D	++	+		R1
Darvish et al. [2012]	L6S, P/Q	D	+	+		R1
Hilton and Sohal [2012]	L6S, Q	D	+	+	B2	R1, R4
Laureani and Antony [2012]	L6S, A/Q	D	+	+	A2, B2	R1, R3, R4
Manville et al. [2012]	L6S, Q	D	+	+	B2	R1, R4

Table E.2: Lean Six Sigma and Corporate Success - Publications studying the link between Lean Six Sigma and Performance (Source: own analysis)

The recent publication by **Burton [2011]** emphasizes, that only a combination of the most critical success factors, namely leadership, strategy, deployment, and execution will leverage the full benefits of Lean Six Sigma (see [Burton, 2011, p. 395]). Within the required triangle of leadership, improvement, and technology, leadership is claimed to be the driving accelerator or competitive force of Lean Six Sigma (see [Burton, 2011, p. 392f.]). On the other hand Burton recognizes that success through Lean Six Sigma depends highly upon a company‘s own environment, own challenges and own culture (see [Burton, 2011, p. 13]).

In his doctoral dissertation at MIT, **Quinn [2011]** conducts a case study and simulation at DTE Energy Corporation[1] to identify crucial factors of success for continuous-improvement (CI) initiatives, encompassing Lean and Six Sigma. Analyzing the perception of employees at all hierarchical levels, he identifies Black Belts' projects and coaching as the critical element to convince that CI work is worthwile, to maintain the link between different hierarchical layers and eventually lead to CI savings and productivity improvements (see [Quinn, 2011, p. 316f.]).

Recent articles confirm the findings of Burton [2011] and Quinn [2011]. **Darvish et al. [2012]** investigate the link between Lean Six Sigma and competitiveness, defined in line with Corporate Success as outlined in section 2.3.1. Although the presentation of the article is scant and lacks scientific professionalism, results from the data confirm a positive impact of Lean Six Sigma on competitiveness.

Conceptual evidence concerning the critical role of Black Belts and/or Master Black Belts is also provided by **Hilton and Sohal [2012]**. Lean Six Sigma project success is affected by the competence, namely technical and interpersonal attributes, of the trained change agents (see [Hilton and Sohal, 2012, p. 67]).

As part of the research efforts leading to Laureani's PhD thesis with the topic “Impact of Leadership on Lean Six Sigma Deployment in Organizations”[2] **Laureani and Antony [2012]** review critical success factors for an effective Lean Six Sigma implementation, based on prior research (e.g., see Coronado and Antony [2002]) and on an empirical survey across 600 Lean Six Sigma professionals. Next to “management commitment” and “linking Lean Six Sigma to business strategy”, respondents rank “organizational culture” and “leadership style” the highest (see [Laureani and Antony, 2012, p. 281]).

[1] For an overview of the nature and structure of DTE Energy as a company see [Quinn, 2011, p. 26f.].

[2] According to direct feedback by Laureani in January 2013, this research is projected to finish end of 2013.

A view from middle management is provided by **Manville et al. [2012]**. Based on a case study of a single firm including the opinion of 100 middle managers, the aggregated CSF ranking of respondents largely confirms the findings by Laureani and Antony [2012].

Overall the evaluated studies covering the link between Lean Six Sigma and Corporate Success are in a very early stage, limited to rankings and descriptions and therefore largely conceptual. No attempt has been published using further operationalizations, or collecting and analyzing empirical data in order to identify cause-and-effect chains to explain the type of impact and magnitude Lean Six Sigma has on Corporate Success.

Table 3.3 lists recent studies focusing on the link between Six Sigma as the QM variable and different performance variables.

Author and Year	Variables	Method	Strength	Relevance	Influences	RQ
Aboelmaged [2011]	6S, Q	F	+	–	A2, B2	R1, R3, R4
Cho et al. [2011]	6S, Q	F	+	–	A2, B2	R1, R3, R4
Eng [2011]	6S, P/Q	D	–	–		R1
Nair et al. [2011]	6S, Q	D	+	+	B1, B2	R1, R4
Parast [2011]	6S, P	D	–	–		R1
Choi et al. [2012]	**6S, P/Q**	**S**	**++**	**++**		**R1**
Shafer and Moeller [2012]	**6S, P/Q**	**L**	**++**	**++**		**R1**
Swink and Jacobs [2012]	6S, P	L	++	+		R1
Pinedo-Cuenca et al. [2012]	6S, Q	D	+	+	A2, B2	R1, R3, R4
Arumugam et al. [2013]	6S, Q	T	+	+		R1

Table E.3: Six Sigma and Corporate Success - Recent publications studying the link between Six Sigma and Performance (Source: own analysis)

Aboelmaged [2011] investigates influential barriers to Six Sigma implementation following earlier empirical research. Results highlight that only specific barriers are significant. As the study is restricted to the United Arab Emirates, with a low response rate and only a few responses from companies actually implementing Six Sigma (see [Aboelmaged, 2011, p. 525]) generalizations cannot be made and the relevance for this research is not given.

The same rating applies to the studies by **Cho et al. [2011]** and **Eng [2011]**. Although Cho et al. [2011] consider Corporate Culture (A2) and Leadership Style (B2) as influencing variables in driving success through Six Sigma, findings are restricted to Korean companies, and the methodology used is limited to factor analysis in a very early stage, not studying the link between Six Sigma and specific performance indicators any further. The conceptual model by Eng [2011] presents early research by examining the two concepts organizational innovativeness and market orientation in relation to Six Sigma. The study can serve as a base for future empirical investigations but lacks statistical testing and cannot be rated relevant for this research.

The purpose of the qualitative approach by **Nair et al. [2011]** is to create a theory about the interrelationship among Six Sigma project context, elements and success. The conceptual theoretical model includes Leadership engagement as a key element. Building a projects typology with the two dimensions project complexity and uncertainty, results include that a balance between structured methods and an environment of psychological safety is leading to project success (see [Nair et al., 2011, p. 547]), hinting at both the influence of Leadership Style (B2) and National Culture (B1) as societal values driving psychological safety.

An other conceptual work is presented by **Parast [2011]**, a framework to evaluate the impact of Six Sigma on innovation and firm performance, built on the basis of theories from process management and innovation. Although the author claims that Six Sigma does not guarantee sustainable competitive advantage by focusing on existing processes, this is neither proven by empirical investigation, nor convincing considering the definition and intention of Six Sigma as described by leading academics in the field (e.g., see Antony [2012] and Günther

[2010]) or as applied in practice by training (e.g., Design for Six Sigma as a core element driving innovation).

A very convincing approach is provided by **Choi et al. [2012]**. Collecting data at different hierarchical levels at Samsung, structural equation modeling is performed on the basis of a model with ten factors (see [Choi et al., 2012, p. 537]). The hypothesized causal relations can be confirmed, supporting the proposition of a strong direct impact of Six Sigma on corporate competitiveness, i.e., Corporate Success.

The longitudinal study by **Shafer and Moeller [2012]** encompasses a ten-year time frame and sample of 84 companies applying Six Sigma (cross-sectional), to reveal that company performance depends on positive adoption of Six Sigma, more specifically how efficient employees are deployed. On the basis of the model and findings by Zu et al. [2008] clear evidence of a link between Six Sigma and performance, more specifically a great positive impact on employee productivity can be confirmed (see [Shafer and Moeller, 2012, p. 530]).

In a similar attempt, **Swink and Jacobs [2012]** assess financial data of 200 Six Sigma adopting firms, providing strong evidence of a positive impact of Six Sigma on monetary indicators like ROA.

Other evidence of the Six Sigma performance link is provided by **Pinedo-Cuenca et al. [2012]** and **Arumugam et al. [2013]**. Pinedo-Cuenca et al. [2012] argue based on a pilot study that a successful Six Sigma deployment depends on a well-managed change process, including Leadership Style (B2) and Corporate Culture (A2). The recent publication by Arumugam et al. [2013] uses regression and bootstrapping analyses showing the mediating influence of learning and knowledge on project performance.

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