



Applications of Content Analysis on Secondary Data in Logistics and Supply Chain Management

**Inaugural dissertation for obtaining the academic degree
Doctor rerum politicarum (Dr. rer. pol.)**

**Faculty of Business Administration
WHU – Otto Beisheim School of Management**

by

René Kemmerling

Vorwort

Die vorliegende Arbeit wurde 2015 von der WHU – Otto Beisheim School of Management als Dissertation angenommen. Einzelne Manuskripte wurden bereits im Vorfeld in wissenschaftlichen Zeitschriften sowie Sammelbänden veröffentlicht.

Im Rahmen der Entstehung dieser Arbeit haben mich viele Menschen begleitet, denen ich an dieser Stelle danken möchte.

Mein Dank gilt zunächst Herrn Prof. Dr. Stephan M. Wagner, der mir die Promotion an der WHU ermöglicht hat und mir auch an der ETH Zürich die Möglichkeit gab, die Forschungsprojekte voran zu treiben. Insbesondere im Rahmen der Veröffentlichungsprozesse war Herr Prof. Dr. Wagner ein wichtiger Treiber.

Ferner möchte ich insbesondere Prof. Dr. Christoph Bode danken. Christoph war stets ein wertvoller Ansprechpartner und die intensiven Auseinandersetzungen und Dialoge mit ihm haben die Projekte aufgewertet. Danken möchte ich auch meinem Zweitgutachter, Herrn Prof. Dr. Dr. h.c. Jürgen Weber, für die Begleitung meiner Dissertation und die rasche Erstellung des Zweitgutachtens.

Herrn Prof. Dr. h.c. Klaus-Michael Kühne möchte ich für sein Engagement zur Förderung der Forschung und Wissenschaft in der Logistik danken. Meine Promotion wurde nicht nur durch die Stellen als wissenschaftlicher Mitarbeiter an geförderten Lehrstühlen begünstigt, sondern auch durch das erstklassige Netzwerk der Kühne-Stiftung. Weiterhin danke ich der „*APICS Educational and Research Foundation*“ für die Förderung des Forschungsprojektes rund um „Chief Supply Chain Officer“.

Mein Dank gilt ferner all jenen, die mich bei der Arbeit an dieser Dissertation unterstützt haben, sei es unmittelbar durch Anregungen und Ratschlägen, sei es mittelbar durch die notwendige Ablenkung von der Arbeit. Hierzu zählen meine Kollegen Nik Neshat, Pan Grosse-Ruyken und Eckhard Lindemann an den Lehrstühlen in Vallendar und Zürich sowie ganz besonders Julia Krause, Sabine El Hussein, Jochen Mahadevan, Julian Horstkotte, Nils Kraiczy, Henning Mohr, Claas Greger und Daniel Hilgers für eine tolle Zeit an der WHU, welche ohne diese Menschen weitaus farbloser verlaufen wäre. Auch danke ich, stellvertretend für das großartige Team der gesamten WHU, Ulrike Cappel und Anja Ziegler für die stets professionelle Unterstützung und die angenehme und humorvolle Zusammenarbeit.

Danken möchte ich Christina Froböse für die große Unterstützung über weite Teile meiner Promotion, der intensiven Auseinandersetzung mit meiner Arbeit und den vielen motivierenden Gesprächen gerade in Zeiten, wo es nicht so rund lief. Hierdurch hat sie die Arbeit in vielfältiger Weise gefördert.

Besonders herzlicher Dank gebührt meiner Familie, insbesondere meinem Vater, meiner Mutter und Hermann-Josef für die unendliche Geduld während der langwierigen Arbeiten und dem ausdauernden Interesse am Fortschritt meiner Dissertation. Diese Arbeit ist ihnen gewidmet. Abschließend möchte ich mich bei meiner Freundin Andrea für ihre uneingeschränkte Unterstützung bedanken. Sie hat mir stets den notwendigen Freiraum in wichtigen Phasen gegeben und durch ihr Verständnis und ihre Ermunterungen zur Fertigstellung der Arbeit wesentlich beigetragen.

Ansbach im November 2015

René Kemmerling

OVERVIEW OF CONTENT

OVERVIEW OF CONTENT	V
TABLE OF CONTENTS	VI
FIGURES	IX
TABLES	X
1 INTRODUCTION.....	1
2 STUDY 1: Internal versus external supply chain risks: a risk disclosure analysis.....	15
3 STUDY 2: Supply chain management executives in corporate upper echelons.....	33
4 STUDY 3: When do firms employ Chief Supply Chain Officers in their top management teams?.....	65
5 STUDY 4: Handling nonresponse in logistics research.....	110
6 CONCLUSION	148
7 REFERENCES.....	152

TABLE OF CONTENTS

OVERVIEW OF CONTENT	V
TABLE OF CONTENTS	VI
FIGURES	IX
TABLES	X
1 INTRODUCTION.....	1
1.1 Situation.....	1
1.2 Conceptual background	5
1.2.1 Secondary data.....	5
1.2.2 Content analysis.....	8
1.3 Thesis structure	10
1.3.1 Study 1: Internal versus external supply chain risks: a risk disclosure analysis	10
1.3.2 Study 2: Supply chain management executives in corporate upper echelons	11
1.3.3 Study 3: When do firms employ Chief Supply Chain Officers in their top management teams?.....	12
1.3.4 Study 4: Handling nonresponse in logistics research	14
2 STUDY 1: Internal versus external supply chain risks: a risk disclosure analysis.....	15
2.1 Introduction.....	16
2.2 Supply chain disruptions, risks, and vulnerability	18
2.2.1 Internal-driven supply chain risks	19
2.2.2 External-driven supply chain risks	21
2.3 Methodology and data	22
2.3.1 Sampling and time frame.....	22
2.3.2 Content analysis.....	23
2.3.3 Data source	23
2.3.4 Examples of disclosed supply chain risk sources	24
2.4 Analysis and results	27
2.5 Discussion and conclusion.....	31
3 STUDY 2: Supply chain management executives in corporate upper echelons.....	33
3.1 Introduction.....	34
3.2 Literature review and development of research questions.....	36
3.2.1 Chief Supply Chain Officer	36
3.2.2 The role of the top management for supply chain management.....	37

3.2.3	Organizational visibility of supply chain management and other functions in corporate upper echelons	38
3.2.4	The role of functional SCM experience among the TMT members.....	42
3.2.5	The link between supply chain management executives and firm performance	43
3.3	Research method and design.....	44
3.3.1	Sample selection	45
3.3.2	Unit of analysis and data sources.....	46
3.3.3	Data coding.....	47
3.3.4	Measures and statistical analysis	50
3.4	Analysis of findings and results.....	52
3.4.1	Research question 1: Presence of CSCOs in TMTs	52
3.4.2	Research question 2: Differences of CSCO presence across industries	54
3.4.3	Research question 3: SCM experience of TMT members, especially CEOs	55
3.4.4	Research question 4: Performance differences regarding CSCO presence in TMTs...	56
3.5	Discussion, implications, and research outlook.....	58
3.5.1	Discussion and implications	59
3.5.2	Limitations and areas for future research	63
4	STUDY 3: When do firms employ Chief Supply Chain Officers in their top management teams?.....	65
4.1	Introduction.....	66
4.2	Literature review	69
4.2.1	Degree of functional executive presence	70
4.2.2	Antecedents of functional executive presence.....	72
4.2.3	Consequences of functional executive presence.....	76
4.3	Conceptual background	77
4.4	Model development and hypotheses.....	79
4.4.1	Upper echelons factors	80
4.4.1.1	Functional experience in supply chain management.....	80
4.4.1.2	Tenure	81
4.4.1.3	Seniority.....	82
4.4.1.4	CEO outsider	83
4.4.1.5	CEO duality	84
4.4.1.6	TMT size.....	85

4.4.1.7	Age of TMT members	86
4.4.1.8	Presence of SCM-related executive in TMT	87
4.4.2	Firm factors.....	88
4.4.2.1	Diversification	88
4.4.2.2	Inventory-related	89
4.4.2.3	Performance-related.....	90
4.5	Data and method	92
4.5.1	Sample	92
4.5.2	Data coding.....	94
4.5.3	Measures	95
4.5.3.1	Dependent variable	95
4.5.3.2	Independent variables	96
4.5.3.3	Control variables.....	97
4.6	Analysis and results	98
4.7	Discussion, implications and conclusion	106
4.7.1	Scholarly and managerial implications.....	106
4.7.2	Limitations and future research	108
5	STUDY 4: Handling nonresponse in logistics research.....	110
5.1	Introduction.....	111
5.2	Background.....	114
5.2.1	Sampling frames	114
5.2.2	Survey response rates	115
5.2.3	The notion of nonresponse.....	117
5.2.4	Techniques to assess nonresponse bias.....	119
5.3	The situation in other fields of business and management	121
5.4	Research methodology.....	124
5.4.1	Sampling.....	124
5.4.2	Coding schedule.....	126
5.4.3	Coding process.....	127
5.5	Analysis and results	128
5.6	Discussion, implications, and limitations	140
6	CONCLUSION	148
7	REFERENCES.....	152

FIGURES

Figure 2-1: Frequencies of ground-level risk sources in 2007 and 2009. 27

Figure 2-2: Relative distribution of ground-level risk sources in 2007 and 2009.^{a)} 27

Figure 2-3: Frequencies of top-level risk source in 2007 and 2009. 29

Figure 2-4: Relative distribution of top-level risk source in 2007 and 2009.^{a)} 29

Figure 2-5: Breakdown of demand-side risk sources in 2007 and 2009. 29

Figure 2-6: Development of relative distribution of demand-side risks from 2007 to 2009^{a)} 29

Figure 2-7: Breakdown of supply-side risk sources in 2007 and 2009. 30

Figure 2-8: Development of relative distribution of supply-side risks from 2007 to 2009^{a)} 30

Figure 3-1: Number of firms with CSCO presence. 53

Figure 3-2: Presence of TMT members with SCM experience in firms with (TMT_A/TMT_B) and without (TMT_Z) a CSCO in the TMT. 55

Figure 3-3: Presence of CEOs with SCM experience in firms with (TMT_A/TMT_B) and without (TMT_Z) a CSCO in the TMT. 56

Figure 5-1: Relationship between sample size and response rate. 131

TABLES

Table 2-1: Sample composition.....	22
Table 2-2: Risk classification schedule.....	25
Table 3-1: Presence of other functional disciplines in corporate upper echelons.....	41
Table 3-2: Sampled firms by industry and size.....	45
Table 3-3: SCM functions in the two distinct CSCO groups.....	49
Table 3-4: Number of CSCOs across years.....	52
Table 3-5: Number of firms having CSCOs by industry and year.....	54
Table 3-6: Differences in operating profit margin between firms with and without a CSCO.....	57
Table 3-7: Effects of CSCO presence and SCM experience on operating profit margin.....	58
Table 4-1: Presence of selected functional disciplines in corporate upper echelons.....	71
Table 4-2: Contextual factors applied in past research on studying CxO presence.....	74
Table 4-3: Overview of hypotheses.....	92
Table 4-4: Sampled firms by industry and size.....	93
Table 4-5: Descriptive statistics and correlation coefficients.....	99
Table 4-6: Results of binary logistic regression using Generalized Estimating Equations.....	102
Table 5-1: Result of the sampling.....	126
Table 5-2: Distribution of total and mail survey articles published.....	129
Table 5-3: Response rates of published mail surveys.....	130
Table 5-4: What was reported as response?.....	133
Table 5-5: Number of techniques applied.....	134
Table 5-6: Type of techniques applied per article.....	135
Table 5-7: Number of references cited per article.....	137
Table 5-8: Top 6 references cited in the context of addressing nonresponse bias.....	138
Table 5-9: Spectrum of phrased conclusions with respect to nonresponse bias.....	140

1 INTRODUCTION

In this introductory chapter the situation within the fields of logistics and supply chain management regarding the application of research methods is described in section 1.1. The following section 1.2 briefly explains the conceptual facets of secondary data and content analysis methods. Finally, section 1.3 explains the background, main findings, and the application of content analysis methods in each of the four studies.

1.1 Situation

Although logistical activities are many thousand years old (Lambert, Stock, and Ellram, 1998) and although logistics as a discipline was already identified in the 1830s as a key success factor in military operations, it gained momentum among business managers not until the 1970s (Stock, 1988). The deregulation of the transportation industry, increasing energy costs, the rapid developments of the information technology, the globalization trends on the customer side, and the rise of multinational firms having a significant expansion in the geographical scope of their operational activities can be regarded as main drivers for logistics' increasing managerial attention (Lambert, Stock, and Ellram, 1998; Stock and Zinszer, 1982).

In the course of this development, the logistics discipline moved more and more in the focus of business oriented scholars. Stock (1988), for example, unveiled in his annotated bibliography that the dissertation activity in logistics tremendously increased especially since 1980 as a reflection for the “growing interest in logistics by the business sector, which is then reflected in increasing dissertation activity at colleges and universities” (p. 131). Further indicators for an increasing research interest in the logistics discipline are that about the same time, important scholarly journals started such as the *Transportation Research* (TR) in 1967, the *Journal of Physical Distribution and Logistics Management* (JPDLM) in 1971, and the

Journal of Business Logistics (JBL) in 1978. The founders identified a lack of scholarly platform that allows a structured treatment of current trends and research issues in this area. La Londe (1978), for example, described in his introduction of the JBL's first issue that – at this time – there was a clear need among academics and practitioners for a communication platform to discuss and test research ideas in the area of business logistics and to exchange ideas and information on current logistics issues from an interdisciplinary perspective.

After having a platform in the form of scientific journals the focus of the business logistics research community in the first years was mostly, if not exclusively, on real world problems such as decision models in inventory and distribution management, simulation of network systems, management of inventories, and strategic planning for physical distribution (e.g., Miyazaki, Phillips, and Phillips, 1999). This development, however, made some scholars worried at the beginning of the 1990s and concerns were articulated regarding the rigor of research methods applied in logistics research and the contribution of logistics studies to theory. Seaker, Waller, and Dunn (1993), for example, were among the first to conclude that, in logistics research, there was “a lack of clarity in research variables and limited rigor in the methodologies” (p. 384). Consequently, they encouraged the logistics community to apply more scientific research methods in order “to move beyond the early, descriptive phase of [logistics] research into the realm of scientific methods“ (p. 385). In the following, Mentzer and Kahn (1995) also assessed that the majority of logistics research “lacks a rigorous orientation toward theory development, testing, and application” (p. 231) and presented a framework for logistics scholars in how to adopt a rigorous research process. Similarly, and at the same time, New and Payne (1995) concluded “that while logistics is a difficult area for relevant empirical research, progress may be possible if the range of methodologies employed expands to match the greater scope of the holistic interpretations of logistics” (p. 74) and also proposed two research frameworks to guide logistics scholars in their research process.

The above mentioned articles seem to have prompted a number of articles whose target audiences are mostly, if not solely, logistics and SCM scholars as such articles are literally not existent on the table of contents of logistics and SCM oriented journals in the 1970s and 1980s. These articles are especially devoted to raise awareness for new or ‘under-used’ research methods and techniques and their correct application. First examples are Lambert and Harrington (1990) on how to measure nonresponse bias in mail surveys, Bienstock (1996) delineating a technique for determining the appropriate sample size in simulation modelling research, Ellram (1996) showing how the case study method can be used in logistics research and providing a detailed example based on actual logistics related problems, Walton (1997) on the appropriateness of telephone survey methodology to logistics research, and Garver and Mentzer (1999) introducing structural equation modeling as a research tool to test for construct validity. Since then scholars are guided by the perception that “high quality research must use the most rigorous research methods possible” (Flynn, 2008, p. 66) and consistently provide methodological input and recommendations for the logistics and supply chain management (SCM) research community.

Additionally, researchers often emphasize the importance of using mixed or multiple methods (e.g., Boyer and Swink, 2008; Goffin et al., 2012; Golicic and Davis, 2012; Mangan, Lalwani, and Gardner, 2004; Seaker, Waller, and Dunn, 1993; Singhal and Singhal, 2012; Soni and Kodali, 2012) in order to achieve the necessary rigor and reliability of findings (Sanders and Wagner, 2011). Sanders and Wagner (2011), for example, believe “that a more purposeful application of multidisciplinary and multimethod research approaches can help advance the logistics and supply chain disciplines” as “single-method research is often unable to provide the rigorous breadth and depth of understanding needed” (p. 317). Thus, they call to utilize a broader spectrum of research methods in order to address contemporary logistics and supply chain challenges.

Despite these advancements up to the point of “being recognized as a top academic domain” (Waller, Fawcett, and van Hoek, 2012, p. 75), however, logistics and SCM research is still being criticized “for its lack of methodological diversity and unwillingness to employ additional methods that may be more appropriate for theory generation and investigation of dynamic, complex phenomena” (Näslund, 2002, c.f. Golicic and Davis, 2012, p. 726). This evaluation is not surprising as all reviews weather recently conducted (e.g., Rabinovich and Cheon, 2012; Soni and Kodali, 2012) or years ago (e.g., Croom, Romano, and Giannakis, 2000; Mentzer and Kahn, 1995; Näslund, 2002; Spens and Kovács, 2005) confirm that logistics and SCM research is still dominated by empirical research and primary data, i.e., data which is mostly collected by the use of questionnaires, interviews, and case studies.

As the mere presentation of review findings on research approaches and methods in studies might not effectively activate the logistics community to question the status quo and to reconsider the use of primary data, journal editors and scholars have recently started to promote (e.g., Boyer and Swink, 2008; Calantone and Vickery, 2010) and explain (e.g., Busse, 2010; Rabinovich, and Cheon, 2011) the use of secondary data sources in order to both, decrease the ‘dependency’ on primary data collected by means of surveys and expand the methodological spectrum. Boyer and Swink (2008), for example, “wholeheartedly endorse and support the use of such [secondary] data” (p. 342) as they see its great potential for the future of research in the field of operations and SCM. Rabinovich and Cheon (2011), on the other hand, “explain how researchers can extend the use of secondary data methodologies to logistics and supply chain studies” (p. 303) in order to “press forward” (p. 304) the use of secondary data.

In light of the above observations and research calls, one goal of this thesis is to contribute to the methodological development of logistics and SCM research. Specifically, this thesis is a compilation of four empirical research studies which all use secondary data

sources and apply content analysis techniques as main data collection method. Each of the four applications should – besides answering the research questions within each application – nurture the understanding of content analysis on secondary data and researchers can learn how content analysis can be successfully applied on secondary data to answer fundamental questions in the field of logistics and SCM or how to solve contemporary problems in theory and practice. Likewise, the challenges and limitations of content analysis will become obvious.

Before summarizing the four applications, the next chapter describes the conceptual background of this thesis and briefly explains the notion of secondary data and content analysis as a means of collecting data.

1.2 Conceptual background

1.2.1 Secondary data

From the perspective of a researcher secondary data is information which has already been created or collected for reasons other than being used for a research study. Secondary data can be classified differently. Lancaster (2005), for example, distinguishes between internal and external secondary data from a company perspective. Internal secondary data already exists within firms and is mostly generated as part of daily operations such as sales figures, accounting data, or data occurring in the production process. Accordingly, external secondary data is existing data collected outside of firms by another party such as trade organizations, commercial research firms, and governmental bodies. Cowton (1998) has another approach and divides secondary data with respect to its source such as governmental/regulatory bodies, companies, the press, other academic researchers, and private sources, i.e., data that might be accessible by negotiation. Finally, Payne and Payne (2004) distinguish between quantitative

secondary data, such as official statistics, balance sheet figures, and share prices and qualitative secondary data, such as corporate statements, press articles, and research paper. Thus, secondary data can take a wide variety of forms, such as textual, visual, or verbal form from many different sources and points in time.

Due to the abundant supply of secondary data, it is essential for the success of any research study to select only data sources, which are appropriate to answer the posed research questions. For this, the research team needs a complete overview of available data sources in order to be able to select the most appropriate one. Furthermore, it is important that the research team has a deep understanding about the selected data sources with respect to its advantages and drawbacks. Otherwise the drawn conclusions might be misdirected or even contrary if inherent attributes of the applied secondary data are not fully considered. Finally, a clear and structured procedure is necessary to analyze secondary data (e.g., Busse, 2010).

In the course of this research project, various secondary data sources were identified and evaluated. The sources, which are used in the four empirical studies, will be briefly described in the following.

Corporate financial reports. The first three studies rely heavily on corporate financial reports. As the sampled firms in these studies are located in the U.S., two different sources are used. The first source is 10-K filings, of which most of the information is drawn. Form 10-K, which is required by the U.S. Securities and Exchange Commission (SEC) for large companies, is an annual report and its structure is standardized for all companies. This annual filing provides a comprehensive overview of the company's business and financial condition and includes audited financial statements and a summary of the financial performance. Furthermore the 10-K includes information such as company history, organizational structure, equity, risk factors, subsidiaries, and the top management team, among other information. The second source is

the annual report to the shareholders. This kind of report comprises almost the same content as the 10-K filing. However, the structure is not standardized and the layout might be completely different between companies.

Financial databases. The first three studies all use data from commercial databases such as *Compustat*, *AMADEUS*, and *Worldscope Global Database*. These databases contain massive financial, statistical, and market data of thousands of companies worldwide. Although these databases contain both only quantitative data is used in the research studies. Qualitative data, e.g., the names and position of top executives, is not usable as it is not available for each year in the studies' time horizon.

Research studies. The fundament of every research study is, of course, existing research. Beyond that the scope of the fourth study is existing empirical research as the papers' methodology is the unit of analysis. Thus, published paper in top-journals served as secondary data source in order to address the research questions in this study. Furthermore, existing research which is similar to the corresponding study is also used as secondary data source. For example, in the study on the antecedents of having a Chief Supply Chain Officer, research on antecedents of top executives in other managerial disciplines was used as secondary data source in order to identify the variables analyzed in those studies.

Consultancy studies. Secondary data in the form of studies issued by consulting firms, professional organizations, and trade magazines were also used and analyzed, especially in the second and third study. For example, studies by McKinsey, IBM, and CSC were analyzed in order to compare the research results with these findings.

Websites. Different websites were used as data source. The most important websites in research studies 1-3 are corporate websites, which are an important data source. Especially in the studies on Chief Supply Chain Officer this source contains valuable biographical data

about the corporate's top executive. Furthermore, corporate websites deliver more detailed information on the business model compared to the description in annual reports. Finally, online databases from business journals such *Forbes* and *Businessweek* were scanned to enrich the studies' data warehouse and close data gaps.

Although the above data sources are in general appropriate for the research studies, the majority of information was initially concealed as the data was only available qualitatively, i.e., in textual form. Thus, the data was not readily available to be processed in our empirical research to statistically test relationships among concepts. Therefore appropriate data collection and generation methods were required in order to transfer secondary data into a format adequate for statistical analysis. The data collection method applied in all four studies is content analysis; a method which is regarded having a huge potential for logistics research (Rabinovich and Cheon, 2011).

1.2.2 Content analysis

Content analysis is a well-established method in journalism, communication research, public opinion research, and even accounting and due to its history, a broad spectrum of explaining literature is available, some dating back more than 70 years ago (e.g., Berelson, 1952; Boyatzis, 1998; Holsti, 1969; Krippendorff, 2004; Neuendorf, 2002; Weber, 1990). This method, however, is hardly found in logistics and SCM research. Based on a review of more than 200 papers, Rabinovich and Cheon (2011) unveiled that content analysis was applied in only 3% of the studies analyzed.

Existing definitions are not completely congruent, but central to this methodology is the distillation of information out of large amounts of texts or other material (e.g., film, photos, websites, drawing) into fewer content-related categories in a systematic and objective way,

i.e., along a predefined coding schedule and coding manual, “for making replicable and valid inferences from texts (or other meaningful matter) to the context of their use” (Krippendorff, 2004, p. 18).

Content analysis has basically two different approaches with which different objectives might be achieved. The first approach involves the mere counting of words, sentences, or topics and is thus rather objective. The second approach, which is the one applied in the four research studies within this thesis, aims to make valid inferences about the underlying meanings and is thus rather subjective and meaning-oriented.

To conduct a meaning-oriented content analysis, a well-defined coding schedule is essential. A coding schedule is a table to structure the gathered data. On the vertical dimension, each row in this table is an element for which data is being collected, e.g., a firm, a paper, or a top executive. The horizontal dimension contains the categories to be analyzed in order to answer the research questions, whereas each category has either predefined variables to be selected or the variables will emerge in the course of the coding process. In case of predefined variables, it is important that these are exhaustive and mutually exclusive.

The process to fill the coding schedule is called coding and is the main activity in content analysis. The coder reads the text, e.g., the risk disclosures as in study one or the methodology section of empirical research studies as in study four, and attaches codes to the respective text section along the categories. The coding process in meaning-oriented content analysis is usually conducted by human coders. However, this process should be computer-aided by a Computer Assisted Qualitative Data Analysis Software (CAQDAS), i.e., a software explicitly developed to support content analysis of secondary data such as NVIVO, ATLAS.ti, or MAXQDA. In the course of this thesis, the coding was conducted by one (study

1) or two coders (study 2-4) and one of the mentioned software package was used in combination with own-developed excel tools.

1.3 Thesis structure

This thesis comprises four empirical studies within the logistics and SCM research framework using content analysis methods to gather data from secondary data sources. In this chapter these four studies are briefly depicted before fully presented afterwards.

1.3.1 Study 1: Internal versus external supply chain risks: a risk disclosure analysis

Purpose. Although strategies such as outsourcing/offshoring of activities, low-cost country sourcing, and collaboration with international suppliers are advantageous in modern supply chains firms are both qualitatively and quantitatively exposed to a higher risk level. In this context supply chain risk management gained much importance in the last years.

The main objective of this research was to empirically investigate the supply chain risk disclosures in 10-K reports of U.S firms as the risk disclosure in annual reports became the main risk communication between firms and outsiders and information on the risk situation is mainly demanded by shareholders, potential investors, and other stakeholders such as employees to access and appraise the future performance of the company.

Methodology. A content analysis approach was chosen, because the risks are disclosed in a qualitative (textual) fashion in the annual SEC filings and only this technique is able to encode such information. In this study, the counting measure ‘paragraph’ was considered as basis as it is the reliable and meaningful coding unit in this type of data source. A single coder performed the content analysis and training was provided prior to the commencement. The

training consisted of discussing the research objectives and the scope of supply chain risks, jointly defining the coding scheme, and familiarizing the coder with relevant literature regarding risk disclosure, content analysis, and supply chain risk management. To support the coding process, a dedicated Excel-tool was developed.

Main Findings. The empirical evidence show an increased quantity of supply chain risk disclosures from 2007 to 2009 in all five risk sources, i.e., supply-side and demand-side risks, infrastructure and operational/production risks, regulatory, legal, and bureaucratic risks, and finally catastrophic risk. Companies increase the amount of information disclosed with regard to the risks faced and their expected impact on future profits.

1.3.2 Study 2: Supply chain management executives in corporate upper echelons

Purpose. In the last two decades supply chain strategies and their implementation have been recognized as a source of competitive advantage. Accordingly this trend has transformed the position of the SCM function within the organizational structure (e.g., Kim, 2007), the way of organizing the SCM function(s) (e.g., Elmuti, 2002), and the placement of SCM authorities in the organizational hierarchy (Monczka et al., 2005). And although some studies unveiled the advent of top executives responsible for SCM, little is known about the degree to which executives responsible for SCM functions (i.e., Chief Supply Chain Officers) are present or absent in TMTs and if their presence is related to firm performance. The purpose of this study is threefold. First, scholars and consultants get empirical evidence to support firms in establishing organizational structures and in understanding the consequences of certain structures (Hambrick and Mason, 1984). Second, companies gain support in the decision whether or not to implement a Chief Supply Chain Officer and on how to structure their supply chain organization. Third, strategists get empirical data to predict companies' or their

competitors' moves and countermoves, as the strategic direction of a company is often mirrored in the composition of its TMT (Boal and Hooijberg, 2000).

Methodology. A panel study over the time frame 2004-2009 using content analysis of firms' annual reports was conducted to achieve the described objectives. SEC filings were the primary data source for identifying the entire top management team and the functional executives. Additionally this data was enriched with biographical information pertaining more than 3,800 distinct executives found on corporate websites and in online databases such as *Forbes* and *Bloomberg Businessweek*. Finally, financial data extracted from *Compustat* was obtained for each firm and year.

Main Findings. This study unveils empirically if and to what extent SCM and related functions are represented by top-level executives in the firms' top management teams (TMTs) and reveals differences in the extent of SCM presence in TMTs across industries. Furthermore, this study shows the extent to which the CEOs and TMT members have professional experience gained in supply chain-related positions previous to their current position. Finally the statistical analysis suggests that firms with a Chief Supply Chain Officer (CSCO) underperform firms without a CSCO regarding a firm's operating margin

1.3.3 Study 3: When do firms employ Chief Supply Chain Officers in their top management teams?

Purpose. Recent research suggests supply chain management is present more than ever in upper echelons, either directly through Chief Supply Chain Officer (CSCO) or indirectly by executives, especially CEOs, who had acquired SCM experience in their previous positions. However, little is known about the choice of firms to appoint a highly paid executive to the

top management team (TMT) in order to drive a firm's supply chain strategy and to link supply chain operations with the strategic apex.

This study has two main objectives. First, to contribute to research at the intersection of SCM, strategic management, organization, and strategic leadership to give scholars empirical evidence to support firms in finding the optimal corporate structure. Second, this research contributes empirically and methodologically to the research stream on upper echelons in general and functional executives in particular. Especially the influence of upper echelons factors, i.e., factors related to the background characteristics of the CEO and the top management team is separated from those factors related to structural factors such as firm size.

Methodology. The TMTs of 211 large US corporations from several industries over a 5-year time window were studied and a set of hypothesized internal and external factors potentially associated with the presence or absence of having a CSCO analyzed. The Generalized Estimating Equations (GEE) approach, which has been proved simpler and theoretically superior for studies with repeated measures compared to other approaches such as the least squares or maximum likelihood regression, were used as main statistical test.

Main Findings. The statistical analysis revealed that functional experience in SCM among top management team (TMT) members, the CEO being an outsider, position tenure, TMT size, presence of similar executives, average age of the TMT, inventory turnover, and prior firm performance are associated with the likelihood of CSCO presence in corporate upper echelons.

1.3.4 Study 4: Handling nonresponse in logistics research

Purpose. Researchers in the field of logistics and SCM heavily depend on survey methods as main data collection methods. If applied, however, it is critical for the validity and reliability of survey-based logistics research to assess and control for nonresponse bias in order to prevent inferior data quality which likely cause misleading and inaccurate inferences. The first objective of the first study was therefore to gain – for the first time – a better understanding of how logistics and SCM researchers assess and report nonresponse bias in their studies and thus to increase the concern for sample representativeness and nonresponse in research projects. The second objective was also to encourage researchers to conduct more research on the methodological aspects of logistics research in order to further increase the rigor of research studies in the field of logistics an SCM.

Methodology. A longitudinal content analysis was chosen as the most appropriate method to analyze articles published from 1998 through 2007 in three top logistics journals (*International Journal of Physical Distribution and Logistics Management, Journal of Business Logistics, Transportation Journal*). Each article published in the above journals within the time frame was closely inspected and coded either as a survey-based article or other. The survey-based articles formed the dataset for the main content analysis along the coding schedule (see Appendix 5-1 of study 4 for details). The coding was done manually and independently by two researchers and an exchange took place only in the design stage of the coding schedule and coding manual, after a pilot coding of 20 articles.

Main Findings. The findings show that survey response rates have declined over time, an average of 44% of published mail survey articles does not mention tests for detecting nonresponse bias, and the majority of studies apply only one technique to address nonresponse bias.

2 STUDY 1: Internal versus external supply chain risks: a risk disclosure analysis

This chapter is based upon the paper:

Internal versus External Supply Chain Risks: A Risk Disclosure Analysis, co-authored with Stephan M. Wagner and Christoph Bode, published in Essig, M.; Hülsmann, M.; Kern, E.M.; Klein-Schmeink, S. (eds.): *Supply Chain Safety Management – Security and Robustness in Logistics*, Berlin, Springer, 109-122.

2.1 Introduction

The globalization of factor and logistics markets, developments in modern information and communications technologies, and increasingly demanding customers are just a few mega trends in the last decade. In order to cope with these challenges many firms first reengineered their internal operational and organizational processes to cut costs, increase product and service quality, and remain agile in fast changing environments. But to stay innovative and competitive many firms recognized that internal improvements are too myopic. Therefore the management of supply chains (SCM) has become very prominent since the 1980s and is now widely regarded as one of the main critical success factors and considered as a key enabler of strategic change and source of strategic advantage for organizations.

As a consequence, compared with the situation a few decades ago, modern firms collaborate differently, especially more closely, with their customers and suppliers. For example in the automotive industry, original equipment manufacturers (OEMs) increased the involvement of their suppliers in the development of new products and processes by setting up strategic alliances and joint ventures with key upstream partners. Furthermore, concepts such as just-in-time (JIT) or just-in-sequence (JIS) require very close collaboration among all players of the supply chain to prevent it from being disrupted (Wagner and Silveira-Camargos, 2012).

But as advantageous and necessary e.g., outsourcing/offshoring of manufacturing activities, low-cost country sourcing, and collaboration with international suppliers in modern supply chains are, the way of working together has exposed networked firms both qualitatively and quantitatively on a higher risk level. In this context the management of risks influencing the supply chain and its members, i.e., the discipline of supply chain risk management (SCRM), gained much importance in the last years among practitioners and management scholars. However, due to the little consensus on a definition of SCM (Mentzer

et al., 2001; Rossetti and Dooley, 2010), the high degree of heterogeneity among firms and the increasingly changing environment regarding legal requirements, technology, global climate, political situation, etc., ongoing research is constantly necessary to support firms achieving supply chain preparedness.

In the first step on achieving supply chain preparedness, possible causes for supply chain disruptions need to be identified and evaluated with respect to their potential damage and likelihood of occurrence. In addition it is essential for companies to create a risk classification system to group the single risks into risk categories in order to (1) decrease the complexity related to the myriad of possible risks, (2) facilitate the assignment of responsibilities, and (3) create customized risk mitigation measures for each risk class.

This contribution addresses exactly this process of risk classification in the context of supply chain risk management by following two objectives. First, we propose a simple classification system based on the work of Wagner and Bode (2008). This two-level system distinguishes on the top level between (a) *internal-driven* and (b) *external-driven* supply chain risks and on the second level between the five risk categories (1) *demand-side risks*, (2) *supply-side risks*, (3) *infrastructure and operational/production risks*, (4) *regulatory, legal, and bureaucratic risks*, and (5) *catastrophic risks*. Second, we offer first results of a current empirical panel study based on secondary data. These results not only confirm the results of Wagner and Bode (2008) by a different methodological approach but also show that the importance of internal-driven supply chain risks has increased in the last years.

This part is organized as follows. In the next chapter we describe the basic terminology and introduce the supply chain classification system proposed by Wagner and Bode (2008) before adopting it to the two-level supply chain risk classification system. Chapter 2.3 describes the methodology and framework of our empirical study and selected results are

presented in chapter 2.4. The last chapter summarizes our contribution and gives concluding remarks.

2.2 Supply chain disruptions, risks, and vulnerability

Supply chain disruptions can materialize from inside or outside of a supply chain and can vary greatly in their magnitude, attributes, and effects. Consequently, their nature can be highly divergent. For instance, a delayed shipment of non-critical material is potentially a much less serious impact on the supply chain than is an eight-week labor strike at a single-sourced key supplier. In attempting to differentiate supply chain disruptions from other adverse events in business (e.g., shocks on the financial markets), many scholars have proposed classifications of supply chain disruption in the form of typologies and/or taxonomies (e.g., Cavinato, 2004; Chopra and Sodhi, 2004; Christopher and Peck, 2004; Hallikas et al., 2004; Manuj and Mentzer, 2008; Norrman and Lindroth, 2004; Spekman and Davis, 2004; Svensson, 2000). The derived categories of supply chain disruptions are usually labeled supply chain risk sources, in the sense of being a known source from which supply chain disruptions emerge with a certain probability.

Jüttner (2005), for instance, defined supply chain risk sources as “any variables which cannot be predicted with certainty and from which disruptions can emerge” (p. 122). In this regard, operating a production plant constitutes a risk source, because it is associated with various known risks (e.g., fire). Furthermore, the classifications cover a broad spectrum with respect to the amount of risk sources. For example, Svensson (2000) named two supply chain risk sources (quantitative and qualitative), Jüttner (2005) delineated three (supply, demand, and environmental), and Manuj and Mentzer (2008) proposed eight (supply, operational, demand, security, macro, policy, competitive, and resource).

In addition, a few taxonomies of supply chain risk sources do exist. They are, in contrast to these existing typologies empirically substantiated classifications (Bailey, 1994). Zsidisin and Wagner (2010) examined supply-side risk sources and identified supplier, supply market, and the extended supply chains as sources of risk. Wagner and Bode (2008) proposed a classification in five distinct supply chain risk sources: (1) *demand-side*, (2) *supply-side*, (3) *regulatory, legal, and bureaucratic*, (4) *infrastructure and operational*, and (5) *catastrophic*. Furthermore, while the risk sources demand-side, supply-side, and infrastructure and operational risk are internal-driven with respect to the supply chain perspective, the other two risk sources focus on issues that are rather external-driven to the supply chain. The next sections describe these five risk sources in more detail.

2.2.1 Internal-driven supply chain risks

Demand-side risk. Supply chain disruptions can emerge from downstream supply chain operations. These include, on the one hand, disruptions in the physical distribution of products to the end-customer which are usually associated with transportation operations, such as a truck drivers' strike (McKinnon, 2006), and the distribution network. On the other hand, demand-side supply chain disruptions can originate from the uncertainty caused by customers' unforeseeable demands (Nagurney et al., 2005). Here, disruptions may be the results of a mismatch between a company's projections and actual demand, as well as of poor coordination of the supply chain. The consequences of such demand-side disruptions are costly shortages, obsolescence of stocks, poor customer service due to unavailable products or backlogs, or inefficient capacity utilization.

Supply-side risk. Firms are exposed to numerous potential supply chain disruptions stemming from the upstream side of their supply chains. Risks reside in purchasing activities, suppliers,

supplier relationships, and supply networks. These risks encompass, in particular, supplier business risks, production capacity constraints on the supply market, quality problems, and changes in technology and product design (Zsidisin and Wagner, 2010).

Supplier business risks relate to disruptions that affect the continuity of the supplier and result in the interruption or the termination of the buyer-supplier relationship. This is closely linked with the threat of financial instability of suppliers, and possible consequences of supplier default, insolvency, or bankruptcy (Wagner, Bode, and Koziol, 2009). The financial default of a supplier (e.g., a supplier going out of business) is a common supply chain disruption that can have severe consequences for the buying firm. Another type of disruption can occur when a supplier is vertically integrated by a direct competitor of the customer firm, forcing the termination of the relationship (Chopra and Sodhi, 2004). In buyer-supplier relationships that involve high switching costs for the buying firm, opportunistic behavior from suppliers has also been reported to be a source of supply-side risk (Spekman and Davis, 2004; Stump and Heide, 1996).

Infrastructure risk. The infrastructure risk source includes potential disruptions that evolve from the infrastructure that a firm maintains for its supply chain operations. This includes socio-technical accidents such as equipment malfunctions, machine breakdowns, disruptions in the supply of electricity or water, IT failures or breakdowns, as well as local human-centered issues (e.g., vandalism, sabotage, labor strikes, industrial accidents) that are addressed within the area of supply chain security (Lee and Wolfe, 2003; Skorna, Bode, and Wagner, 2009; Spekman and Davis, 2004).

2.2.2 External-driven supply chain risks

Regulatory, legal, and bureaucratic risk. With the exception of government initiatives for security facilitation such as the Customs-Trade Partnership Against Terrorism (C-TPAT) or Authorized Economic Operators (AEO) certifications (Sarathy, 2006; Zsidisin, Melnyk, and Ragatz, 2005), little attention has been paid to supply chain risks stemming from regulatory and legal conditions. However, in many countries, authorities (administrative, legislative, and regulatory agencies) are a significant factor of uncertainty in the setup and operation of supply chains. Regulatory, legal, and bureaucratic risks refer to the legal enforceability and execution of supply chain-relevant laws, regulations, stipulations, or policies (e.g., trade and transportation laws) as well as the degree and frequency of changes in these rules. Such changes may suddenly lead to violations of (or nonconformance with) laws, rules, regulations, or ethical standards.

Catastrophic risk. This class encompasses pervasive events which, when they occur, have a severe impact on the area of their occurrence. Such events can be epidemics or natural disasters, socio-political instability, civil unrest, and terrorist attacks (Kleindorfer and Saad, 2005; Martha and Subbakrishna, 2002; Swaminathan, 2003). In many regions of the world, tsunamis, droughts, earthquakes, hurricanes, and floods are a constant threat to the societies and firms located there (Munich Re, 2011). The negative consequences on supply chains are obvious, since production facilities and transportation systems are highly vulnerable to natural disasters. Due to the globalization of markets and a surge in globe-spanning supply chain operations, local catastrophes have increasingly indirect global repercussions.

2.3 Methodology and data

In the following we will describe briefly our methodology, data gathering procedure, and content analysis techniques which we used to conduct our panel study.

2.3.1 Sampling and time frame

The sample selection process started with identifying all US companies listed in the Dow Jones STOXX® Americas 600 Index¹ at the midterm of 2007, 2008 and 2009 respectively. This resulted in a total of 675 companies. Next, two filter steps were applied. First, all firms that were not listed in the index at all three considered midterm dates were excluded which reduced the data set to 422 companies. Second, we excluded all companies belonging to sectors such as media, banking, insurances, real estate, and financial services, because supply chain management is not a core activity in these industries. As a result, our sample for the empirical analyses contains 219 companies. Table 2-1 indicates that the sample covers a wide range of industry sectors and company sizes (measured by number of employees).

Table 2-1: Sample composition.

Sector and industry	N	in %	Number of employees	N	in %
Automobiles and Parts	4	1.8	< 1,000	1	
Basic Resources	11	5.0	1,000 – 4,999	20	
Chemicals	7	3.2	5,000 – 9,999	56	
Food and Beverage	18	8.2	10,000 – 49,999	84	
Healthcare	16	7.3	50,000 – 99,999	33	
Industrial Goods and Services	46	21.0	≥ 100,000	35	
Oil and Gas	32	14.6	Total		
Personal and Household Goods	19	8.7			
Retail	31	14.2			
Technology	35	16.0			
Total	219	100.0			

¹ This index contains the 600 largest companies in North America and represents a market capitalization of approximately 11.9 trillion USD as of December 2009. Since its first compilation in July 2003 the index composition is reviewed on a quarterly basis and companies are replaced e.g., due to mergers & acquisitions or failing to permanently meeting the index requirements.

2.3.2 Content analysis

A content analysis approach was chosen, because the risks are disclosed in a qualitative fashion in item 1A of the 10-K reports; only content analysis is able to handle the quality of such information (Lajili and Zéghal, 2005). Different counting measures can be used, which include ‘word’, ‘sentence’, ‘page’, and ‘the number of lines’ (Rajab and Handley-Schachler, 2009). In this study, ‘paragraph’ was considered as basis as it is the reliable and meaningful coding unit in this type of data source.

A single coder performed the content analysis manually for this study to avoid iteration and repetition. Coding training was provided prior to the commencement of the study by one of the authors who is experienced in applying content analysis techniques. The training consisted of discussing the research objectives and the scope of supply chain risks in item 1A of Form 10-K, defining the coding scheme, and familiarizing the coder with relevant literature regarding risk disclosure, content analysis, and supply chain risk management. To support the coding process, a dedicated software tool was developed.

2.3.3 Data source

In order to identify internal- and external-driven supply chain risks and as discussed in the above sections, we focus on “Item 1A: Risk Factors” of the annual 10-K report which each company in our sample has to file to the U.S. Securities and Exchange Commission (SEC) 60 days after fiscal year end closing. These filings are freely available to the public and published on the SEC website via the EDGAR database (<http://www.sec.gov/edgar.shtml>).

In item 1A of the Form 10-K statement, a company is required to lay out “(...) a discussion of the most significant factors that make the offering speculative or risky” (SEC, 2010, p. 443). Furthermore, “[t]he risk factors may include, among other things, the

following: (1) (...) lack of an operating history; (2) (...) lack of profitable operations in recent periods; (3) (...) financial position; (4) (...) business or proposed business” (SEC, 2010, p. 443). As item 1A is the section where the complete list of relevant risks is disclosed, we refrained from looking at other sections within the 10-K report.

2.3.4 Examples of disclosed supply chain risk sources

The proposed risk classification system is depicted in Table 2-2. In the first column, the top-level risk sources consisting of internal-driven and external-driven supply chain risks are shown. Next, the second column assigns the above described ground level risk sources. Due to the importance of demand-side and supply-side risks, we decided to create sub-categories in order to increase the level of detail in our analyses. The demand-side risk source consists of three categories: (D01) *customer default / credit risk*, (D02) *customer dependence*, and (D03) *other demand-side risks*. This fine-grained classification allows us to disaggregate the rather broad category of demand-side risks. Likewise, the supply-side risks consists of four sub-categories: (S01) *supplier default*, (S02) *supplier dependence*, (S03) *supplier quality problem*, and (S04) *other supply-side risks*.

Finally, for each risk source, Table 2-2 provides some text examples as they appeared in the reports. These examples clarify the notion of the classification system and the content of each risk source more clearly.

Table 2-2: Risk classification schedule.

Top-level	Ground-level	Reported risks as quoted in annual SEC filings of sampled companies	Firm
Internal-driven risks	D01 Customer default / credit risks	<i>Any difficulties in collecting accounts receivable, including from foreign customers, could harm our operating results and financial condition.</i>	Nvidia
		<i>In the event that a significant pub chain were to go bankrupt, or experience similar financial difficulties, our business could be adversely impacted.</i>	Molson Coors Brewing
	D02 Customer Dependence	<i>The company may be adversely impacted by the increased significance of some of its customers.</i>	Campbell Soup
		<i>A limited number of our customers comprise a significant portion of our revenues and any decrease in revenues from these customers could have an adverse effect on our net revenues and operating results.</i>	Juniper Networks
	D03 Other demand-side Risks	<i>Changes in the level of demand for our products could adversely affect our product sales.</i>	Sth. Copper
		<i>The long sales and implementation cycles for our products, as well as our expectation that some customers will sporadically place large orders with short lead times, may cause our revenues and operating results to vary significantly from quarter-to-quarter.</i>	Juniper Networks
	S01 Supplier default	<i>We rely on business partners in many areas of our business and our business may be harmed if they are unable to honor their obligations to us.</i>	Electronic Arts
	S02 Supplier dependence	<i>We are dependent on sole source and limited source suppliers for several key components, which makes us susceptible to shortages or price fluctuations in our supply chain, and we may face increased challenges in supply chain management in the future.</i>	Juniper Networks
	S03 Supplier quality Problem	<i>We outsource some of our manufacturing. If there are significant changes in the quality control or financial or business condition of these outsourced manufacturers, our business could be negatively impacted.</i>	Avery Dennison
	S04 Other supply-side Risks	<i>Fluctuations in commodity prices and in the availability of raw materials, especially feed grains, live cattle, live swine and other inputs could negatively impact our earnings.</i>	Tyson Foods
		<i>We depend on contract growers and independent producers to supply us with livestock.</i>	Tyson Foods
	I0 Infrastructure & operational/ production risks	<i>The company may be adversely impacted by inadequacies in, or failure of, its information technology system.</i>	Campbell Soup
		<i>Product liability claims could adversely impact our financial condition and our earnings and impair our reputation.</i>	Medtronic

Table 2-2: Risk classification schedule. (continued)

Top-level	Ground-level	Reported risks as quoted in annual SEC filings of sampled companies	Firm
External-driven risks	R0 Regulatory, legal, and bureaucratic risks	<i>The company's results may be impacted negatively by political conditions in the nations where the company does business.</i>	Campbell Soup
		<i>Our industry is experiencing greater scrutiny and regulation by governmental authorities, which may lead to greater governmental regulation in the future.</i>	Medtronic
	C0 Catastrophic risks	<i>Global or regional catastrophic events could impact our operations and financial results.</i>	Coca Cola
		<i>Military action, other armed conflicts, or terrorist attacks.</i>	Halliburton

2.4 Analysis and results

In the following we present selected results based on the analysis of the risk disclosure in the 2007 and 2009 fiscal year-end filings (Form 10-K) of 219 U.S. companies.

In total, we identified 2.473 distinct risks disclosed in the 2007 annual risk reporting and 3.001 risks in 2009 which reflects an increase of 21.4%. Thus, on average, the firms in our sample reported 11.29 risks in 2007 and 13.70 risks in 2009. This corresponds to an increase of 2.41 risks per firm ($p < 0.001$; two-tailed paired-sample t-test). This development comes along with the negative influence of the financial crisis in 2009. Based on the ground level of our classification system, Figure 2-1 shows the frequencies for each of the five risk sources.

Figure 2-1: Frequencies of ground-level risk sources in 2007 and 2009.

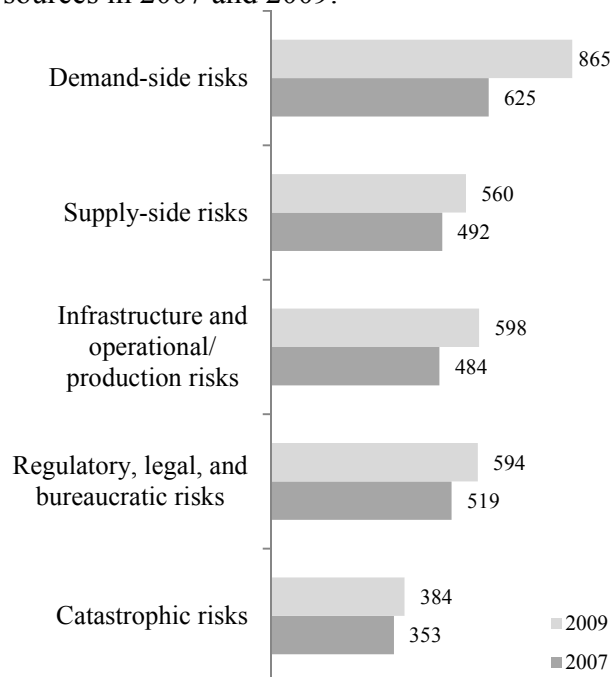
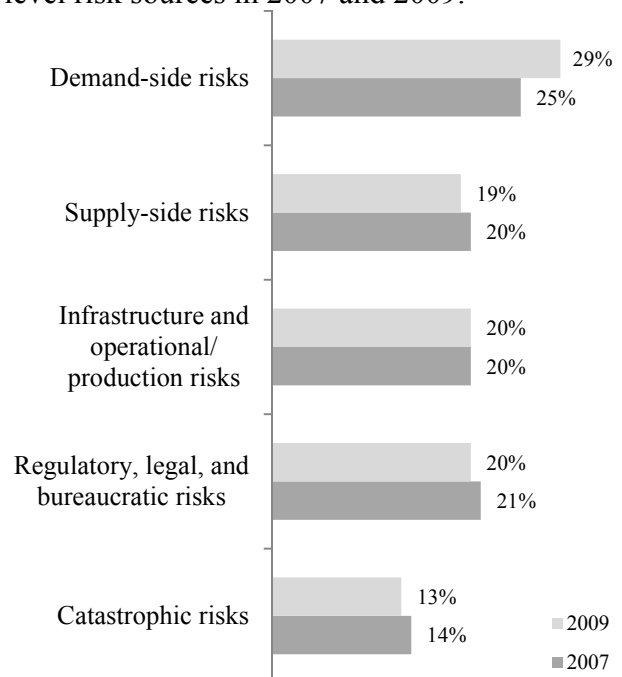


Figure 2-2: Relative distribution of ground-level risk sources in 2007 and 2009.^{a)}



a) 2007: 2.473=100%; 2009: 3.001=100%

The amount of disclosed risks in all five categories increased within the two year time-window. However, in relative terms, the changes differ highly among the various risk sources. While the increase for catastrophic risks (+8.8%, $p < 0.05$), regulatory, legal, and bureaucratic

risks (+14.5%, $p < 0.001$), and supply-side risks (+13.8%, $p < 0.01$) is rather small and below average (+21.4%), the other two risk sources raised at a higher degree. Demand-side risks (+38.4%, $p < 0.001$) and infrastructure and operational/production risks (+ 23.6%, $p < 0.001$) were reported significantly more often in 2009 than in 2007. This trend might reflect the greater emphasis companies put on the downstream part of their supply chain while at the same time knowing that risks coming from this source can have severe negative impacts for the entire enterprise.

Further, we examined the relative importance of each ground-level risk source. Figure 2-2 unveils that the exposure to demand-side risks is not only of highest concern to companies. The weight of this risk source has even increased from 25% in 2007 to 29% in 2009. At the same time, catastrophic risks remained on the lowest awareness level. This confirms the survey-based study of Wagner and Bode (2008) in which companies assigned the least importance to the latter risk source and the highest to demand-side risk sources. The other three sources, i.e., supply-side risks, infrastructure and operational risks and regulatory, legal, and bureaucratic risks share the remaining weights equally and stay constant within the analyzed time window.

Aggregating the empirical data to the top level of our classification system indicates that the number of internal-driven supply chain risks increased by 26.4% ($p < 0.001$) from 2007 to 2009 whereas external-driven supply chain risks increased only by 12.2% ($p < 0.001$) (Figure 2-3). Figure 2-4 shows the relative distribution of the two top-level categories and illustrates that internal-driven supply chain risks have slightly increased their weight within the companies' risk portfolio.

Figure 2-3: Frequencies of top-level risk source in 2007 and 2009.

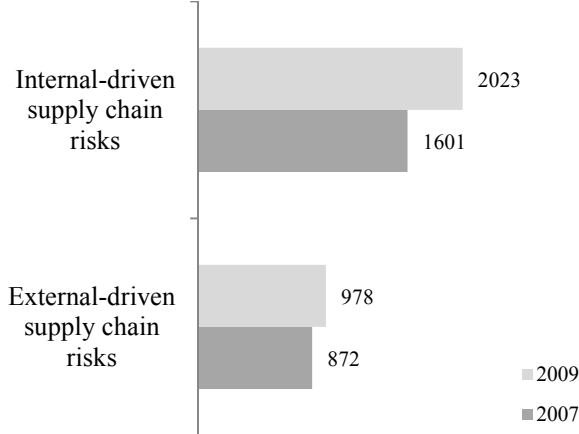
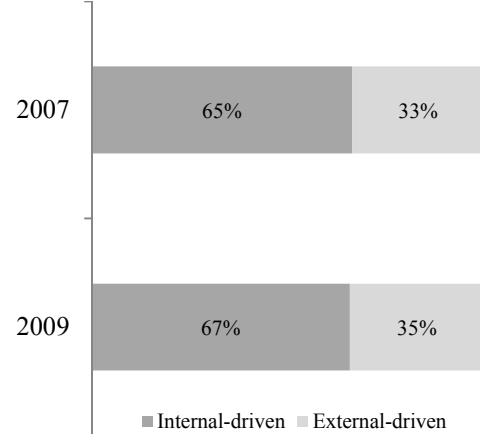


Figure 2-4: Relative distribution of top-level risk source in 2007 and 2009.^{a)}



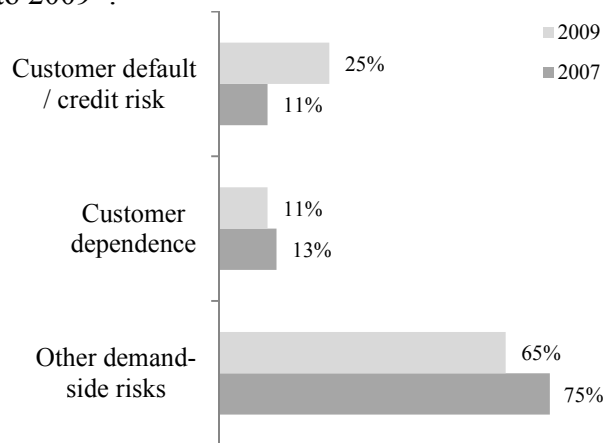
a) 2007: 2.473=100%; 2009: 3.001=100%

As described above, we set up our coding schedule in order to unveil more details for the demand and supply-side risk sources. The more detailed view on the data is visualized in Figure 2-5 to Figure 2-8 respectively.

Figure 2-5: Breakdown of demand-side risk sources in 2007 and 2009.



Figure 2-6: Development of relative distribution of demand-side risks from 2007 to 2009^{a)}.



a) 2007: 625=100%; 2009: 865=100%

Disaggregating the demand-side risks into the categories (1) customer default and credit risks, (2) customer dependence, and (3) other demand-side risks shows that in all three categories the number of reported risks increased from 2007 to 2009 (Figure 2-5). Especially the risks related to the default of customers and customers' inability to pay their obligations

experienced an enormous increase by 216% ($p < 0.001$). This trend reflects that companies, even large multinational firms, became more sensitive toward the default of single customers. In fact, 148 of the 219 analyzed companies (i.e., 67.6%) mentioned customer default risk in their 2009 risk reporting whereas in 2007 only 58 companies (26.5%) reported this specific risk. Figure 2-6 highlights that, within the demand-side risk sources, more emphasis is put on the risk of customer default in 2009 than in 2007. In 2009 every fourth disclosed demand-side risk is related to the default of customers and the related credit risk whereas in 2007 only 1 out of 9 risks were reported in this category. Additionally the number of risks rooted in the dependence on customers increased slightly in absolute terms but lost share by two percentage points.

Figure 2-7: Breakdown of supply-side risk sources in 2007 and 2009.

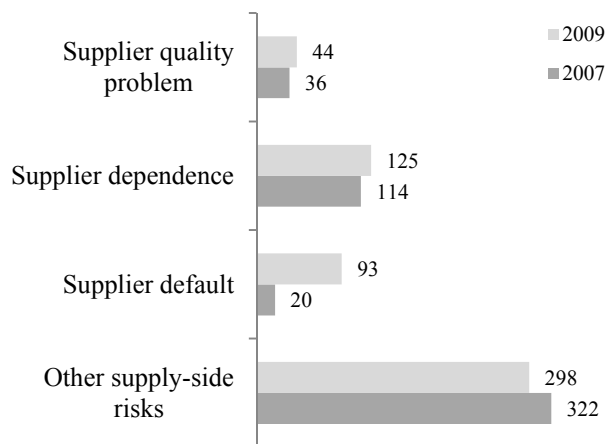
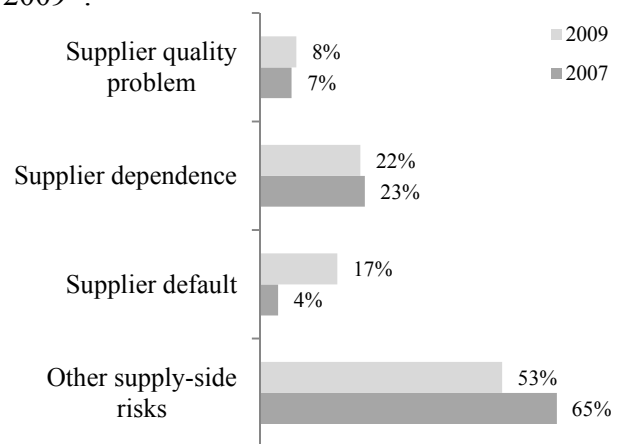


Figure 2-8: Development of relative distribution of supply-side risks from 2007 to 2009^{a)}.



a) 2007: 492=100%; 2009: 560=100%

Looking on the upstream part of the supply chain shows that the absolute increase is caused by an increase in the categories (1) *supplier quality problem*, (2) *supplier dependence*, and (3) *supplier default* whereas the (4) *other supply-side risks* decreased slightly at the same time (Figure 2-7). Within this risk source default risks show as well the highest intensification by 365%. Furthermore, only 17 companies reported the risk of supplier default in their 2007

reporting while 80 companies do so in 2009. Although this trend reflects a greater awareness by companies for the negative consequences of supplier defaults, this empirical insight also indicates, that 63% of the companies still not report supplier default in their annual reporting. Analogue to Figure 2-6, Figure 2-8 illustrates the mix of reported upstream risks. It is evident that supplier quality problems and the dependence on suppliers remain constant in their significance whereas the supplier default gained weight from the other supply-side risks category.

2.5 Discussion and conclusion

The objective of this research was to empirically investigate the supply chain risk disclosures in 10-K reports of U.S firms. Following a content analysis, this study describes and analyzes supply chain risk disclosures of 219 U.S companies over 2 years by summarizing and classifying disclosed supply chain risk related information. Besides legally required, information on the risk situation is mainly demanded by shareholders, potential investors, and other stakeholders such as employees to access and appraise the future performance of the company. Therefore the risk disclosure in annual reports became the main risk communication between firms and outsiders. Referring to our empirical evidence which shows an increased quantity of supply chain risk disclosures from 2007 to 2009 in all five risk sources, i.e., supply-side and demand-side risks, infrastructure and operational/production risks, regulatory, legal, and bureaucratic risks, and finally catastrophic risk, companies increase the amount of information disclosed with regard to the risks faced and their expected impact on future profits in order to more effectively fulfill these demands (Beretta and Bozzolan, 2004). The increasing trends for risk disclosures are consistent with previous researches, e.g., Kajüter and Winkler (2003) and Fischer and Vielmeyer (2004).

In 2008, a series of banks' and insurance companies' failures triggered a financial crisis that effectively halted the global credit market. These failures caused a crisis of confidence that made banks reluctant to lend money amongst themselves, or for that matter, to anyone leading to many corporations filing for bankruptcy in the U.S. Therefore, the financial crisis of 2008 and the global economy recession as a consequence drove a lower demand and more exposures to supplier and customer default and credit risks. Based on these developments, we inferred that the significant increase in the disclosure quantity of supplier default, customer default and demand-side risks were mainly due to the financial crises of 2008

3 STUDY 2: Supply chain management executives in corporate upper echelons

This chapter is based upon the paper:

Supply chain management executives in corporate upper echelons, co-authored with Stephan M. Wagner, published in the Journal of Purchasing and Supply Management, Vol. 20, No. 3, 2014, 156-166.

3.1 Introduction

In the 1980s, the interest in supply chains (SC) and supply chain management (SCM) increased tremendously. SCM is now viewed more than ever as a source of strategic advantage for organizations (Mol, 2003). This has transformed the position of the SCM function within the organizational structure (e.g., Kim, 2007), the way of organizing the SCM function(s) (e.g., Elmuti, 2002), and the placement of SCM authorities in the organizational hierarchy (Monczka et al., 2005). In this context, we expect first, following Chandler's (1962) principle that "structure follows strategy," that firms now have more SCM functions represented in their top management team (TMT) and second, that firms having a SCM executive in their TMT demonstrate better firm performance.

The studies on the organizational structure in the field of SCM have already made important contributions to the understanding of SCM's organizational visibility (e.g., Andersen and Rask, 2003; Fearon, 1988; Fearon and Leenders, 1995; Johnson and Leenders, 2006; Kim, 2007; Trent, 2004). These studies, however, relied mostly on case studies, anecdotal evidence or survey research, instead of more objective secondary data. Most of the questionnaires that are sent to the heads of logistics, purchasing, or SCM have failed to examine where on the corporate ladder these persons are situated since it is impossible to infer from a person's job title alone whether or not he or she belongs to the TMT.

Outside of the SCM discipline, ample research on TMT composition and functional representation has been conducted using objective measures based on archival data. This stream sets its focus either on individual leaders such as the Chief Executive Officer (CEO) or on heads of business units, on governance bodies such as boards of directors, or on the entire TMT (for excellent reviews see e.g., Carpenter, Geletkanycz, and Sanders, 2004; Finkelstein, Hambrick, and Cannella, 2009; Pettigrew, 1992). While the research in management disciplines such as marketing and finance (see Section 3.2) is more advanced, no research has

– to the best of our knowledge – empirically analyzed the degree to which SCM is explicitly represented by executives in firms’ TMTs and if SCM representation is related to firm performance.

The purpose of our article is to shed light on SCM representation in firms’ TMTs. This seems a fruitful undertaking given “this area’s great potential, its various unresolved and unexplored research issues, and the many unexplored functional TMT members” (Menz, 2012, p. 46), and because numerous management scholars have highlighted the importance of studying the organization of SCM (e.g., Ketchen and Hult, 2007; Kim, 2007; Miles and Snow, 2007; Sandberg and Abrahamsson, 2010; Storey et al., 2006; Tassabehji and Moorhouse, 2008; Zheng et al., 2007). More specifically, we believe that generating insights in this field is valuable for the following reasons. First, scholars need more empirical evidence to support firms in establishing suitable organizational structures and in understanding the consequences of certain structures (Hambrick and Mason, 1984). In this context SCM gained importance as its presence not only enhances the variety of professional expertise on the TMT but also affects the likelihood and speed of translating supply chain strategies into practice (Fawcett, Magnan, McCarter, 2008). Second, companies would gain support in structuring their supply chain organizations and in selecting and cultivating upper-level executives (Johnson, Leenders, and Fearon, 1999; Mulder, Wesselink, and Bruijstens, 2005; Richey and Wheeler, 2004). Third, strategists could more accurately predict their companies’ or their competitors’ moves and countermoves, as the strategic direction of a company is often mirrored in the composition of its TMT (Boal and Hooijberg, 2000). Especially for investors, as the empirical research on the effects of SCM practices suggests (e.g., Hendricks and Singhal, 2005; Wagner, Grosse-Ruyken, and Erhun, 2012), it is critical to know if the executive in charge of SCM is part of the TMT with “direct” access to the top decision makers or if this executive is situated lower in the leadership hierarchy.

We analyze the TMTs of large US corporations from a variety of industries. We hope to ascertain if the executives responsible for SCM and related functions, i.e., the Chief Supply Chain Officer (CSCO), belong to what Finkelstein, Hambrick, and Cannella (2009) call “the small group of people at the top of an organization [that] can dramatically affect organizational outcomes” (p. 3). Next, we examine the extent to which TMT members in general (excluding the CSCO) and the CEO in particular have gained SCM experience from positions that they held earlier in their career. Finally, we compare the performance of firms with and without a CSCO in their TMT.

Our article proceeds as follows. In Section 3.2 we describe the conceptual framework upon which we formulate four research questions based on a literature review. Section 3.3 describes our methodology before the results for each research question are presented in Section 3.4. Finally, we summarize our research and give concluding remarks on the limitations of this study and areas for future research.

3.2 Literature review and development of research questions

3.2.1 Chief Supply Chain Officer

The Chief Supply Chain Officer (CSCO) is the highest executive with designated responsibility for SCM. According to the CSCMP (2010) “this position is ordinarily found in large corporations and less often in small- and medium-sized companies” and (s)he “must be a strategic thinker with confidence and speed in execution [and] have the ability to interact at the highest levels of the company.” Although this definition might seem self-explanatory, there is no consensus on what comprises SCM (e.g., Li et al., 2006b; Mentzer et al., 2001). Scholarly work has even confirmed that the “SCM vision remains fuzzy at most organizations” and that “most individuals do not have a clear perception of what SCM means

in relation to their tasks” (Fawcett, Magnan, and McCarter, 2008, p. 44). To the best of our knowledge, no scholarly work explains the functional areas related to SCM or finds the “root function” of SCM. For example, Larson, Poist, and Halldórsson (2007) regard logistics as the nucleus for SCM but found that definitions and perspectives of SCM differ within the logistics function. For some supply chain professionals, logistics is a part of SCM but for others, SCM is a sub-function of logistics.

Due to these ambiguities, we consider SCM an “umbrella term” (Andersen and Rask, 2003, p. 84) that encompasses two different viewpoints. As a consequence, the CSCO can be seen in a narrow sense and encompass terms such as supply chain management or value chain management. Alternatively, in a wider sense, adjacent SCM functions such as purchasing or logistics are considered.

3.2.2 The role of the top management for supply chain management

Four decades ago, researchers in the field of SCM and related functions explored the standing and influence of these functions in the hierarchy of corporations with interesting results. For example, Ammer (1974) concluded that “the obvious reason why many purchasing managers do not frequently participate in non-purchasing decisions and instead operate within a narrow definition of their job is lack of organizational visibility. They simply are not close enough to the top to know what is going on” (p. 20). In the following years, many researchers highlighted the importance of TMT commitment for implementing supply chain strategies (e.g., Fawcett, Magnan, and McCarter, 2008; Gibson, Mentzer, and Cook, 2005; Lancioni, 2000). Based on empirical evidence gathered via a survey of supply chain professionals from manufacturing firms in North America, Trent (2004) revealed that large firms “perceive an executive position responsible for coordinating and integrating key supply chain activities

from supplier through customer ... as important” (p. 11) for an effective organizational design. This study has found that many organizational design features that are related to the involvement of the upper echelons such as regular presentations by the Chief Purchasing Officer (CPO) to the CEO, a higher-level CPO with a title related to purchasing and supply management, or executive buyer-supplier councils which coordinate the upstream activities with key suppliers are evaluated as indispensable to reach supply and procurement objectives. Larson, Poist, and Halldórsson’s (2007) study on enabling factors for SCM implementation clearly showed that top management support has the greatest impact on the success of supply chain strategies. Sandberg and Abrahamsson (2010) performed case study research to analyze the enabling role of the top management for SCM practices. They identified four archetypal roles for top management: supply chain thinker, relationship manager, controller, and organizer for the future.

3.2.3 Organizational visibility of supply chain management and other functions in corporate upper echelons

In the past decade, many studies of the organizational status of SCM were published (e.g., Aquino and Draper, 2008; CSC, 2007; CSC, 2010; CSC, 2012; Eyefortransport, 2011; Heckmann, Shorten, and Engel, 2003; IBM, 2009; SCM World, 2010; Wilding et al., 2010). In addition to investigating the proliferation of the supply chain concept, its influence on the business, and a forecast on the future of SCM, some scholars have begun to investigate the position of the leading supply chain executive in the corporate hierarchy.

As early as 2002, an empirical study by Booz Allen Hamilton (Heckmann, Shorten, and Engel, 2003) noted that “at most companies today, SCM tends to be pushed down the leadership hierarchy” to the point that “SCM is rarely considered part of a company’s overall business strategy and, thus, is not usually included in the strategic planning process” (p. 3).

Consequently, the survey found that “in companies where responsibility for SCM resided below senior management, annual savings in the cost to serve customers are just 55% of what they are when SCM is a component of the overall business strategy” (p. 2). A survey conducted by CSC, the *Supply Chain Management Review*, and Neeley Business School at Texas Christian University (CSC, 2012) has recently concluded that 51% of the responding firms have “an executive officer who manages all supply chain functions” (p. 9). Considering the formerly revealed figures of 38% from 2007 (CSC, 2007) and 49% from 2010 (CSC, 2010), more firms now report having an executive officer who manages all SCM functions. Furthermore, firms that are leaders in their industry “are more likely to have a single officer in charge of a wide span of supply chain management activities and functions” (CSC, 2010, p. 10). In a global survey of supply chain professionals, SCM World (2010) revealed that on average 54% of the respondents have “an executive position with end-to-end supply chain responsibility” (p. 8) and that best-in-class companies are 50% more likely to have such an executive position. Finally, on their study on supply chain strategy in the board room, Wilding et al. (2010) received a positive response from 72% of the firms to the question: “Is the senior supply chain person on the board?” (p. 8) and found evidence that the success of supply chain strategies is more likely with “the active support of the board, senior executive buy-in, and sponsorship” (p. 20).

While all these studies offer valuable insights, they have two shortcomings. First, all studies gather the data by surveying supply chain professionals. This might lead to having firms that do not perceive SCM as important underrepresented in the responding sample and thus diminishing the generalizability of such insights about the presence of SCM executives. Second, a comparison of the results is hampered because the studies (1) lack a common definition of the supply chain executive, (2) lack a standard definition of who comprises the TMT, and (3) formulate the same questions in different words.

Outside of SCM, an abundance of research on the firms' TMTs uses more objective empirical data (for an excellent review see Menz, 2012). This research covers a huge spectrum of topics and is mostly concerned with the position of the Chief Executive Officer (CEO), the board of directors, the composition and heterogeneity of TMTs, and performance and power implications of the represented functions. Within the latter category, interesting research has been conducted – mostly in the past ten years – on the presence of managerial disciplines in corporate upper echelons, such as studies of Chief Marketing Officers (CMO) (e.g., Boyd, Chandy, and Cunha, 2010; Nath and Mahajan, 2008; Nath and Mahajan, 2011; Vafeas and Vlittis, 2009), Chief Information Officers (CIO) (e.g., Grover et al., 1993; Li et al., 2006a; Preston, Karahanna, and Rowe, 2006; Smaltz, Sambamurthy, and Agarwal, 2006), Chief Technology Officers (CTO) (e.g., Medcof, 2008), Chief Operating Officers (COO) (e.g., Dobbin et al., 2003; Hambrick and Cannella, 2004; Zhang, 2006), Chief Officer of Corporate Social Responsibility (e.g., Strand, 2013), Chief Strategy Officers (CSO) (e.g., Menz and Scheef, 2014) and on Chief Financial Officers (CFO) (e.g., Mian, 2001; Zorn, 2004).

In addition to investigating the individual, organizational, and TMT factors (e.g., Nielsen, 2009) of being on the executive board and the related performance consequences, some studies offer insights on the status and development of the functions' presence in the upper echelons. The selected studies that we summarize in Table 3-1 show the percentage of firms in the sample having an executive of the analyzed function in their TMT. In 1963, for example, the position of CFO was unheard of; by 2000 they were found in 80% of the sampled firms. Reasons for this increase include legal changes in accounting standards, the merger wave of the 1980s, and the increased shareholder value orientation (Zorn, 2004). At the same time, Hambrick and Cannella's (2004) study reports a decline in the presence of the COO, a decline that has been confirmed by Tulimieri and Banai (2010).

Table 3-1: Presence of other functional disciplines in corporate upper echelons.

Source	CXO ^a	Time frame	Geographic scope	Sampling frame	Sample size	Percentage of firms with CXO presence
Zorn (2004)	CFO	1963-2000	USA	Fortune rankings, Million Dollar Directory	429	1963 = 0% 2000 = 80% ^b
Nath and Mahajan (2008)	CMO	2000-2004	USA	Firms in <i>Compustat</i> with sales >250 m US\$	167	2000 = 41% 2001 = 42% 2002 = 44% 2003 = 41% 2004 = 39%
Ronay (2006)	CMO	2006	United Kingdom	FTSE UK 100 Index	100	2006 = 14%
Hambrick and Cannella (2004)	COO	1987-1996	USA	Firms in <i>Compustat</i> with sales >200 m US\$	404	1987 = 20% 1996 = 17.5% ^b
Menz and Scheef (2014)	CSO	2004-2008	USA	Firms selected from S&P 500 index	147	2004 = 34% 2008 = 49% ^b

^a CFO = Chief Financial Officer; CMO = Chief Marketing Officer; COO = Chief Operating Officer, CSO = Chief Strategy Officer

^b Only data for start and end of time frame given. Yearly figures are available in original source.

Following Menz (2012), that “understanding to what extent, why, and how functional TMT members’ presence and thus TMT structure change over time is critical” (p. 74), the identified importance of the TMT for SCM success, and the valuable insights other managerial disciplines can draw from empirical evidence (Menz, 2012), led to the following research question:

Research question 1: *To what extent has SCM been present in TMTs, and has there been a change (increase, decrease) in its presence over time?*

Just as noteworthy are the valuable contributions by CAPS Research, especially on the development of supply organizations’ roles and responsibilities (e.g., Fearon and Leenders, 1995; Johnson and Leenders, 2006; Johnson, Leenders, and Fearon, 2006) and on demographic characteristics of CPOs (e.g., Johnson, Leenders, and Fearon, 1999). These studies suggest, among other results, that there are huge differences in a wide spectrum of

variables among industries. These insights will be considered in our study and generated the second research question:

Research question 2: *Do differences in the extent of SCM presence in TMTs exist across industries?*

3.2.4 The role of functional SCM experience among the TMT members

Following Hambrick and Mason's (1984) upper echelons perspective, focusing on single executives instead of the entire TMT would be too myopic, as the "attention to executive groups, rather than to individuals, often yields better explanations of organizational outcomes" (Hambrick, 2007, p. 334).

Following this notion, it is necessary to analyze the functional experiences of the non-CSCO executives as most strategic choices are set by the entire TMT and a high degree of SCM expertise among the top management might influence the perceived importance and, in turn, the success of SCM projects. This is especially true for CEOs given their special position and status. For example, empirical evidence suggests that firms having CEOs with a finance background make more diversified acquisitions (Palmer and Barber, 2001) and are more diversified themselves (Jensen and Zajac, 2004) than are firms that do not have a CEO with a finance background. Based on this evidence, SCM might have a different standing in firms whose CEOs have experience in SCM or a related function than in firms without such CEOs.

Therefore, in order to analyze the degree of SCM implementation in corporate upper echelons, only the consideration of the entire TMT provides a full picture (Cannella, Park, and Lee, 2008; Carpenter, Geletkanycz, and Sanders, 2004). The next research question with respect to the status of SCM in the upper echelons is:

Research question 3: *To which degree do TMT executives (especially the CEOs) have SCM experience gained on prior positions and has there been a change (increase, decrease) in TMT executives' SCM experience over time?*

3.2.5 The link between supply chain management executives and firm performance

Given the interest in “the link between the people at the strategic apex of the organization and that organization’s performance” (Pitcher and Smith, 2001, p. 1) as well as the relationship between SCM practices and organizational performance, we investigate the link between SCM executives and firm performance.

First, studies frequently revealed a relationship between characteristics of executives – individually, such as the CEO, or the entire TMT – and firms’ organizational performance. Particularly important are studies elaborating on the notion that managers’ functional background affects what they perceive (e.g., Dearborn and Simon, 1958; Kefalas and Schoderbek, 1973; Walsh, 1988), and that managers’ perceptions affect their strategic choices and organizational performance (Hambrick and Mason, 1984). Although these studies have produced inconclusive or inconsistent results and despite flaws in their scope and methodology (Finkelstein, Hambrick, and Cannella, 2009; Waller, Huber, and Glick, 1995), they initiated valuable research and the function and functional experience of executives has become one of the most often-cited characteristics with the potential to affect corporate strategy and performance (Jensen and Zajac, 2004).

Second, a significant number of empirical studies has revealed the positive effect of SCM practices on organizational performance (e.g., Ellinger et al., 2011; Hsu et al., 2008; Tan et al., 1999; Li et al., 2006b; Tracey, Vonderembse, and Lim, 1999; Wagner, Grosse-Ruyken, and Erhun, 2012). But while past research elaborated mostly on the effect of SCM practices such as inventory reduction, just-in-time delivery or strategic supplier partnerships, the

performance effects of implementing a CSCO in the TMT, has not yet received much scholarly attention. Important contributions in this context are studies addressing the implications of the degree of centralizing SCM competencies and the status of the SCM department within an organization (e.g., Kim, 2007; Mollenkopf, Gibson, and Ozanne, 2000; Monczka et al., 2005). For example, Kim (2007) suggests organizational structures that are favorable for an effective SCM such as the functional organization, in which the main SCM activities are pooled under a centralized SCM department.

Bringing both research streams together and following the requirement by Li et al. (2006a), that “any organizational initiative, including SCM, should ultimately lead to enhanced organizational performance” (p. 111), we are interested in the following:

Research question 4: *Do firms with a CSCO in the TMT differ on firm performance compared to firms without a CSCO in the TMT?*

3.3 Research method and design

In order to achieve the goals of our study and like similar studies on functional executives (e.g., Nath and Mahajan, 2008; Menz and Scheef, 2014), we conducted a panel study over the time frame 2004-2009. The end point 2009 was set because the data for the annual year 2009 was not completely available until fall 2010, the time this study was initiated, as firms might file amendments to the original SEC file and due to availability lags in the databases of commercial providers (e.g., *Compustat*). Further, we explicitly chose the 6-year period in order to get a sample size of above 200. Extending the time horizon to the past would automatically decrease the sample while maintaining our criteria for inclusion.

In the subsequent sections we describe our research methodology with respect to the sampling, unit of analysis, data gathering, coding process, and statistical analysis.

3.3.1 Sample selection

The sample selection process started with identifying all US companies consistently listed in the Dow Jones STOXX® Americas 600 Index² in the period 2007-2009. Applying this criterion, that had been adopted in similar studies using secondary data (e.g., Short et al., 2010), we achieved a high degree of stability in our sample which is necessary in panel studies to reduce the number of dropouts over the course of the analyzed time window. Note that we obtain a similar sample when extending the 3-year period (2007-2009) to our entire time frame (2004-2009).

The above procedure revealed 675 companies, subsequently reduced to 413 as we filtered out 253 firms not consistently listed in the index in the years under consideration, and an additional 9 firms not covering the entire time frame of our study for reasons such as mergers. In the next step we excluded 202 companies belonging to sectors where SCM is not of core relevance, such as media, banking, insurance, real estate, and financial services. The sector of a company is based on the Industry Classification Benchmark (ICB) which classifies a company according to its primary revenue source in one of 19 sectors. As depicted in Table 3-2, the resulting sample consists of 211 corporations and shows a wide variance in terms of industry sectors and company sizes as measured by the number of employees. Of these 211 corporations, 91% belonged to the Fortune 1000 and 76% to the Fortune 500 in 2009.

Table 3-2: Sampled firms by industry and size.

Industry sectors	N	in %	Number of employees	N	in %
Industrial goods & services	46	21.8	< 10,000	49	23.2
Consumer goods	38	18.0	10,000 – 49,999	95	45.0
Oil & gas	33	15.6	50,000 – 99,999	32	15.2
Technology	33	15.6	100,000 – 249,999	26	12.3
Consumer services	27	12.8	≥ 250,000	9	4.3
Basic materials	18	8.5	Total	211	100.0
Healthcare	16	7.6			
Total	211	100.0			

Note: All values are based on data of the year 2009.

² This index contains the 600 largest companies in North America and represents a market capitalization of approximately 11.9 trillion USD as of December 2009. Since its first compilation in July 2003 the index composition is reviewed on a quarterly basis and companies are replaced e.g., due to mergers and acquisitions or failing to permanently meeting the index requirements.

3.3.2 Unit of analysis and data sources

As we empirically examine if and to what extent SCM and related functions are represented by executives in corporate upper echelons, our unit of analysis is the top management team (TMT), which is most often used in empirical research on TMT composition (Nielsen, 2010).

There are many operational definitions of TMT (e.g., Carpenter, Geletkanycz, and Sanders, 2004) and due to this lack of consensus (Finkelstein, Hambrick, and Cannella, 2009) we formulated a definition that is in accordance with our research approach. We define the TMT as the group of persons listed under the caption “Executive Officer of the Registrant” in the annual 10-K filing, which is filed with the Securities and Exchange Commission (SEC) 60-90 days after the end of the registrant’s fiscal year (Bragg, 2009). Under this caption, all companies are obliged to list the names and ages of all their executive officers and all candidates for executive offices. In this context, the term “executive officer” pertains not only to top managers who perform a policy making function. Besides the CEO these are mostly the firms’ CXOs, corporate presidents, and vice presidents in charge of principal business units, divisions, or functions (e.g., sales, human resources, finance). Heads of subsidiaries may also be regarded as executive officers if they have a policy making function. Apart from executive directors and the chairman of the board, members of the board of directors are out of scope.

Among the many classifications, our definition of the TMT based on the 10-K report has three advantages. First, the regulations for the 10-K submission are legally codified and apply to all sampled firms. Additionally, the rules governing the disclosure of executive officers remained constant throughout our time window. Both aspects diminish incomparability issues across companies and time periods and leave the decision about “our TMT composition” to the firms instead of to external providers. Second, SEC filings are publicly available and cannot be changed. Only the latter feature allows a longitudinal study, unlike sources such as corporate websites that are constantly updated. These indeed suggest

another possibility to define the TMT as most firms provide the names, titles, and short bios of their senior management team. But the major drawback are the lack of access to data from previous years, and the absence of hard and fast rules about who must or must not be listed on the corporate website. Finally, a company's 10-K report must be fully audited by its financial auditors and then approved by the board of directors (Bragg, 2009). In sum, our approach improves the reliability of all information including the specification of the executive officers, and allows for the replication or extension of our study.

We started gathering the required SEC filings which are the primary data source for identifying the TMTs by downloading the 2004-2009 10-K reports from the SEC's EDGAR (Electronic Data Gathering, Analysis, and Retrieval) system via the FTP retrieval server (<http://www.sec.gov/edgar.shtml>). Additionally, we had to gather all DEF-14A reports (i.e., the definitive proxy statement for the annual meeting) as some corporations opt not to provide the executive officers in the 10-K report but rather reference to the subsequent proxy statement. In the next step we imported the six relevant SEC reports for each of the 211 corporations (i.e., 1,266 filings) into a self-programmed database.

In addition to the data obtained from the SEC filings, the database was later enriched with biographical information pertaining to 3,842 distinct executives found on corporate websites and in online databases such as *Forbes* and *Bloomberg Businessweek*. Finally, financial data extracted from *Compustat* was obtained for each firm and year.

3.3.3 Data coding

The section in each SEC filing providing the TMT (i.e., the section labeled "Executive Officer of the Registrant") was identified automatically based on a keyword search in the database and tagged accordingly. This tag was the starting point for applying content analysis

techniques on the gathered secondary data to fill our data warehouse, methods which have recently been recommended for logistics and SCM research (Calantone and Vickery, 2010; Rabinovich and Cheon, 2011).

The second author and a graduate research assistant, who were both experienced in content analysis and with handling large datasets, manually identified all individual executives reported in each SEC filing. We extracted the first, middle, and last name of each officer and created a record for each person by assigning a unique identifier. This step, used in similar research settings (e.g., Kini et al., 2010), was necessary to prevent double counting as a few officers swapped their employment between our sampled corporations. Next, we derived the year of birth on the basis of the two data items age in years as given in the report and the filing date of the report. Finally, we assigned the gender and stored all textual information from the SEC filing in a yearly based data container related to each person. The biographical information from the corporate websites and online databases was added in order to gain a broad picture of each officer's experience, previous positions, and deeper insights about the responsibilities in his/her current and/or previous positions. In this context, however, we have to mention that, inherent to our longitudinal research approach, it was impossible to obtain all biographical information for the entire career of each individual executive found in the 10-K reports. Therefore, our numbers related to the executives' SCM experience mark the lower bound and are probably higher in reality.

Due to the ambiguities what encompasses SCM (see Section 3.2.1) we have created two distinct groups in order to increase the level of detail of our analyses and to satisfy the different viewpoints. In the first group (CSCO_A) we pooled the executives that either have the term *supply chain*, *value chain*, or *supply chain management* in their job title, or whose responsibility for one of these functions was stated in their biographical data. Executives who have key words such as *purchasing*, *logistics*, or *product supply* in their title or who are

responsible for these adjacent SCM functions fall into in the second group (CSCO_B). Table 3-3 depicts our nomenclature and lists the functional areas and titles of the executives considered.

Table 3-3: SCM functions in the two distinct CSCO groups.

Group	Functional areas	Sample titles
CSCO _A	Supply Chain / Value Chain / Supply Chain Management	<ul style="list-style-type: none"> • Executive Vice President, Supply Chain Management • Global Chief Supply Chain Officer • Vice President Global Supply Chain • Senior Vice President Corporate Supply Chain Operations
	Sourcing/Procurement / Purchasing/Supply Management	<ul style="list-style-type: none"> • Group Vice President Purchasing • Executive Vice President Purchasing
CSCO _B	Transportation/Logistics / Distribution/Warehousing	<ul style="list-style-type: none"> • Executive Vice President Logistics and Distribution • Senior Vice President of Transportation
	Inventory / Materials Management	<ul style="list-style-type: none"> • n/a ^a
	Product Supply	<ul style="list-style-type: none"> • Senior Vice President Product Supply

^a No executive title in our sample contained the term inventory or materials management.

In this context, three aspects are noteworthy. First, even within the functional areas there are ambiguities. For example, the terms *sourcing*, *procurement*, *purchasing*, and *supply management* might be synonymous for some people but different for others (Kraljic, 1983). But the creation of more detailed groups would have increased the complexity for just marginal additional insights. Second, we deliberately excluded the functional areas containing terms such as *manufacturing*, *production*, or *operations*. Especially the latter term has other connotations which might distort our coding process, and the areas of production and manufacturing are often not considered core SCM activities (e.g., Elmuti, 2002). Third, due to identifying CSCO based on their job titles given in the 10-K reports it might be possible that executives are CSCO but not labeled as such. However, as companies are legally required to “indicate all positions and offices with the registrant held by each” executive and to furnish information about all executives’ “business experience during the past five years,” even if the executive officer was with another company (SEC, 2010), we believe that this limitation has only marginal effects on the reliability of the data we have gathered.

After working closely together in the design stage to develop a coding schedule and coding tool, and after a pilot coding of 10 firms, the two coders worked independently. Finally, the two coders met to discuss and reconcile all discrepancies. The first author was consulted on every firm-year that achieved less than 95% agreement. In total we are confident that we have created a high-quality dataset upon which reliable conclusions can be based.

3.3.4 Measures and statistical analysis

To answer the research questions, four types of measures were developed, and descriptive, non-parametric and multivariate statistical methods were used for the analysis.

CSCO presence. For this variable, we created three analysis clusters and in each cluster two independent groups were created and subsequently compared. In Cluster I, firms are, on a yearly basis, either allocated to group TMT_A , if at least one $CSCO_A$ executive (Table 3-3) is present in the TMT or to group TMT_Z otherwise. In Cluster II, firms are, on a yearly basis, either allocated to group TMT_B , if at least one $CSCO_B$ executive is present in the TMT or to group TMT_Z otherwise. In Cluster III, firms are, on a yearly basis, either allocated to group TMT_C , if at least either one $CSCO_A$ or one $CSCO_B$ executive is present in the TMT or to group TMT_Z otherwise.

SCM experience in TMT. This binary variable measures, on a yearly basis, whether or not at least one executive with SCM experience is present in the TMT. Within our terminology, an executive is considered to have SCM experience, if he/she had held a position in any of the functional SCM areas mentioned in Table 3-3 (i.e., $CSCO_A$ or $CSCO_B$ functions) prior to his/her current position. As such, we measure the SCM experience for each individual with a binary variable and do not distinguish SCM in the narrow sense from the adjacent functions. Due to the CEO's special position, we also measure on a yearly basis *SCM experience of CEO*

if the CEO obtained SCM experience in any of the functional SCM areas prior to his/her current position.

Industry. This variable captures the industry which is the primary revenue source of each company. The Industry Classification Benchmark (ICB) scheme was used.

Performance. In line with existing studies on performance implications of SCM as an organizational initiative (e.g., Ellinger et al., 2011; Li et al., 2006b), we use the operating profit margin as performance measure to unveil the impact of having SCM executives institutionalized in TMTs. The operating profit margin is measured as operating income before tax and interest divided by total sales, and was obtained from *Compustat*. Furthermore, the performance measure is lagged 1 year to the year of presence of the CSCO. Note that the results are not significantly different when the performance measure is lagged 2 years (not presented in this article in the interest of space).

We first apply the Mann-Whitney-U-test (since assumptions of parametric techniques are not met) for each year to compare the two independent groups in each cluster on the operating profit margin as performance measure. We also take into account that our main variable (CSCO presence) might be autocorrelated due to repeatedly observing the same firms over a certain period of time. In other words, the presence of a CSCO in a single year is not independent from the CSCO's presence in the previous year. Thus, we also report the results of an OLS regression using the generalized estimating equations (GEE) approach.

3.4 Analysis of findings and results

We have analyzed the data in terms of our objectives as stated in the introduction and we will now present the results for each research question.

3.4.1 Research question 1: Presence of CSCOs in TMTs

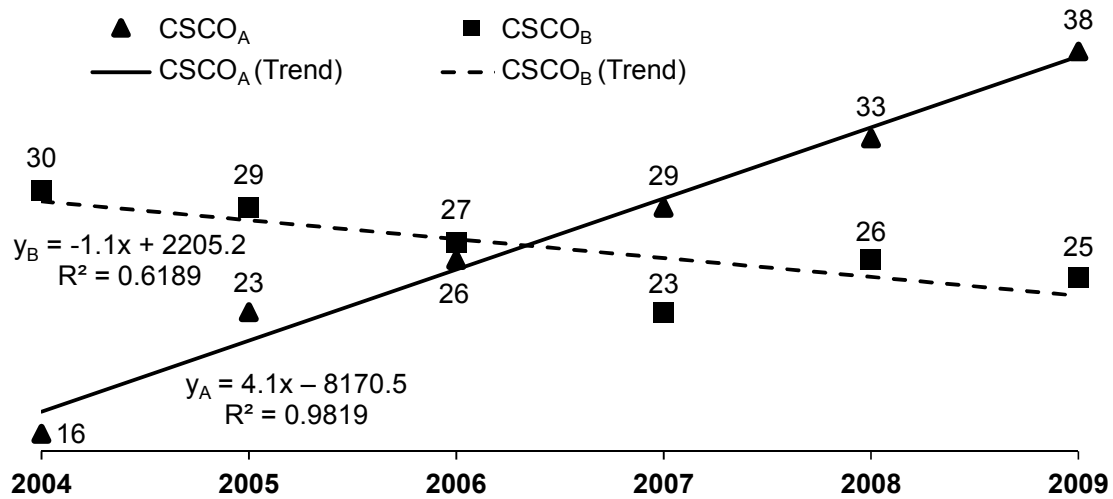
First, we examine the degree to which SCM executives have been institutionalized in firms' TMTs and if an accompanying trend can be observed over the 6-year time window. Based on our conceptual distinction, the data in Table 3-4 shows the absolute numbers across years of CSCO_A and CSCO_B. The number of CSCO_A more than doubles (+144.4%) whereas CSCO_B executives are less often found in 2009 than in 2004 (-24.3%). Nevertheless, the data shows an overall increase (+30.9%) of more SCM executives being present in TMTs. While the absolute number of CSCOs is increasing, even as the average number of top executives per TMT (-6,9%) generally decreases, the percentage of SCM executives among all officers remains very low. In 2004, the 55 CSCOs accounted for only 2.3% of all 2,347 identified officers in 2004; in 2009 this share rises slightly to 3.3% of the 2,185 TMT officers in this year.

Table 3-4: Number of CSCOs across years.

	2004	2005	2006	2007	2008	2009	Δ in % (2004-2009)
CSCO _A	18	24	29	31	37	44	+144.4%
CSCO _B	37	34	31	25	28	28	-24.3%
Total	55	58	60	56	65	72	+30.9%

As a few firms have more than one SCM executive in their TMT, the picture of the number of firms having SCM functions anchored in the upper echelons looks slightly different, as Figure 3-1 shows.

Figure 3-1: Number of firms with CSCOA presence.



The number of firms with a CSCOA (TMT_A) more than doubled from 16 in the first year of analysis (2004) to 38 in the final year (2009) ($p < 0.01$; two-tailed paired-sample t-test), yet the number of firms with a CSCOB (TMT_B) has been unstable and follows a diminishing but insignificant trend ($p > 0.1$). A closer look on the overall up-trend and at the individuals in supply chain positions reveals that individual officers did not simply replace the title of their CSCOB position with a title associated with a CSCOA position. In contrast, new people joined the TMT which either replaced existing CSCOB or stepped aside and widened the SCM competence. For example, the company ConAgra Foods had an executive responsible for Product Supply in 2006 and 2007 (James H. Hardy, Jr). In 2008 and 2009, this company had an executive responsible for SCM (Gregory L. Smith). Thus, ConAgra not just changed the title of an existing executive but also hired a new executive with more responsibility for SCM. This course of action might make a change of the strategic direction with respect to SCM more likely.

3.4.2 Research question 2: Differences of CSCO presence across industries

The analysis of the TMT composition across different industries (Table 3-5) revealed that for some industries the CSCO_A position has remained of either low (oil & gas and healthcare industries) or high importance (consumer goods and consumer services industries) over the investigated time frame; for others the presence of a CSCO_A has increased tremendously, as in the technology and basic materials industries.

It is interesting to note that industries with a stable number of firms having a CSCO_B, also show only small changes in the number of CSCO_A officers. For example, in the oil and gas industry, the purchasing function remains more visible in the TMTs than SCM, even though firms within this industry did appoint additional CSCO_A officers.

Table 3-5: Number of firms having CSCOs by industry and year.

Industry	N	TMT _A		TMT _B	
		2004	2009	2004	2009
Industrial goods & services	46	2 (4%)	9 (20%)	6 (13%)	4 (9%)
Consumer goods	38	7 (18%)	9 (24%)	4 (11%)	5 (13%)
Consumer services	27	5 (19%)	7 (26%)	11 (41%)	8 (30%)
Technology	33	1 (3%)	5 (15%)	3 (9%)	1 (3%)
Basic materials	18	1 (6%)	5 (28%)	1 (6%)	0 (0%)
Oil & gas	33	0 (0%)	3 (9%)	4 (12%)	6 (18%)
Healthcare	16	0 (0%)	0 (0%)	1 (6%)	1 (6%)
Total	211	16 (8%)	38 (18%)	30 (14%)	25 (12%)

Note: Numbers are absolute and in % of industry.

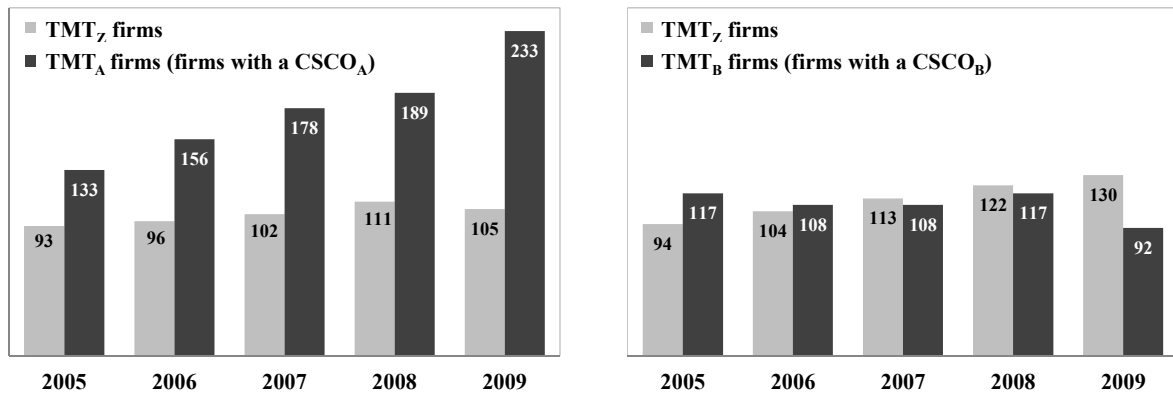
By comparing the CSCO_A and CSCO_B presence in firms' TMTs per industry, we find that in most industries with an increased presence of a CSCO_A, the number of firms with a CSCO_B in the TMT decreased. This again could indicate a mere change in the executive titles from, for instance, Vice President of Purchasing to Vice President of SCM. But again, our detailed analysis of each officer's career history shows that such a relabeling did not take place.

3.4.3 Research question 3: SCM experience of TMT members, especially CEOs

Distinguishing between both CEOs and TMT members of firms with and without CSCO reveals some interesting patterns.

Figure 3-2 (data indexed to 2004) provides additional evidence for the increased presence of SCM functions in corporate upper echelons. There is a clear trend that executives with SCM experience gained in their former positions become more and more present. This development is most evident in firms which have a CSCO_A in their TMT (Figure 3-2, left). Here, we see a 133% increase in the number of SCM-experienced executives in these firms' TMTs. In contrast, firms having a CSCO_B (TMT_B) reduced the number of SCM-experienced executives in their TMT by 8%, while firms without a CSCO_B (TMT_Z) increased the percentage of SCM-experienced executives by 30% (Figure 3-2, right).

Figure 3-2: Presence of TMT members with SCM experience in firms with (TMT_A/TMT_B) and without (TMT_Z) a CSCO in the TMT.

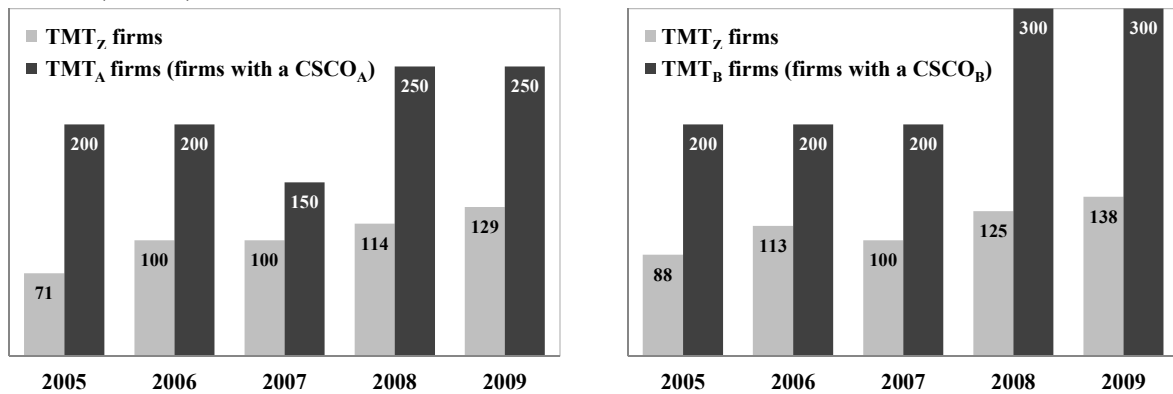


Note: Index where 2004 = 100%.

Considering only the CEOs of the firms shows substantial increases in the number of CEOs who have previously worked in SCM positions. As depicted in Figure 3-3, the proportion of SCM-experienced CEOs increased by 150% for firms having a CSCO_A (Figure 3-3, left), and by 200% for firms having a CSCO_B (Figure 3-3, right) in their upper echelons. In contrast, firms lacking these CSCO positions show smaller increases in SCM-experienced

CEOs. Despite the significant increase in relative terms – which is another indication of the greater presence of SCM in the upper echelons – the absolute figures are still rather low. In total, we identified only 14 companies for 2009 led by a SCM-experienced CEO; the comparable figure for 2004 was only 9.

Figure 3-3: Presence of CEOs with SCM experience in firms with (TMT_A/TMT_B) and without (TMT_Z) a CSCO in the TMT.



Note: Index where 2004 = 100%.

3.4.4 Research question 4: Performance differences regarding CSCO presence in TMTs

Table 3-6 presents the industry-adjusted medians and the Mann-Whitney-U-test statistics of the group analysis on the operating profit margin. Interestingly, firms with a CSCO have a mostly significant lower operating profit margin than did firms that did not have these executives in their TMT. We show evidence in Cluster I, that firms with executives explicitly responsible for SCM in their TMT (i.e., CSCO_A) perform worse – although not statistically significant so – in 5 out of 6 years. Only in 2004, did the results indicate a superior operating profit margin of CSCO_A firms. In all other years this measure is lower than in firms without a CSCO_A (with the greatest difference of 2.7% in 2008). A similar conclusion is seen in the results in Cluster II for CSCO_B firms. In all years, the industry-adjusted measure on the operating profit margin is – in most cases statistically significant – lower for firms with a

CSCO_B executive. Finally, the descriptive statistics in Cluster III for the CSCO_C executives give additional and mostly significant credence, that firms employing an executive responsible for SCM and related functions demonstrate inferior performance with respect to the operating profit margin.

Interestingly, besides being relatively stable over time (with the few exceptions mentioned above), the performance differences between firms with a CSCO and without a CSCO is not much different for the years before and during the financial crisis 2008/2009.

Table 3-6: Differences in operating profit margin between firms with and without a CSCO.

Year	With CSCO		Without CSCO		Mann-Whitney-U-test statistics			
	Median	N	Median	N	Sig.	z	U	r
Cluster I: CSCO_A (= TMT_A firms)								
2004	7.4%	16	3.1%	195	.110	-1.60	1,185	.11
2005	3.4%	23	3.6%	188	.632	-0.48	2,030	.03
2006	3.0%	26	3.7%	185	.880	-0.15	2,361	.01
2007	1.4%	29	3.9%	182	.136	-1.49	2,184	.10
2008	1.0%	33	3.7%	178	.234	-1.19	2,554	.08
2009	1.0%	38	3.2%	173	.098	-1.66	2,723	.11
Cluster II: CSCO_B (= TMT_B firms)								
2004	2.1%	30	3.7%	181	.121	-1.55	2,235	.11
2005	0.6%	29	4.3%	182	.002	-3.11	1,691	.21
2006	0.6%	27	4.0%	184	.003	-2.94	1,612	.20
2007	0.6%	23	4.0%	188	.005	-2.78	1,394	.19
2008	1.1%	26	3.9%	185	.031	-2.15	1,777	.15
2009	0.0%	25	3.4%	186	.007	-2.70	1,550	.19
Cluster III: CSCO_C (= TMT_C firms)								
2004	3.5%	43	3.5%	168	.941	-0.07	3,586	.01
2005	2.0%	48	4.3%	163	.042	-1.95	3,189	.13
2006	1.8%	50	4.0%	161	.023	-2.28	3,165	.16
2007	0.8%	50	4.6%	161	.001	-3.22	2,812	.22
2008	1.1%	55	4.8%	156	.035	-2.11	3,467	.15
2009	0.8%	60	3.7%	151	.002	-3.07	3,300	.21

Note: To account for industry effects, the performance measure is adjusted by deducting the industry median, measured at the 3-digit SIC level.

The results of the Mann-Whitney-U-tests are flanked by the OLS regression results using the GEE approach (Table 3-7). We find additional support that firms that have installed

SCM expertise in their TMT, either in form of a CSCO or in form of TMT members (including the CEO) having SCM experience, have lower operating profit margins. In models 1-3 the presence of a CSCO in its narrow meaning (CSCO_A), wide meaning (CSCO_B), or both respectively show a significant negative association to the operating profit. Furthermore, we analyzed the association between performance and SCM experience among TMT members and SCM experience of the CEO (model 4). Here we also find a negative, however somewhat weaker relationship with operating profit margin.

Table 3-7: Effects of CSCO presence and SCM experience on operating profit margin.

Variable	Model 1	Model 2	Model 3	Model 4
CSCO _A	-0.24 * (0.10)			
CSCO _B		-0.46 *** (0.12)		
CSCO _C			-0.40 *** (0.09)	
SCM experience in TMT				-0.16 † (0.10)
SCM experience of CEO				-0.36 * (0.18)
N	1,260	1,260	1,260	1,260
CSCO presence	13.1%	12.6%	24.2%	34.5%
Goodness of fit ^a				
QIC	1,066.4	1,046.4	1,039.0	1,060.6
QICC	1,014.4	994.0	986.8	1,004.5

Note: Table shows the parameter estimates of OLS regression using generalized estimating equations (GEE); standard error in parentheses; correlation matrix = independent; dependent variable was standardized; robust variance estimators applied (Liang and Zeger, 1986). We controlled for industry effects using dummy variables for 7 industries based on the ICB classification scheme. Except for healthcare all industry dummy estimates are significant.

^a Information criteria are in small-is-better form.

*** p < 0.001; ** p < 0.01; * p < 0.05; † p < 0.1

3.5 Discussion, implications, and research outlook

Responding to recent calls to deepen our knowledge on functional TMT members (e.g., Menz, 2012) and to conduct large-scale longitudinal studies using content analysis of firms' annual reports (e.g., Buyl, Boone, and Matthyssens, 2011) the objective of this research was to empirically investigate if and to what degree executives responsible for SCM and related

functions are present in corporate upper echelons and if this presence is related to firms' performance. Following an analysis of the TMTs as stated in the section "Executive Officer of the Registrant" in the annual 10-K filings, this study describes and analyzes the prevalence of CSCOs in 211 US companies over 6 years. Our research is the first (1) to empirically examine if and to what extent SCM and related functions are represented by executives in the firms' TMTs, (2) to reveal if differences in the extent of SCM presence in TMTs exist across industries, (3) to investigate the extent to which the CEOs and TMT members have professional experience gained in previous supply chain-related positions, and (4) to make statistical comparisons between the performance of firms having a CSCO or SCM-experienced executives in the TMT and firms that do not.

In the following, we discuss our findings, implications for academia and managers as well as the limitations of our research. We propose future research avenues to continue deepening the knowledge of functional TMT members in general and the CSCO in particular.

3.5.1 Discussion and implications

The findings related to our four research questions warrant discussion. First, in our study we identify a long-term trend for a stronger CSCO presence in TMTs, leading to a gradual increase in supply chain expertise in US corporate upper echelons. The increasing importance assigned to SCM is supported by the fact that more firms have created a new executive-level position with responsibility for SCM on their TMTs, while reducing overall team size. Supply chain-related officers are present in the TMT of almost 30% of the sampled firms at the end of our 6-year window. In turn, this means that in three-fourths of the firms, there are no top management executives with job titles that designate their responsibility for SCM functions. This suggests that although the advantages of SCM practices have been clearly unveiled in the past, SCM has not reached the same status as, for example, finance or marketing. One reason

might be the broad spectrum of definitions with the outcome that “different companies – and even managers in a single company – have different viewpoints, or paradigms, when it comes to the supply chain” (Ayers, 2000, p. 10). Thus, firms need a thorough understanding of what comprises SCM and a clear assignment of SCM and/or the adjacent functions such as logistics to one or more executives in the TMT.

The very high numbers of ‘supply chain professionals on top of the hierarchy’ reported in survey-based studies – ranging from 38% (CSC, 2007) up to 72% (Wilding et al., 2010) – which are in stark contrast to the numbers from the secondary data concerning the presence of CSCOs reported in our study confirm our concerns regarding the lack of a common terminology and a strong selection bias as a result of surveying mostly supply chain professionals. Assessing CSCO presence through survey-based studies will at least depend on the population surveyed and the respondents chosen for the survey. A replication of our study with the same sample (as described in Section 3.3.1), the same coding procedure (e.g., the TMT definition as used in the 10-K filings; distinction between $CSCO_A$ and $CSCO_B$ as described in Section 3.3.3), and over the same time period would result in exactly the same numbers for CSCO presence. As a consequence, we recommend making a distinction between SCM and adjacent functions such as purchasing or logistics (i.e., what we labeled as SCM in its narrow ($CSCO_A$) and wide ($CSCO_B$) meanings). Furthermore, without this differentiation the oppositional trends of $CSCO_A$ and $CSCO_B$ presence would be masked.

Second, the continuously lower $CSCO_A$ presence in some and higher $CSCO_A$ presence in other industries reflects the importance of SCM functions in the respective industries. In contrary, the increased $CSCO_A$ presence in several industries (technology and basic materials industries) reflects the need for SCM expertise on the TMT. Reasons could be the increasing cost pressures due to global competitive intensity and global activities. The multinational electrical products group Siemens, for example, appointed Barbara Kux as its Chief Supply

Chain Officer in 2008. In order to make SCM a source of permanent value enhancement, Kux immediately launched a supply chain initiative to accelerate the benefits from SCM more intelligently and aggressively (FD Wire, 2009). Within a short period of time, Siemens significantly extended its global sourcing activities, reduced the supplier base and improved the material cost productivity by pooling direct purchases to central units and purchasing more volume via e-auctions. This example shows the impact and speed of implementation the installation of the SCM function in the strategic apex via a CSCO can have (Hambrick and Mason, 1984).

Third, the increase of SCM experience in the TMT when a CSCO_A is present suggests that the TMTs of these firms became more supply chain-oriented as a whole rather than just implementing a CSCO_A and sticking to existing functional silos.

Likewise, we found that firms having a CSCO in the upper echelons are led by CEOs having SCM experience as well, suggesting that CEOs employ CSCOs due to similar experiences, beliefs and understanding of business problems rather than to ‘insource’ cognitive values and models to shape the strategic direction. The development that the increase in CSCO presence is accompanied by an increase of SCM-experienced CEOs is in line with the one unveiled by Ocasio and Kim (1999), who found that only 44% of the CEOs had a functional background in production, technical, and operations areas in 1961, but 61% in 1992. Overall, our study does not support the conclusion of Menz (2012) that the findings of Nath and Mahajan (2008) and Angwin, Paroutis, and Mitson (2009) “confirm that functional TMT members often compensate for CEO’s lack of experience in an important functional area and lack of firm specific experience.” (p. 61).

Finally, our research provides a snapshot on the link between operating profit margin and SCM experience in the TMT, respectively CSCO presence. As such, it helps to close the knowledge gap on the firm performance effect of functional TMT members as suggested by

Menz (2012). Our comparison of the groups of firms employing a CSCO with firms not having a CSCO in their TMT reveals that firms with a CSCO underperform firms without a CSCO. At first glance, this result seems to contradict research in other managerial disciplines, which found neither a positive nor a negative effect, such as Nath and Mahajan (2008) for CMOs or just recently, Menz and Scheef (2014) for Chief Strategy Officers. Likewise, this result is not in line with Ellinger et al. (2011), for example, who found that “firms recognized by industry experts for their distinctive SCM competency exhibit superior levels of financial success” (p. 219). Therefore, at first glance, the results of our analysis on the performance effects do not provide strong arguments in favor of anchoring SCM and related functions in firms’ TMT and employing a CSCO.

However, the CSCO presence–performance link might be more multi-faceted and the negative association found in our study could be explained by several factors. First, there is a variety of variables that influence firm performance, and we only capture the presence of a CSCO and SCM experience in firms’ TMTs. We cannot assess whether these variables influence a substantial fraction of firms’ performance. It could be small, and therefore emphasising SCM might only have a small impact on the performance metric we studied. Second, the CSCO effect might be more correctly measured using SCM-specific indicators instead of a ‘more distant’ measure of firm performance or operating profit. Third, it could well be that firms with low performance or low earnings employ a CSCO in order to improve operations, reduce cost and perform better in the future. For example, the Siemens CSCO, Barbara Kux, was installed to launch new SCM initiatives since deficiencies existed before and company performance was low in 2008 (FD Wire, 2009). As such, more firms with lower performance might have or install a CSCO than firms that do well.

In sum, due to the still limited knowledge on the CSCO presence–performance link, our results should not advise against anchoring SCM and related functions in firms’ TMT. We

rather still need more exploration of this important research stream (Sanders and Wagner, 2011) before drawing conclusions about the right to exist of CSCO in TMTs.

3.5.2 Limitations and areas for future research

As with every study, ours is not without limitations, most of which are rooted in the methodology and the set scope. First, the generalizability is affected by the geographic, industry, and firm dimension scope. While our findings are representative of large US corporations, other countries might practice different organizational strategies and have a different understanding of SCM (Halldórsson, Larson, and Poist, 2008). Therefore, the level and development of SCM presence in TMTs could be different outside of the US. Second, even within the same geographic region, small and medium-sized firms might have different organizational approaches (Trent, 2004). Third, we excluded non-industrial sectors and non-profit firms which probably have divergent TMT compositions. Therefore, we urge caution in generalizing our results to other countries, industrial sectors, and corporations of small and medium size. Fourth, we cannot establish causality (only association) between CSCO presence and firm performance. Finally, due to restrictions on the availability of the SEC files, availability lags in the databases of commercial providers (e.g., *Compustat*) and the use of lagged effects of the performance measures, our analyzed time window covers only up to 2009. Hence, potential changes in CSCO presence and performance that might have occurred in the past three years are not covered by our analysis.

Due to the limited research on our topic, an implicit objective of our study is to initiate additional research projects at the intersection of strategic management, TMT research, and SCM. First, the interest of the topic is not limited to US corporations and research focusing on a broader geographic scope could provide meaningful comparisons as, for example, the studies by Nath and Mahajan (2008) and Ronay (2006) show with respect to the presence of

Chief Marketing Officers in the US and the UK (see also Table 3-2). As firms collaborate on an international level, studies of such collaboration in other geographic settings could identify whether or not the collaboration is influenced by different leadership structures or different backgrounds of TMT members. Second, a large scale survey, similar to Ammer's (1974) study, among SCM and general managers could reveal the SCM executives' perceived standing in the firm and the top managements' perception of the SCM function. Third, the identified trends uncover new knowledge gaps. For example, why do firms elevate the SCM function from lower hierarchy levels to the strategic apex of corporate decision making? Is it due to increased legal requirements, which kicked off the prevalence of the CFO in the 1980s (Zorn, 2004)? Or is it rooted in economic factors, such as in the mid-1970s when the oil crisis and the associated shortages on the supply markets fostered the importance of the purchasing function (Ellram and Carr, 1994; Kraljic, 1983)? Answers to these questions would give supply chain scholars, professionals, and firms valuable support about possible developments. Fourth, the initial empirical results concerning CSCO presence and firm performance warrant further investigation. Fifth, more research is needed on the antecedents of CSCO presence – similar to Nath and Mahajan (2008) for the CMO. This would also allow to unveil other main and contextual factors influencing firm performance. Finally, we call for extended panel studies on the overall composition of the TMT to find evidence of the ways in which the increased heterogeneity caused by SCM executives influences the organizational outcomes of firms.

4 STUDY 3: When do firms employ Chief Supply Chain Officers in their top management teams?

This chapter is based upon the paper:

When do firms employ chief supply chain officers in their top management teams?, co-authored with Stephan M. Wagner and Christoph Bode, unpublished manuscript as of June 2015.

4.1 Introduction

Recent studies in the area of strategic supply chain management (SCM) suggests that more and more firms have a Chief Supply Chain Officer (CSCO) present in their top management team (TMT) (e.g., Aquino and Draper, 2008; CSC, 2007, 2010, 2012; Eyefortransport, 2011; IBM, 2009; SCM World, 2010; Wagner and Kemmerling, 2014; Wilding et al., 2010). But, although the research on functional executives in TMTs has become a prominent area in strategic management (Menz, 2012), this field is rather underdeveloped with respect to SCM compared to other disciplines such as marketing (Abernathy, Kubick, and Masli, 2013; Boyd, Chandy, and Cunha Jr., 2010; Nath and Mahajan, 2008, 2011; Weinzimmer et al., 2003), finance (Zorn, 2004), information technology (Li et al., 2006; Medcof, 2008; Smaltz, Sambamurthy, and Agarwal, 2006), communications (Verhoeven, 2014) or strategy (Menz and Scheef, 2014), who have analyzed ‘their’ functional TMT member in the recent past (Menz, 2012). Thus, many unresolved and unexplored research issues exist in the SCM context.

This research gap is rather unexpected as ample research unveiled the importance of top management support for implementing supply chain strategies (e.g., Fawcett, Magnan, and McCarter, 2008; Gibson, Mentzer, and Cook, 2005; Lancioni, 2000; Mangan and Christopher, 2005; Petersen, Frayer, and Scannell, 2000), and that the SCM expertise on the TMT also affects the likelihood and speed of transforming supply chain strategies and programs into practice (Fawcett, Magnan, and McCarter, 2008).

We believe that generating insights in this area is of very high value for various target groups and compelling for the following reasons. First, recently published research by Thomas et al. (2011) unveiled that the structure of internal supply chain organizations and aspects of strategic leadership have been identified by experienced SCM practitioners as the most managerially relevant and impactful supply chain issues. The study not only revealed a

“need for a true supply chain organization within a firm” (p. 660) and suggestions “that traditional functions like transportation, inventory, warehousing, purchasing, and manufacturing needed to be more integrated and pulled closer together by a common mission within a single supply chain group” (p. 660) but also that “organizations lacked any clear leadership in supply chain management and the overall supply chain strategy was ambiguous” (p. 662) and that “managers described their need and desire for a leader with a well-articulated vision who understood all aspects of supply chain management” (p. 662). Thus, contributing to the research at the intersection of SCM, strategic management, organization, and strategic leadership would give scholars more empirical evidence to support firms in finding the optimal corporate structure and companies would gain insights in how to set up their supply organizations and to select and cultivate upper-level executives (Johnson, Leenders, and Fearon, 1999; Mulder, Wesselink, and Bruijstens, 2005; Richey and Wheeler, 2004).

Second, as “the nature and effectiveness of organizational responses vary in part with the characteristics and composition of the TMT” (Nielsen, 2009, p. 277) the strategic orientation of a firm is often mirrored by the composition of its TMT (Boal and Hooijberg, 2000) and its TMT functional diversity (Knight et al., 1999). Empirical evidence, for example, suggests that firms having CEOs with a finance background make more diversified acquisitions (Palmer and Barber, 2001) and are more diversified themselves (Jensen and Zajac, 2004) than are firms that do not have a CEOs with a finance background. Anecdotal evidence further support the proposition, that competitors and suppliers could more accurately predict companies’ strategic intentions as the following example shows. After Siemens Ltd. appointed Barbara Kux as Chief Supply Chain Officer in 2008 in order to make SCM a source of permanent value enhancement she started immediately a supply chain initiative to accelerate the benefits from SCM more aggressively (FD Wire, 2009). Within a short period of time, Siemens

significantly extended its global sourcing activities, reduced the supplier base, and improved the material cost productivity by pooling direct purchases to central units and purchasing more volume via E-auctions. This example shows the impact and speed of implementation the installation of the SCM function in the strategic apex can have and that competitors and suppliers could be better prepared when having a more solid basis for forecasts.

Regarding another interest group, investors, research provided interest findings in this context. Just recently, Hendricks, Hora, and Singhal (2015) showed that appointments of CSCO to the TMT induced a positive stock market reaction on the day of the announcement, which is even more positive when the position is newly created instead of changing just the individual executive on this position. Zorn (2004) also revealed that “adding a CFO to the upper echelons seems to signal to investors and rating agencies the firm’s eagerness to regain a better rating”(p. 361). Higgins and Gulati (2006) found that having a Chief Scientific Officer with related experiences is associated to the decision of institutional investors to invest in young firms. And Abernathy, Kubick, and Masli (2013) also provide evidence that Chief Marketing Officer presence in TMTs is economically relevant to shareholders of the firm. All these results indicate that investors might benefit from our study as well.

Finally, we contribute empirically and methodologically to the research stream on upper echelons in general and functional executives in particular. For example, we explicitly separate the influence of upper echelons factors, i.e., factors related to the background characteristics of the CEO and the top management team, from those related to structural factors and unveil which seem to have a greater impact on the composition of TMTs. Further, we follow Buyl, Boone, and Matthyssens (2011) who promoted large-scale longitudinal studies of secondary data in upper echelons research; an approach, according to Menz (2012), ostensibly neglected to study functional executives.

Our paper proceeds as follows. The next section gives a brief overview on the literature relevant to our study. Then, we describe the theoretical framework on which our hypothetico-deductive model is based. Following the description of our sample and methodology we describe the findings of our analysis, discuss the implications for managers and scholars and conclude with identifying avenues for future research.

4.2 Literature review

In recent years, management scholars have placed an increased emphasis on investigating functional executives (Menz, 2012) such as studies on Chief Marketing Officers (e.g., Abernathy, Kubick, and Masli 2013; Boyd, Chandy, and Cunha Jr., 2010; Nath and Mahajan, 2008, 2011; Vafeas and Vlittis, 2009; Weinzimmer et al., 2003), Chief Information Officers (e.g., Grover et al., 1993; Li et al., 2006; Preston, Karahanna, and Rowe, 2006; Smaltz, Sambamurthy, and Agarwal, 2006), Chief Technology Officers (e.g., Medcof, 2008), Chief Operating Officers (e.g., Dobbin et al., 2003; Hambrick and Cannella, 2004; Zhang, 2006), Chief Officer of Corporate Social Responsibility (e.g., Strand, 2013), Communications Officers (Verhoeven, 2014), Chief Strategy Officers (e.g., Menz and Scheef, 2014) and on Chief Financial Officers (e.g., Mian, 2001; Zorn, 2004).

After thoroughly examining this research stream we have identified three main areas in this research area. The first area of interest focuses on two facets: (1) the organizational visibility of a specific function in the upper echelons (degree of presence), i.e., to which degree the analyzed function has been institutionalized in TMTs and can a trend towards an increasing presence be observed over time, and (2) on the composition and structure of the upper echelons, i.e., to which degree consists the entire TMT of functional and general managers.

4.2.1 Degree of functional executive presence

The first facet is rather developed in the SCM context as in recent years, academics, consultancies, and others have directed attention to the organizational status and visibility of both firms' SCM department in general (e.g., Kim, 2007; Mollenkopf, Gibson, and Ozanne, 2000; Monczka et al., 2005) and the position of the leading supply chain executive in the corporate hierarchy (e.g., Aquino and Draper, 2008; CSC, 2007, 2010, 2012; Eyefortransport, 2011; Heckmann, Shorten, and Engel, 2003; IBM, 2009; SCM World, 2010; Wagner and Kemmerling, 2014; Wilding et al., 2010), unveiling that – despite methodological shortcomings (Wagner and Kemmerling, 2014) – more and more firms not only report having an executive officer who manages the supply chain function but also that this executive is part of the TMT. For example, a survey conducted by CSC, the *Supply Chain Management Review*, and Neeley Business School at Texas Christian University (CSC, 2012) revealed that 51% of the responding firms have “an executive officer who manages all supply chain functions” (p. 9). Considering the figures of former surveys of 38% from 2007 (CSC, 2007) and 49% from 2010 (CSC, 2010), more and more firms report having a top executive officer who is responsible for SCM. Further, SCM World (2010) and Wilding et al. (2010) unveiled, both based on survey data, that on average 54% and 72% respectively of the respondents have an executive who is responsible for SCM. We were able to confirm this trend in the first study of our research series on CSCO (Wagner and Kemmerling, 2014). In this study we unveiled the number of firms having a CSCO in its TMT more than doubled in the time frame 2004-2009. However, the degree of presence we encountered, i.e., 8% of the firms having a CSCO in 2004 and 18% in 2009, is significantly lower compared to the studies mentioned above.

Outside of SCM, an abundance of research offer interesting insights as well on the status and development of the presence of functional executives in the TMT. The selected studies,

which we summarize in Table 4-1, show the percentage of firms in the respective sample having an executive of the analyzed function in their TMT.

Table 4-1: Presence of selected functional disciplines in corporate upper echelons.

Source	CXO	Time frame	Geographic scope	Sampling frame	Sample size	Percentage of firms with CXO presence
Zorn (2004)	CFO	1963-2000	USA	Fortune rankings, Million Dollar Directory	429	1963 = 0% 2000 = 80% ^b
Menz and Scheef (2014)	CSO	2004-2008	USA	Firms selected from S&P 500 index	147	2004 = 34% 2008 = 49% ^b
Nath and Mahajan (2008)	CMO	2000-2004	USA	Firms in <i>Compustat</i> with revenue >250 m US\$	167	2000 = 41% 2001 = 42% 2002 = 44% 2003 = 41% 2004 = 39%
Ronay (2006)	CMO	2006	United Kingdom	FTSE UK 100 Index	100	2006 = 14%
Verhoeven (2014)	CO	2012	Global	Financial Times Global 500 companies	467	2012 = 24% ^a
Hambrick and Cannella (2004)	COO	1987-1996	USA	Firms in <i>Compustat</i> with revenue >200 m US\$	404	1987 = 20% 1996 = 17.5% ^b
Wagner and Kemmerling (2014)	CSCO	2004-2009	USA	Firms selected from Dow Jones STOXX Americas 600 index	211	2004 = 8% 2005 = 11% 2006 = 12% 2007 = 14% 2008 = 16% 2009 = 18%

Note. Abbreviations: CFO = Chief Financial Officer; CMO = Chief Marketing Officer; CO = Communications Officer; COO = Chief Operating Officer; CSO = Chief Strategy Officer; CSCO = Chief Supply Chain Officer.

^a Relative distribution by region: North America = 24%, Australia = 29%, Europe = 24%, Africa = 14%, Asia = 7%, Middle East = 50%.

^b Only data for start and end of time frame given. Yearly figures are available in original source.

With respect to the second facet (the composition and structure of the upper echelons) Guadalupe et al. (2014) found that the size of TMTs in large US firms doubled from 1986 to 2006 (from five persons to ten persons) and that this growth was largely driven by the increase in the number of functional managers compared to general managers. The average number of functional managers increased from 3.1 in the late 1980s to 6.7 in the mid 2000s. Guadalupe et al. (2014) explained this shift in the composition of TMTs towards functional

managers first, with the trend of large US firms to become less diversified in response to global competition and second, that firms have dramatically increased investments in IT which offer opportunities for synergies.

4.2.2 Antecedents of functional executive presence

The second area on functional TMT executives elaborates on the antecedents of having a functional TMT member, i.e., which factors are associated with firms' choice to have an executive responsible for a specific function in their TMT. To the best of our knowledge, no SCM research exists analyzing the determinants of installing a CSCO in the TMT whereas research on other functional TMT members is more advanced and these insights could be applied to analyze possible antecedents of having a CSCO (Menz, 2012).

Nath and Mahajan (2008), for example, found out that the following factors are positively associated with CMO presence in TMTs: high levels of expenditures for R&D (innovation) and advertising (differentiation), the existence of a corporate branding strategy, the CEO being new in the firm when starting his position, and having marketing experienced executives in the TMT. Having executives with general management experience on the other hand hampers the presence of CMOs. Both, the other hypothesized factors, i.e., a firm's diversification and the market concentration of a firm's main industry, and all control variables (e.g., prior firm performance or CEO tenure) were found to have no association with CMO presence.

In Table 4-2 we have created a comprehensive overview in order to systematically identify the variables applied in similar studies to unveil the antecedents of CxO presence in TMTs. This list, which was an important input for our theoretical framework, not only summarizes the research results of the included studies but also provides interesting

differences between the factors. For example, while the CEO tenure decreases the likelihood of COO presence in the TMT, it has no association to CMO presence. Diversification, which has been applied in all studies, has both positive and negative relationships to the presence of functional executives. These results underline the importance for research on upper echelons and functional executives, as the factors which explain a specific executive's presence are rather individual and mere adoption of relationships is likely to yield wrong conclusions.

Table 4-2: Contextual factors applied in past research on studying CxO presence.

Factors	CFO		CSO		CMO		COO		Description
A. Upper echelon factors									
<i>A.1 CEO-related</i>									
CEO duality			C	+			M	++	BV with 1 = CEO is board chairman
Finance/law CEO ^a	M	o					M	++	BV with 1 = CEO with background in finance/law
CEO never COO							M	++	BV with 1 = CEO lacks experience as COO
Outsider CEO					M	++	M	++	BV with 1 = CEO spent zero (CMO) or less than two years (COO) in the firm before being appointed
COO presence	M	++	C	-	C	o			BV with 1 = COO is present in TMT
CEO tenure			C	-	C	o	C	--	Length of time CEO has been on his/her position
CEO succession	C	++							BV with 1 = CEO succession event occurred
CEO seniority	C	--							Length of time CEO has been employed with his/her firm
<i>A.2 TMT-related</i>									
CFO density	M	++							Percentage of sample firms reporting a CFO
TMT role interdependence			M	++					Heterogeneity index (Blau, 1977) based on six functional categories of the TMT members' titles: production/operations, R&D, marketing, special tasks (e.g., SCM), and general management
TMT marketing experience					M	+			Proportion of the executives in the TMT with experience in marketing and/or marketing-related functions (sales, advertising, brand management, customer service)
TMT general management experience					M	-			Proportion of the executives in the TMT with experience as a head of a division or region or as an executive without any specific functional responsibilities
TMT divisionalization					C	O			Proportion of executives in the TMT who are divisional heads
Strategic Planning Vice President	C	--							BV with 1 = firm reports having a vice president strategic/corporate/long-range planning
Finance Vice President	C	--							BV with 1 = firm reports having a vice president finance
Existence of heir apparent for CEO							C	--	BV with 1 = at least one executive in the firm classified as 'Heir apparent'

Table 4-2 (continued): Contextual factors applied in past research on studying CxO presence.

Factors	CFO	CSO	CMO	COO	Description				
B. Firm factors									
<i>B.1 Structure-related</i>									
Firm size	C	o	M	o	CMO/CSO = revenue; CFO = assets; CMO = no. of employees				
Firm age	C	--			Firm age since founding in years				
Diversification	M	+	M	++	Entropy measure (mostly according to Palepu, 1985) based on a firm's revenues in different segments				
Acquisition activity			M	++	COO = count of acquisitions in t-1 that were at least 2% of focal firm's size; CSO = avg. no. of acquisitions over past three years				
Alliance activity			M	o	Average number of new alliances over the past three years				
Innovation				M	++	Firm's R&D intensity (R&D expenditures to revenue)			
Differentiation				M	++	Firm's advertising intensity (advertising expenditures to revenue)			
Corporate Branding				M	++	BV with 1 = firm has corporate branding strategy according to the definition of Rao, Agarwal, and Dahlhoff (2004)			
Firm's consumer profile				C	o	BV with 0 = B2B-profile; 1 = B2C or mixed profile			
<i>B.2 Performance-related</i>									
Firm performance	M	-	C	o	Return on assets or sales				
Revenue growth				C	o	Revenue growth between t - 2 and t - 1			
Leverage	M	-			Debt-to-equity ratio				
Market-to-book ratio	M	o			Market value of common equity / by book value of common equity				
Credit rating drop	M	++			BV with 1 = credit rating was lowered in any of the 3 previous years				
C. Industry factors									
Industry performance			C	o	Industry ROA (median) and industry MTB (median)				
Industry dynamism					M	o	3 industry indicators: growth, instability & R&D intensity		
Industry dummies	C	^b			C	o	M	^b	Binary variables; amount depending on spectrum
Market concentration					M	o			Herfindahl-Hirschmann index at the 2-digit SIC code level
D. Other factors									
Year	M	++	C	++	C	o	C	--	Continuous year variable
Inflation	M	+							Consumer price index, calendar year average

Note. Keys: C = used as control variable, M = used as main variable; BV = binary variable; -- = significant negative association across all models, - = significant negative association across some models, o = no significant association, + = significant positive association across some models; ++ = significant positive association across all models.

In the interest of space: interaction effects used in the studies are omitted, some factors are omitted due to redundancy to other factors (e.g., COO appointment).

^a in the CMO study (Zorn, 2004), the variable is "Finance CEO". ^b coefficients for industry controls are not reported, number of dummies used, for significance refer to original study.

4.2.3 Consequences of functional executive presence

In the third research area, scholars focus primarily on performance implications of having a specific functional TMT executive, i.e., the linkage between the presence of functional executives and a variety of organizational outcomes.

The positive effects of modern SCM practices on firm performance have been documented by a large amount of empirical studies (e.g., Ellinger et al., 2011; Frohlich and Westbrook, 2001; Hsu et al., 2008; Li et al., 2006; Shin, Collier, and Wilson, 2000; Tan et al., 1999; Tan, Kannan, and Handfield, 1998; Tracey, Lim, and Vonderembse, 2005;). Studies explicitly focusing on the performance consequences of CSCO presence, however, are rather rare. Based on surveying supply chain professionals instead of using more objective secondary data the following three studies give interesting implications on the existence and position of SCM executives. Heckmann, Shorten, and Engel (2003) unveiled that “in companies where responsibility for SCM resided below senior management, annual savings in the cost to serve customers are just 55% of what they are when SCM is a component of the overall business strategy” (p. 2). Moreover, industry leaders “are more likely to have a single officer in charge of a wide span of supply chain management activities and functions” (CSC, 2010, p. 10). And SCM World (2010) recently revealed that best-in-class companies are 50% more likely to have an executive position end-to-end supply chain responsibility.

In our first study on CSCO (Wagner and Kemmerling, 2014), we compared the performance of firms having a CSCO in the TMT with firms without a CSCO and revealed that firms with a CSCO underperform latter firms. This result is different to research in other managerial disciplines, which found either a positive relationship to performance outcomes, such as Marcel (2009) regarding the presence of a COOs, or which found no effect, such as Nath and Mahajan (2008) for CMOs or, just recently, Menz and Scheef (2014) for Chief Strategy Officers.

4.3 Conceptual background

The basic motivation of this study is to analyze why an increasing number of firms, although the presence is still rare in relative terms, decide to have the SCM function explicitly represented via an executive in the upper echelons while other firms decide against doing so. Thus, we are interested to examine factors influencing the composition of TMTs in general and the rationale for CSCO presence in particular.

In order to select the appropriate theoretical backbone we first identify the decision makers having the authority to influence the TMT composition with respect to the individuals, size, and structure. This authority is formally assigned to the firms' Board of Directors, which has the codified right to select and remove executive officers within their annual meeting or at any other regular meeting if the case requires. However, although the formal right to appoint individual executives lies with the Board of Directors (BoD), the existing TMT, especially the CEO, certainly influence the BoD by making suggestions and providing rationales in case further executive positions are needed. Furthermore, in many companies, such as *Baker Hughes Inc.*, the direct possibility to install TMT positions already exists for the executive board as the BoD "may empower the Chief Executive Officer to appoint such other officers as the business of the Corporation may require, each of whom shall hold office for such period, have such authority and perform such duties as are provided in the Bylaws or as the Board of Directors may from time to time determine" (Baker Hughes, 2014, p. 20). Thus, the decision to install a functional executive such as the CSCO is solely driven by the assessment of the existing upper echelons on the necessity to change the size and/or structure of the current TMT. In the following, however, we follow similar studies on functional executives (e.g., Menz and Scheef, 2014; Nath and Mahajan, 2008) and continue only with the executive team as the center of gravity and leave the BoD out of scope.

Based on this foundation, the upper echelons theory (Hambrick and Mason, 1984) is of paramount relevance to our study for the following reasons. First, the upper echelons theory is based on the premise that “top executives matter” (Hambrick and Mason, 1984, p. 194). This issue, which has provoked an everlasting debate among strategic management scholar (see Finkelstein, Hambrick, and Cannella, 2009 for an excellent review), is important for our framework as we have identified above the executive team as one of the main driver in changing the TMT composition. That is, executives in our model matter, albeit by law. Second, the upper echelons theory considers only strategic choices (Child, 1972). This is consistent with our study as we regard the decision to install a CSCO as strategic, e.g., in order to change the strategic direction of the firm. Third, strategic choices are made under conditions of bounded rationality (Cyert and March, 1963; March and Simon, 1958). This setting is important as it reflects the situation the decision making executives in our framework are facing as TMTs, especially the CEO, are permanently confronted with complex decisions, conflicting goals, and thus cannot scan every aspect of the organization and its environment. Thus managers are expected to economize on such efforts by working collectively as a team (Carpenter, Geletkanycz, and Sanders 2004). Therefore, the upper echelons theory is well applicable as matching our premises.

The basic idea of the upper echelons perspective is that top executives make strategic choices on the basis of their cognition and values and that the organization becomes a reflection of its TMT (Hambrick and Mason, 1984). But, as an executive’s cognitive base, values, and perceptions are almost unobservable, Hambrick and Mason (1984) suggest observable managerial characteristics, such as the executive’s educational background, age, or the number of years with the company or within the industry, as adequate surrogates to partially explain strategic choices and performance in organizations.

Although the upper echelons perspective focuses on executive's characteristics as predictor for firms' strategic choices it does, however, not neglect the explanatory power of other factors as "the combination of certain situational conditions and upper echelon characteristics will lead to strategic choices that could not have been predicted as strongly by knowing only one or the other" (Hambrick and Mason, 1984, p. 197). Based on this our theoretical framework is enriched by the contingency theory as its basic premise is that organizational design decisions are contingent on environmental conditions.

The application of this notion to our context, i.e., that the TMT composition in general and the antecedents of functional executive presence penetrates inherently different factors, such as individual, team, firm, and industry levels, was recently warranted by different TMT researchers (e.g., Boone and van Witteloostuijn, 2007; Carpenter, Geletkanycz, and Sanders 2004; Nielsen, 2009). We further follow the proposition of Nielsen (2009) that "the inclusion of different level antecedents of TMT composition is a fruitful area of research" (p. 295) and analyze the influence of several other factors beyond upper echelons factors on the presence of CSCO, especially which are firm and industry related.

4.4 Model development and hypotheses

Following Hambrick and Mason's (1984) upper echelons perspective, just focusing on single executives instead of the entire TMT would be too myopic, as the "attention to executive groups, rather than to individuals, often yields better explanations of organizational outcomes" (Hambrick 2007, p. 334). Therefore, in order to analyze the antecedents of CSCO presence in corporate upper echelons, only the consideration of the *entire* TMT provides a full picture (Cannella, Park, and Lee 2008; Carpenter, Geletkanycz, and Sanders 2004). However, we acknowledge the superior position of the CEO, at least due to its authority to install new

executives in many firms, and therefore consider the CEO and the TMT separately within the upper echelons factors.

Furthermore, upper echelon theorists (Finkelstein and Hambrick, 1990; Hambrick and Finkelstein, 1987; Hambrick and Mason, 1984) not only argue that it is necessary to consider the entire TMT instead of single executives as described above but also, that *all* background characteristics of TMT members determine firms' strategic choices and, thus, its strategic direction. Therefore, our aim is to cover a broad spectrum of socio-demographic attributes as the diversity of a team reflects the degree to which the individual team members differ on certain characteristics. For example, the age and tenure diversity within the TMT might influence the communication patterns among the TMT members and the risk attitude with respect to decision making processes. However, it is important to note that the rationale behind each characteristic is different and the simultaneous consideration may have weakening or even opposing effects (Nielsen, 2009).

4.4.1 Upper echelons factors

4.4.1.1 Functional experience in supply chain management

Already decades ago (e.g., Dearborn and Simon, 1958; Kefalas and Schoderbek, 1973; Walsh, 1988), researchers determined an association between managers' functional background and what they perceive, and that managers' perceptions influence their strategic choices and organizational performance (Hambrick and Mason, 1984). Although these studies have produced equivocal and divergent results and despite flaws in their scope and methodology (Finkelstein, Hambrick, and Cannella, 2009; Waller, Huber, and Glick, 1995), they initiated valuable research and the functional experience of executives has become one of the most often confirmed executive background characteristics with the potential to affect corporate

strategy (Jensen and Zajac, 2004). The basic premise of functional experience among the TMT is, that “executives with similar functional background experiences tend to converge on similar understandings of business problems and appreciate similar solutions to these problems” (Jensen and Zajac, 2004, p. 509). Following this reasoning, SCM might have a different standing in firms whose top executives have experience in SCM or a related function than in firms without such executives. Moreover, it is necessary to analyze the functional experiences of all executives as most strategic choices are set by the entire TMT and a high degree of SCM expertise among the top management might influence the perceived importance of having a CSCO. This is especially true for CEOs given their special position, status, and the empowerment to install executive officers without consulting the Board of Directors.

Taking the incumbent’s perspective, i.e., that of the CSCO in our case, research by Nielsen (2009), who applied the attraction-selection-attrition framework (Schneider, 1983) and the similarity-attraction paradigm (Byrne, 1971) to demographic characteristics, and not only to personal attributes or attitudes, suggests that existing TMT members having a SCM background are favorable to new executives having a similar background, such as the CSCO, and that potential CSCOs are more attracted by TMTs in which the SCM mindset is more pronounced due to executives having a SCM career history. Thus,

Hypothesis 1: *The likelihood of CSCO presence in a firm’s TMT is positively related to*

- a. the degree of experience in SCM functions of a firm’s CEO.*
- b. the degree of experience in SCM functions among a firm’s TMT executives.*

4.4.1.2 Tenure

Past research has provided considerable empirical evidence that an executive’s tenure, i.e., the time an executive has been on his/her position, influences this executive’s willingness to

initiate strategic or organizational changes. The prevailing result is, despite the various research settings, that the higher the tenure of an executive, the less likely (s)he tends to make major changes in their organization (Finkelstein, Hambrick, and Cannella, 2009) such as installing an executive solely responsible for a single function.

Similar studies have also analyzed the effect of tenure, especially of the CEO, on the presence of a functional executive with different results. Menz and Scheef (2014), for example, found that the shorter the tenure of the CEO, the more likely is the presence of a Chief Strategy Officer in this firm's TMT ($p < 0.05$). In contrast, Nath and Mahajan (2008) found no association between the tenure of the CEO and the likelihood of Chief Marketing Officer presence in a firm's TMT. The above discussion is reflected in the following hypothesis:

- Hypothesis 2:** *The likelihood of CSCO presence in a firm's TMT is negatively related to*
- a. *the tenure of its CEO.*
 - b. *the average tenure of its TMT.*

4.4.1.3 Seniority

Although the tenure of an executive and his/her seniority, i.e., the time (s)he has been with his/her current organization (also called 'organizational tenure') are conceptionally nested (Finkelstein, Hambrick, and Cannella, 2009) the length of both attributes might differ significantly, i.e., while the tenure of an executive might be short, the seniority may be many times higher. Therefore, and due to empirical results in the past, we consider the seniority separately as an executive background characteristic with the potential to influence the strategic choices of individual managers or the entire TMT (Hambrick and Mason, 1984).

Already Hambrick and Mason (1984), based on early work (e.g., Cyert and March, 1963; March and March, 1977), supposed that "executives who have spent their entire careers in one

organization can be assumed to have relatively limited perspectives” (p. 200). As the SCM function can be regarded as rather novel in firms’ organizations in general and their TMTs in particular, we expect that a limited perspective due to a long seniority has an effect on the presence of CSCO.

Various studies (e.g., Finkelstein and Hambrick, 1990; Gabarro, 1987; Hambrick, Geletkanycz, and Fredrickson, 1993; Wiersema and Bantel, 1993) furthermore showed the longer the seniority of executives is, the stronger are they committed to the status quo, current organizational profiles, and established policies, all of which hamper strategic change. That the seniority is a relevant factor in analyzing the antecedents of having a functional executive was, for example, shown by Zorn (2004). He examined the rise of chief financial officers among US firms during the period 1963-2000 and found that the shorter the employment of the CEO with its firm the less likely is the addition of a chief financial officer to the TMT.

The above discussion is reflected in the following hypothesis:

- Hypothesis 3:** *The likelihood of CSCO presence in a firm’s TMT is negatively related to*
- a. *the seniority of its CEO.*
 - b. *the average seniority of its TMT.*

4.4.1.4 CEO outsider

From a scholarly and managerial perspective the replacement of top executives, especially the CEO, has been consistently regarded as major event for an organization and “widely thought to be a critical decision that influences a firm’s future direction and effectiveness” (Karaevli, 2007, p. 686). Therefore, the study of antecedents and consequences of selecting a new CEO from inside or outside an organization has been of paramount interest and subject of an extensive volume of research (Finkelstein, Hambrick, and Cannella, 2009).

Hambrick and Mason (1984) summarized important research results within this stream (Carlson, 1972; Helmich and Brown, 1972; Kotin and Sharaf, 1967) and concluded that “chief executives brought in from the outside tend to make more changes in structure, procedures, and people than do chief executives promoted from within” (p. 199). Referring to Carlson (1972), Hambrick and Mason (1984) further mentioned possible reasons for this behavior of outsiders such as a lesser commitment to the status quo or to signal strategic change to internal and external stakeholders, whereas the desire of new chief executives to “create new, loyal lieutenants” (p. 199) is very interesting for our study.

Existing studies support the notion, that a CEO’s origin influences the presence of a CxO. Nath and Mahajan (2008) in their study on the factors associated with the likelihood of chief marketing officer presence in firms’ TMTs unveiled, that this functional executive is significantly ($p < 0.05$) more often present when the firm’s CEO is an outsider. In addition, Hambrick and Cannella (2004) show that CEOs were more likely to have COOs if they were hired from outside.

Based on the conceptual discussion above and the empirical results of similar studies we expect a different degree of CSCO presence when the CEO is an outsider leading to the following hypothesis:

Hypothesis 4: *The CEO of a firm being an outsider when installed on his position is positively related to the likelihood of CSCO presence in a firm’s TMT.*

4.4.1.5 CEO duality

Hambrick and Cannella (2004) argue and unveil that a CEO who is also responsible for, among others, “chairing and orchestrating the board’s activities, chairing meetings of shareholders, and interacting with external parties ranging from creditors to regulatory

bodies” (p. 965) additionally to his/her CEO responsibility spectrum, is open to having other executives in order to reduce complexity and get know-how while retaining control over key resources. Within the research stream on studying functional TMT members, other scholars have analyzed the linkage between CEO duality and presence later as well. Menz and Scheef (2014), for example, unveiled that having a chief strategy officer is more likely in firms in which the CEO is also the chairman ($p < 0.1$).

Due to the results in prior research studies, we also include this factor in our study and hypothesize the following:

Hypothesis 5: *The CEO of a firm simultaneously being the chairman of the board (CEO duality) is positively related to the likelihood of CSCO presence in a firm’s TMT.*

4.4.1.6 TMT size

Prior research has used the size of the TMT, i.e., the mere number of executives in the upper echelons, mostly as control variable or, less often, as a predictor of organizational outcomes (e.g., Cooper and Bruno, 1977; Eisenhardt and Schoonhoven, 1990; Hambrick and D’Aveni, 1992; Wiersema and Bantel, 1992). It was, however, used in neither study on the presence of functional executives (refer to Table 4-2), although conceptual and empirical evidence has unveiled the theoretical importance of this construct for TMT research (Haleblian and Finkelstein, 1993; Keck, 1990; Merton, 1968). Therefore, we explore the size of the TMT as a factor related to CSCO presence.

Two different lines of reasoning exist within this area. The first is ostensibly simple and straightforward. The larger the team, i.e., the more executive positions exists, the more likely it is that one executive is responsible for SCM. In this context, the findings by Guadalupe, Li, and Wulf (2014) are of interest. They unveiled a significant increase in the size of the

executive teams of large US firms since the mid-1980s of which the main part is associated primarily by an increase in functional managers rather than general managers. These figures suggest that firms tend to increase their functional perspective in upper echelons in order to cope with the differences in the information-processing activities associated with each function.

On the other hand the question arises why firms having large TMTs should add the CSCO position as “the resources available on a team result from how many people are on in” (Hambrick and D’Aveni, 1992, p. 1449). Thus, a large team already provides a brought spectrum of problem-solving capabilities, functional experiences and cognitive resources to formulate and implement the firm’s strategy. Furthermore, larger groups tend to have coordination and communication issues (Blau, 1977) resulting in more discussion and slower decision-making.

Following the above discussion and related to the recent research results we propose the following hypothesis:

Hypothesis 6: *The size of a firm’s TMT is positively related to the likelihood of CSCO presence in its TMT.*

4.4.1.7 Age of TMT members

Already Hambrick and Mason (1984) suggested the importance of top executives’ age on strategic choices and proposed an association between this managerial characteristic and the top executive’s commitment to the status quo and willingness to accept change. Applied in empirical studies, Wiersema and Bantel (1992), for instance, unveiled that firms undertaking strategic change are headed by younger executives. Further, Bantel and Jackson (1989) also

proposed a link between the average age of the TMT and its ability to both recognize change needs and implement appropriate responsive actions.

The underlying reasoning is that older executives tend to be risk averse compared to younger executives (Vroom and Pahl, 1971) leading to be more conservative and biased to keep the existing status (e.g., Stevens, Beyer, and Trice, 1978). Younger managers, on the other hand, pursue more innovative and risky strategies and are more open to organizational changes (Grimm and Smith, 1991) and are more able to assess the need for action arising out of new business concepts – such as supply chain management. Consistent with this rationale, our resulting hypothesis is as follows:

Hypothesis 7: *The average age of a firm’s TMT executives is negatively related to the likelihood of CSCO presence in its TMT.*

4.4.1.8 Presence of SCM-related executive in TMT

In our first CSCO study one objective was on unveiling to which extent SCM is present in upper echelons, either through executives whose responsibilities explicitly include SCM or indirectly by executives, especially CEOs, who had acquired SCM experience in their previous positions. To achieve this objective, however, is not straightforward as there is still no consensus on what comprises SCM (e.g., Li et al., 2006b; Mentzer et al., 2001). The “SCM vision remains fuzzy at most organizations” and “most individuals do not have a clear perception of what SCM means in relation to their tasks” (Fawcett et al., 2008, p. 44).

Based on empirical evidence, an important implication of this study is that it necessitates to distinct between executives responsible explicitly for supply chain management or value chain management and executives responsible for adjacent functions such as purchasing or logistic as the presence of these two groups follow oppositional trends.

Further drawing on the results of Zorn (2004), who found a significant negative association between CFO presence and the existence of a senior-level manager for finance in a top management position, we expect the following:

Hypothesis 8: *The presence of a SCM-related executive in a firm's TMT is negatively related to the likelihood of having a CSCO in this TMT.*

4.4.2 Firm factors

4.4.2.1 Diversification

Research has shown that a firm's diversification strategy determines the degree of homogeneity and task interdependence across business units, which in turn influences the ideal composition of its TMT (Menz and Scheef, 2014; Michel and Hambrick, 1992; Nath and Mahajan, 2008). The line of reasoning, however, is strongly dependent on whether the diversification is related or unrelated.

Rather related business segments share common resources and have interdependent tasks and the related firms are more integrated and thus possess the requisite cohesion and knowledge base in their TMT. The role of top executives in such firms is to coordinate activities across the different units, orchestrate flows among related businesses, and sharing the firm's core resources across all business units (Rumelt, 1974). TMT in relatedly-diversified firms possess knowledge of corporate-wide operating activities in order to exploit potential cooperation opportunities and coordinate inter unit flows (Michel and Hambrick, 1992). In their study Michel and Hambrick (1992) empirically showed that relatedly diversifying firms had more executives with primary responsibilities for tasks such as monitoring the environment, negotiating and making strategic choices in their respective domains (e.g., marketing, sales, operations, etc.).

Highly unrelated firms face a structure that reduces the TMT's complexity in managing the diversification profile (Nath and Mahajan, 2008). In such firms all core functional areas are decentralized to the divisions (Galbraith, 1983). The upper echelons executives limit their role to granting or denying approval (Lorsch and Allen, 1973) and performing financial coordination including capital allocation and controlling (Dundas and Richardson, 1982). The TMT generally omits direct intervention in divisional strategy and does not pursue synergistic relations between divisions (Hoskisson, 1987). Likewise, the backgrounds of the executives in firms with unrelated product diversification are predominantly in finance, law, accounting, and general management mirroring their key tasks of allocating capital via formal planning and budgeting systems, monitoring and sanctioning quantitative measures of performance and divesting business (Dundas and Richardson, 1982)

Thus the diversification strategy affects the structure of a firm's TMT in that it determines which managerial function is needed in the TMT to cope with complexities arising out of the diversified structure.

Hypothesis 9: *A firm's degree of diversification is positively related to the likelihood of CSCO presence in its TMT.*

4.4.2.2 Inventory-related

The optimization of inventories has achieved full top management attention since the 1980s not only because academia unveiled a favorable association between inventory reduction and growth in productivity (Hall, 1983) but also because case studies and anecdotal evidence promoted the importance of this topic (e.g., Denton, 1994). According to the changed perspective, inventory reductions are regarded as source to gain competitive advantage and decrease costs.

In this context we expect a high necessity for CSCO presence in firms either having high values tied in inventory in absolute terms and or in which the inventory has a large share in relative terms. A CSCO anchored in the TMT would not bring the full top management attention needed to permanently optimize this balance sheet item.

This line of reasoning is further supported by applying the empirical evidence of Nath and Mahajan (2008) to our context. They unveiled a strong positive association between a firm's advertising intensity, the existence of a corporate branding strategy and the presence of a chief marketing officer. Both aspects are under the marketing domain and are consequently managed the respective executive. Thus, we argue that in firms in which the inventory is of great financial importance, the presence of a CSCO is more likely because the benefits of an explicit inventory management via an upper echelons position are ostensible. This leads to the following hypothesis:

- Hypothesis 10:** *The likelihood of CSCO presence in a firm's TMT is positively related to the firm's*
- a. *inventory turnover value.*
 - b. *inventory as a percentage of its current assets.*

4.4.2.3 Performance-related

Strategic management research clearly suggests that firms experiencing poor performance are more likely to initiate organizational and strategic changes in order to overcome the current situation (e.g., Cyert and March 1963; Hambrick and Schecter, 1983; March and Simon, 1958; Tushman and Romanelli, 1985). Already Chandler (1962), for example, qualitatively described in his seminal work on strategy and structure that large companies change their basic strategies after showing poor performance in the past. Boeker's (1997) study, on the other hand, is an empirical example indicating that poor organizational performance (as

measured by revenue growth) makes strategic change (as measured by change in degree of diversification) more likely.

Furthermore, the performance of an organization is one of the main factors in the executive succession context (Finkelstein, Hambrick, and Cannella, 2009). This research stream, although only marginally related to our study as it focuses on the individual executive and not on the position, provides interesting findings with relevance to our study. The main one is that, despite the various research settings, samples and performance measures, empirical evidence in this field clearly unveiled poor organizational performance as a likely trigger for changes in the TMT. Whereas the main rationale is to make changes on the individual level, any exchange in the TMT of a firm inevitably changes its composition and heterogeneity, which in turn opens possibilities to install in the TMT not only a new individual but also a not represented function. This suggestion is supported by the study of Zorn (2004) in which his prediction that “firms going through a capital crisis will be particularly susceptible to introducing a CFO” (p. 352) was empirically supported, i.e., poor performance (as measured by return on assets) is associated with the introduction of a Chief Financial Officer. Nath and Mahajan (2008) and Menz and Scheef (2014) on their studies on the on Chief Marketing Officer and Chief Strategy Officer respectively, however, found no significant relationship between prior firm performance and the presence of the respective functional executive.

The above discussion is reflected in the following hypothesis, in which we additionally consider different performance measures following the growing number of researchers in this field (Finkelstein, Hambrick, and Cannella, 2009):

- Hypothesis 11:** *The likelihood of CSCO presence in a firm’s TMT is negatively related to the firm’s preceding*
- a. *firm performance (EBIT margin).*
 - b. *revenue growth.*

A summary of the hypotheses and the factors associated with CSCO presence in corporate upper echelons is depicted in Table 4-3.

Table 4-3: Overview of hypotheses.

A. Upper echelon factors		Prediction
<i>A.1 CEO-related</i>		
H1a	SCM experience CEO	+
H2a	CEO tenure	-
H3a	CEO seniority	-
H4	CEO outsider	+
H5	CEO duality	+
<i>A.2 TMT-related</i>		
H1b	SCM experience TMT	+
H2b	TMT tenure	-
H3b	CEO seniority	-
H6	TMT size	+
H7	Age of TMT members	-
H8	Presence of SCM-related executive	-
B. Firm factors		
<i>B.1 Structure-related</i>		
H9	Product diversification	+
H10a	Inventory turnover	+
H10b	Inventory as % of current assets	+
<i>B.2 Performance-related</i>		
H11a	EBIT margin	-
H11b	Revenue growth	-

Note. + := positive association with CSCO presence, - := negative association with CSCO presence.

4.5 Data and method

4.5.1 Sample

The empirical basis of our analyses consists of a panel of 211 firms, drawn from the Dow Jones STOXX Americas 600 Index, over a five-year period from 2005 to 2009. We selected all firms that (1) were listed in this index at the midterm of 2007, 2008, and 2009, (2) covered the entire time frame of our study, and (3) do not belong to industries where SCM is not of core relevance (media, banking, insurances, real estate, and financial services). Industry

membership was determined via the Industry Classification Benchmark (ICB), which classifies a firm based on its primary revenue source in one of 19 sectors. As shown in Table 4-4, the sample covers a wide range of industries and firms sizes (measured by the number of employees). Of the selected 211 firms, 91% belonged to the Fortune 1000 and 76% to the Fortune 500 in 2009. The data set was pooled to 1055 firm-years (5 years \times 211 firms = 1055 firm-years).

Table 4-4: Sampled firms by industry and size.

Industry sectors	N	in %	Number of employees	N	in %
Industrial goods & services	46	21.8	< 10,000	49	23.2
Consumer goods	38	18.0	10,000 – 49,999	95	45.0
Oil & gas	33	15.6	50,000 – 99,999	32	15.2
Technology	33	15.6	100,000 – 249,999	26	12.3
Consumer services	27	12.8	\geq 250,000	9	4.3
Basic materials	18	8.5	Total	211	100.0
Healthcare	16	7.6			
Total	211	100.0			

Note. All values are based on data of the year 2009.

In a second step, we gathered upper echelon data and information about the presence of a CSCO for the firms in our sample. In congruence with similar studies (for a review, see Carpenter, Geletkanycz, and Sanders, 2004), we define the TMT as the group of persons listed under the caption “Executive Officer of the Registrant” in the annual 10-K filing, which is filed with the Securities and Exchange Commission (SEC) 60 to 90 days after the end of the registrant’s fiscal year (Bragg, 2009). Under this caption, all firms are obliged to list the names and ages of all their executive officers and all candidates for executive offices. Besides the CEO these are mostly the firms’ CXOs, corporate presidents, and vice presidents in charge of principal business units, divisions, or functions (e.g., sales, human resources, finance). Using 10-K filings as source for TMT-related data has several advantages. First, the rules for the 10-K reports are legally codified and apply to all filing firms, second, the 10-K reports are publicly available and cannot be changed, and third, a firm’s 10-K report must be

fully audited by its financial auditors and then approved by the board of directors (Bragg, 2009). Hence, the obtained information, including the specification of the executive officers, are highly reliable and studies like ours can be readily replicated or extended.

Finally, we collected executive-related data (necessary for the hypotheses) from firm's proxy statements, annual reports, corporate websites, and from online databases such as *Forbes* and *Bloomberg Businessweek*. The firm-related data such as financials and structural parameters were extracted from *Compustat* on a firm-year basis

4.5.2 Data coding

One of the authors and an experienced research assistant applied content analysis techniques on the section in each SEC filing providing the TMT (i.e., the section labeled "Executive Officer of the Registrant") to identify all individual executives and enriched our data warehouse with the additionally gathered biographical information. The biographical information from corporate websites and online databases was added in order to gain a broad picture of each officer's experience, previous positions, and deeper insights about the responsibilities in his/her current and/or previous positions. In this context, however, we have to mention that, inherent to our longitudinal research approach, it was impossible to obtain all biographical information for the entire career of each individual executive found in the 10-K reports. Therefore, our numbers related to the executives' SCM experience mark the lower bound and are probably higher in reality.

After working closely together in the design stage to develop a coding schedule and coding tool, and after a pilot coding of 10 firms, the two coders worked independently. Finally, the two coders met to discuss and reconcile all discrepancies. The first author was

consulted on every firm-year that achieved less than 95% agreement. In total we are confident that we have created a high-quality dataset upon which reliable conclusions can be based.

4.5.3 Measures

In the following we describe how the variables in our study were measured at which all variables are measured on an annual basis, i.e., with respect to each fiscal year end date.

4.5.3.1 *Dependent variable*

All our hypotheses make predictions about *CSCO presence in the TMT*. We capture this by means of a binary variable which takes the value “1” if at least one CSCO executive was present in a firms’ TMT and “0” otherwise. An executive is considered CSCO (1) if s/he has the term *supply chain*, *value chain*, or *supply chain management* in the job title, or (2) if the corresponding biographical data states that s/he is responsible for at least one of these functions.

It is important to note that executives who have key words such as *purchasing*, *logistics*, *manufacturing*, *production*, or *operations* in their title or who are responsible for these adjacent SCM functions are explicitly *not* considered as CSCO. The decision to use a narrow definition of a CSCO was based on the still existing ambiguities of what encompasses SCM (e.g., Elmuti, 2002; Fawcett et al., 2008; Larson, Poist, and Halldórsson, 2007; Li et al., 2006b; Mentzer et al., 2001) and on current research results, which highlighted the importance to separate these adjacent function from SCM (Wagner and Kemmerling, 2014). Pooling all SCM-related functions under one umbrella would mask important trends.

4.5.3.2 Independent variables

SCM experience of CEO. The SCM experience of the CEO was binary coded with 1 if the CEO had a position in any functional SCM area prior to his current position and 0 if not.

CEO outsider. This variable was binary coded with 1 if the current CEO of a firm was recruited from outside the company, i.e., this executive was directly appointed CEO when entering the firm, and 0 if not.

CEO tenure and seniority. The tenure of the CEO is measured by the number of years (s)he has been on this position while the seniority is measured by the number of years this executive has been with the firm, i.e., as CEO and on other positions.

CEO duality. This variable was measured by a dichotomous variable coded as 1 if the CEO also holds the position of the chairman of the board of directors and 0 otherwise.

SCM experience in TMT. As with the SCM experience of the CEO this variable was also binary coded with 1 if at least one executive of the TMT had a position in any functional SCM area prior to his current position and 0 if not.

TMT tenure. The Tenure of the TMT is measured by the average number of years the TMT executives have been on their current position while the seniority is measured by the average number of years the TMT executives have been with their current firm.

TMT size. The TMT size is measured by the number of executives reported in the SEC 10-K filing under the caption “Executive Officers of the Registrant” (SEC, 2010).

Age of TMT members. This variable is calculated by averaging the age of each TMT member.

Presence of SCM. The presence of an executive of an SCM adjacent function was binary coded with 1 if at least one executive having key words such as *purchasing*, *logistics*,

manufacturing, or inventory in his title or whose responsibility for one of these functions was stated in the biographical data was present in a firms' TMT and 0 if not.

Total diversification. The entropy measure proposed by Palepu (1985) was used to measure diversification, whereas the product segments that have the same two-digit-level SIC codes are grouped into industry groups.

Inventory turnover. This ratio, showing how many times a firm's inventory is sold and replaced over a period, is annually calculated by cost of goods sold divided by average inventory.

Inventory as percentage of current assets. This variable reflects the relationship of the total value of inventories as a part of a firm's current assets. The total value of inventories in manufacturing companies includes finished goods, work in process, and raw materials and supplies. In non-manufacturing companies finished goods bought for resale is the major portion of the inventories.

EBIT margin. The operating profit margin is measured as operating income before tax and interest (EBIT) divided by total revenue and was obtained from *Compustat*.

Revenue growth. This variable reflects the amount by which the revenue of a firm has grown from $t - 2$ to $t - 1$.

4.5.3.3 Control variables

Industry. This variable captures the industry which is the primary revenue source of each company. FTSE's Industry Classification Benchmark (ICB) scheme was used, i.e., each firm is allocated to one subsector whose definition most closely describes the nature of the firm's business.

Firm Age. The age of a firm is measured annually by the number of years since the firm was incorporated.

Revenues. This variable represents gross revenue and other operating revenue less discounts, returns, and allowances.

4.6 Analysis and results

Table 4-5 shows the descriptive statistics and bivariate correlations (pooled across all firm years) for all variables.

Table 4-5: Descriptive statistics and correlation coefficients.

Variables	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1) Presence of CSCO	0.14	0.35		.18	.13	.07	.16	-.16	-.04	.06	.00	.20	-.17	.03	.24	.02	-.02	.00	.05	.13	-.14	-.12
(2) Firm age ^a	51.71	35.31	.15		.22	.05	.08	-.06	.15	-.15	.09	.15	-.06	.32	.23	.15	.18	.14	-.01	.16	-.07	-.12
(3) Revenue ^b	23.32	42.96	.11	.15		.12	.17	-.13	.21	-.22	.12	.24	-.17	.35	.33	.22	.30	.33	.30	.24	-.44	-.20
(4) Year	2007	1.41	.06	.04	.09		.03	.06	-.01	-.01	-.01	.05	.03	.04	-.01	.11	-.02	-.01	.00	.01	.03	-.20
(5) SCM exp. of CEO	0.05	0.22	.16	.07	.14	.02		-.10	-.05	-.03	.02	.32	-.07	.02	.00	.04	.08	.04	.11	.16	-.15	-.04
(6) CEO tenure ^c	74.43	71.11	-.13	-.04	-.08	.05	-.08		.38	.03	.35	-.10	.51	.02	-.16	.10	.04	-.01	.00	-.13	.08	.15
(7) CEO seniority ^c	22.87	139.66	-.03	.11	.15	.00	-.04	.27		-.46	.23	.05	.32	.55	.09	.17	.13	.16	.01	.06	-.03	.00
(8) CEO outsider	0.24	0.43	.06	-.12	-.18	-.01	-.03	.04	-.56		-.04	-.12	-.11	-.38	-.12	-.08	-.14	-.16	-.01	-.14	.03	.01
(9) CEO duality	0.67	0.47	.00	.07	.10	-.01	.02	.28	.19	-.04		.06	.06	.17	.01	.15	.08	.11	.01	.02	.04	.02
(10) SCM exp. in TMT	0.34	0.47	.20	.12	.19	.05	.32	-.08	.04	-.12	.06		-.18	.15	.12	-.02	.11	.03	.09	.20	-.10	-.08
(11) TMT tenure ^c	51.53	28.32	-.14	-.04	-.11	.02	-.05	.36	.21	-.09	.05	-.15		.22	-.19	.24	.06	.00	-.08	-.02	.05	.18
(12) TMT seniority ^c	177.23	73.1	.02	.22	.24	.03	.01	.01	.39	-.31	.14	.12	.15		.12	.38	.25	.15	.01	.08	-.03	-.06
(13) TMT size	1.9	4.8	.21	.16	.23	-.01	.00	-.11	.06	-.11	.01	.10	-.13	.08		-.03	.17	.22	.03	.05	-.11	-.10
(14) Age TMT members ^a	52.54	3.01	.02	.10	.15	.08	.03	.07	.11	-.06	.12	-.02	.16	.26	-.02		.07	.17	.05	.05	.03	-.11
(15) Presence CSCO _{wide}	0.12	0.33	-.02	.15	.25	-.02	.08	.03	.1	-.14	.08	.11	.05	.20	.15	.05		.01	.06	.11	-.19	.04
(16) Diversification	0.44	0.47	.00	.10	.24	-.01	.03	-.01	.11	-.13	.10	.02	.00	.10	.16	.12	.01		.10	.06	-.23	-.05
(17) Inv. turnover	1.49	19.98	.04	.00	.21	.00	.09	.00	.01	-.01	.01	.07	-.06	.00	.02	.04	.05	.06		-.22	-.28	.04
(18) Inv. as % of CurA	0.27	0.19	.11	.11	.17	.01	.13	-.09	.04	-.11	.02	.16	-.01	.05	.04	.03	.09	.05	-.15		-.41	-.13
(19) EBIT margin	0.16	0.12	-.11	-.05	-.31	.02	-.12	.05	-.02	.03	.04	-.08	.03	-.02	-.08	.02	-.16	-.17	-.20	-.29		.17
(20) Revenue growth	0.14	0.19	-.10	-.08	-.13	-.14	-.04	.10	.00	.00	.01	-.06	.12	-.04	-.07	-.07	.03	-.03	.03	-.09	.11	

Note. $n = 1055$. Spearman's correlation coefficients are shown below the diagonal (all absolute values greater than 0.05 are significant at the 0.05 level, 2-tailed). Kendall's tau-b correlation coefficient are shown above the diagonal (all absolute of greater than 0.06 are significant at the 0.05 level, 2-tailed).

^a in years.

^b in billions US\$.

^c in months.

As our observations cover the same 211 firms over a 5-year time window and because a firm's decision of having a CSCO on the TMT in one year is not independent to the decision in the prior year (i.e., a single firm will likely display correlated values on the dependent variable) the statistical assumption about independent observations of traditional regression methods is violated (Ghisletta and Spini, 2004). If this within-subject correlation is not accounted for, especially the parameters' standard errors may be biased. Therefore, and following similar studies on analyzing the antecedents of functional executives (e.g., Menz and Scheef, 2014; Nath and Mahajan, 2008) the generalized estimating equations (GEE) approach, which has been proved simpler and theoretically superior for studies with repeated measures compared to other approaches such as the least squares or maximum likelihood regression (Vinod and Geddes, 2003). The GEE approach, originally developed by Zeger and Liang (1986), applies the generalized linear model (Nelder and Wedderburn, 1972) to estimate the regression parameters more efficient and unbiased (Ballinger, 2004). By assuming an invariant dependency correlation structure it is especially accounted for that the responses on the dependent variable are correlated within the same subject and the outcome variables are dichotomous (Hanley et al., 2003).

We checked for multicollinearity by determining the variation inflation factors for each year. None of the factors exceeded 5, indicating an absence of multicollinearity problems.

Table 4-6 presents the results of the logistic regression analysis using GEE. Model 1 (M1) includes only the control variables. In model 2 (M2) and 3 (M3) the hypothesized CEO-related and TMT-related variables are entered in a blockwise fashion while Model 4 (M4) captures both blocks simultaneously. The same procedure is applied to the firm factors. In model 5 (M5) we add the structure-related variable and in model 6 (M6) we analyze the impact of performance-related factors for CSCO presence. All firm factors are jointly

analyzed in model 7 (M7). Finally, in model 8 all control and main variables are added, which leads to an improved goodness of fit across all models.

Table 4-6: Results of binary logistic regression using Generalized Estimating Equations.

Variables	Dependent Variable: CSCO Presence															
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
Controls^a																
Firm age	.42 ***	.37 ***	.39 ***	.36 ***	.43 ***	.41 ***	.43 ***	.36 **								
	(.09)	(.10)	(.11)	(.11)	(.10)	(.09)	(.10)	(.11)								
Revenue	-.12	-.25 †	-.42 *	-.46 **	-.12	-.18	-.17	-.54 **								
	(.12)	(.13)	(.17)	(.17)	(.12)	(.13)	(.13)	(.19)								
Industry: Oil & gas	-1.70 **	-1.47 **	-1.41 *	-1.37 *	-1.94 **	-1.49 **	-1.69 **	-1.45 *								
	(.56)	(.56)	(.56)	(.57)	(.59)	(.56)	(.59)	(.61)								
Industry: Basic materials	.45	.34	.20	.20	.33	.32	.25	-.11								
	(.35)	(.36)	(.38)	(.39)	(.36)	(.36)	(.37)	(.43)								
Industry: Industrials	.27	.30	.02	.10	.14	.10	.03	-.21								
	(.29)	(.30)	(.32)	(.33)	(.31)	(.29)	(.31)	(.36)								
Industry: Cons goods	.45	.28	.11	.08	.32	.26	.19	-.19								
	(.29)	(.31)	(.31)	(.32)	(.32)	(.30)	(.32)	(.35)								
Industry: Retail	.96 **	.99 **	1.32 ***	1.29 ***	.67	.63 †	.42	.61								
	(.31)	(.33)	(.34)	(.36)	(.43)	(.32)	(.43)	(.49)								
A. Upper echelon factors																
<i>A.1 CEO-related</i>																
SCM experience CEO		.31 ***		.21 **				.20 *								
		(.08)		(.08)				(.08)								
CEO tenure		-.73 ***		-.42 *				-.44 *								
		(.17)		(.18)				(.19)								
CEO seniority		.34 *		.22				.21								
		(.14)		(.16)				(.16)								
CEO outsider		.50 ***		.43 **				.42								
		(.13)		(.13)				(.14)								
CEO duality		.08		.05				.08								
		(.10)		(.11)				(.11)								
<i>A.2 TMT-related</i>																
SCM experience TMT			.35 ***	.32 **				.35 ***								
			(.10)	(.10)				(.11)								
TMT tenure			-.65 ***	-.45 **				-.44 *								
			(.15)	(.17)				(.18)								
TMT seniority			-.05	-.01				.03								
			(.12)	(.14)				(.14)								
TMT size			.53 ***	.53 ***				.58 ***								
			(.10)	(.10)				(.11)								
Age of TMT members			.32 *	.26 *				.27 *								
			(.13)	(.13)				(.14)								
Presence of SCM-related executive			-.33 **	-.34 **				-.40 **								
			(.12)	(.13)				(.14)								

Table 4-6 (continued): Results of binary logistic regression using Generalized Estimating Equations

B. Firm factors										
<i>B.1 Structure-related</i>										
Product diversification						.01 (.10)				
Inventory turnover						.19 * (.09)				
Inventory as % of current assets						.13 (.13)				
<i>B.2 Performance-related</i>										
EBIT margin										
Revenue growth										
QIC ^b	841.34	816.08	786.63	785.63	853.79	835.25	848.71	788.94		
QICC	808.67	770.39	733.26	721.39	811.09	800.61	803.79	713.61		

Note. $n = 1055$. Model information: probability distribution = binomial; link function = logit; working correlation matrix structure = independent; subject effect = firm-ID; within-subject effect = year; covariance matrix = model based variance estimators applied; all independent variables are lagged by one year; standardized parameter coefficients with standard errors in parentheses.

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; † $p < 0.10$ (two-tailed)

^a For industry dummies: "Technology & Healthcare" served as the baseline category.

^b Information criteria are in small-is-better form.

As Table 4-6 shows we find strong support for our first hypothesis. Firms run by a CEO who has gained experience in SCM related functions prior to his current position ($H1_a = p < 0.001$ in M2; $p < 0.01$ in M4; $p < 0.05$ in M8) and firms having a high degree of experience in SCM functions among a firm's TMT executives ($H1_b = p < 0.001$ in M2; $p < 0.01$ in M4; $p < 0.05$ in M8) are significantly more tended having a CSCO in the TMT. Furthermore, CSCO presence in a firm's TMT is more likely the shorter the tenure of its CEO ($H2_a = p < 0.001$ in M2; $p < 0.05$ in M4/8) or the shorter the average tenure of its top executives ($H2_b = p < 0.001$ in M3; $p < 0.01$ in M4; $p < 0.05$ in M8). With respect to our hypothesized influence of the top executive's seniority on CSCO presence, we find oppositional support for $H3_a (= p < 0.05$ in M2; $p > 0.1$ in M4/8) predicting that the likelihood of CSCO presence is rather positively related to the seniority of its CEO, while we do not obtain support for our prediction that the lower the average seniority of a firm's top executives the more likely is the presence of a CSCO ($H3_b = p > 0.1$ in M2/4/8). Hypothesis H4, which predicted that firms having outsider CEOs are more susceptible to CSCO presence, is also strongly supported across all models ($p < 0.001$ in M2; $p < 0.01$ in M4/8). However, we find no support for our hypothesis that the likelihood of CSCO presence in a firm's TMT is higher when the CEO of a firm is simultaneously the chairman of the board (CEO duality) ($H5 = p > 0.1$ M2/4/8). Hypothesis H6 which posits that CSCO are more present in firms having large TMTs is strongly supported across all models ($p < 0.001$ in M3/4/8). Regarding our hypotheses predicting that CSCO presence is more likely in firms having younger compared to older executives in their TMT our results show the opposite, i.e., this association is oppositional to our expectation ($H7 = p < 0.05$ in M3/4/8). Finally, firms having an executive responsible for adjacent functions such as purchasing or logistics in their TMT are significantly less likely having a CSCO, thus supporting hypothesis H8 ($p < 0.01$ in M3/4/8).

Focusing on model 5-7, in which the firm factors are added, we find no support for the hypothesized association between a firm's degree of diversification and CSCO presence ($H9 = p > 0.1$ in M5/7/8). We also obtain highly insignificant results when using measures of unrelated and related diversification instead of total diversification. The findings with respect to the inventory-related variables are rather mixed. While we find weak support for a positive association between inventory turnover and CSCO presence ($H10a = p < 0.05$ in M5/8; $p < 0.1$ in M7), no support was found for our hypothesis that CSCO presence is more likely in firm in which the inventory contributes greatly to the total current assets. Within this hypothesis, we have further analyzed the effect of several other inventory-related variables, such as the change in total inventories, the days of inventories held and other working capital related indicators. None of these effects were significant and are not presented here in the interest of space.

Our last hypothesis, which states that the likelihood of CSCO presence in a firm's TMT is negatively related to its preceding performance and revenue development, is partially supported. While firm's having experienced lower EBIT margins are significantly more prone to CSCO presence ($H11_a = p < 0.01$ in M6/7; $p < 0.001$ in M8), the association between revenue growth and subsequent CSCO presence can only partially supported with weak parameters ($H11_b = p < 0.1$ in M6/7; $p > 0.1$ in M8). It is noteworthy, that the results are not significantly different when the performance measure is lagged 2 years instead of 1 year. Furthermore, we also analyzed the effects of other performance-related variables on the presence of CSCO such as the return on assets, net income, earnings per share, or the return on invested capital. None of these alternative show significant results across any model constellation and are thus not presented here.

4.7 Discussion, implications and conclusion

This study focusses on the organizational status of SCM in corporate upper echelons and responds to research suggestions made by management scholars in the recent past (e.g., Johnson and Leenders, 2006; Ketchen and Hult, 2007; Kim, 2007; Miles and Snow, 2007; Sandberg and Abrahamsson, 2010; Storey et al., 2006; Tassabehji and Moorhouse, 2008; Trent, 2004; Zheng et al., 2007). With its special attention to the antecedents of CSCO presence in corporate upper echelons it further contributes to the existing pool of TMT research. In the following we discuss our main findings, derive implications for academia and practice, and allude to potential limitations before suggesting avenues for future research.

4.7.1 Scholarly and managerial implications

There could be a wide variety of factors that determine the presence of an executive with primary responsibility for supply chain management in a firm's TMT. This study focused on two different groups of possible antecedents. First, we analyzed the influence of factors related to the upper echelons itself, i.e., to which degree an increase or decrease in the background characteristics of the CEO and other members of the TMT influences the likelihood of CSCO presence. Second, we also analyzed if the presence of CSCO is contingent on firm specific factors.

First, we find that SCM experience among TMT executives other than the CSCO is positively associated with CSCO presence. This finding, which corresponds well with the result of Nath and Mahajan (2008) that chief marketing officers are more often present in firms in which the degree of marketing experience in the TMT is higher, indicates that firms do not install CSCO in order to balance the lack of SCM know-how in the upper echelons. CSCO rather meet executives in the TMT which have an own SCM track record and might

know the importance to get this function managed professionally. This finding further informs managers that a co-existence of CSCO and SCM experienced executives in the TMT, i.e., an overlap of functional experience, is not an exception.

Second, our results show that the shorter the CEO and the other executives are on their top-level position the higher is the likelihood to find a CSCO in the upper echelons. This finding suggests that changing the strategic direction to focus more on supply chain management is initiated especially in the course of changing the TMT composition. Another interpretation is, however, that it needs a period of executive succession for SCM to become part of the executive board; an observation with respect to the CEO also made while unveiling factors associated with COO (Marcel, 2009), CSO (Menz and Scheef, 2014), and CFO (Zorn, 2004) presence.

Third, we find that a firm's diversification strategy do not affect the likelihood of CSCO presence. This finding is in stark contrast to the empirical evidence for other functional executives, which either suggest a strong positive (Menz and Scheef, 2014; Zorn, 2004) or negative (Marcel, 2009) association between the degree of diversification and CxO presence.

Fourth, we found a strong association between bad firm performance and CSCO presence. This result suggests that firms experiencing tough times seek new ways to improve the current situation. Focusing more on SCM seems to one option firms pursue. Furthermore, this finding might explain the result of our first study in this area (Wagner and Kemmerling, 2014). In this study we unveiled that firms having a CSCO experienced a worse operating profit than firms without this position. Combining the insights of both studies suggests that CSCO become presents in times of bad firm performance and it might take longer until positive effects take place.

Finally, our results underline the importance for research on upper echelons and functional executives, as the factors which explain a specific executive's presence are rather individual and mere adoption of relationships is likely to yield wrong conclusions.

4.7.2 Limitations and future research

There are several limitations of our study which, however, suggest some interesting avenues for future research. First, we collected our data from very large US corporations operating in various industry sectors and countries. Hence, our findings may not be generalizable to small and medium-sized firms and the reasons for SCM presence in TMTs could be different outside of the US due to differences in governance systems a different understanding of what comprises to SCM (Halldórsson, Larson, and Poist, 2008). Consequently, future research is needed from such organizations.

Second, we identified CSCOs only according to their job title as stated in the 10-K report and additional sources. And although we believe to have generated a solid data base with this approach, we left to analyze responsibilities and competencies of this position out of scope. There, we encourage future research to develop a comprehensive role inventory for SCM executives and to clarify SCM roles in a consistent and methodological way. This approach could further allow inferences about the role of the SCM function in corporations, leading to a better understanding of the role of SCM and the responsibilities of its executives.

Next, although our data are not cross-sectional, our time frame of 5 years might be too short in order to show a long term trend. We therefore suggest following up on this research topic to unveil whether the upward trend in CSCO presence is permanent or just a "management fashion" (Abrahamson, 1996).

Finally, our literature review and the results of our study show that some factors differently influence the presence of functional executives. We suggest to simultaneously analyzing factors for different CxO presence. This approach could provide meaningful comparisons and would contribute to upper echelons research in general and the upcoming research stream on functional executives in particular. For example, an extended panel study on the overall composition of the TMT could provide evidence of the ways in which the increased heterogeneity caused by SCM executives influences the organizational outcomes of firms.

5 STUDY 4: Handling nonresponse in logistics research

This chapter is based upon the paper:

Handling Nonresponse in Logistics Research, co-authored with Stephan M. Wagner, published in the *Journal of Business Logistics*, Vol. 31, No. 2, 2010, 357-381.

5.1 Introduction

Researchers in the field of logistics and supply chain management have depended on survey methods and have favored the deductive research approach (Golicic, Davis, and McCarthy, 2005; Sachan and Datta, 2005). Mentzer and Kahn (1995) found that 54 % of the articles published in the *Journal of Business Logistics* between 1978 and 1993 relied on surveys, and Kotzab (2005) found that surveys were the predominant method of research reported in the *Journal of Business Logistics* between 1993 and 2003, accounting for 44 % of the articles. Likewise, the content analysis of articles published 1998-2002 in three logistics journals (*The International Journal of Logistics Management*, *International Journal of Physical Distribution and Logistics Management*, *Journal of Business Logistics*) shows that the majority (50 %) adopted a deductive research approach (Spens and Kovács, 2006).

Deductive positivistic research transforms general theory (e.g., transaction cost theory) into specific hypothesis (e.g., on the relationship between shippers and logistics service providers) suitable for empirical testing. Despite the increasing critique of the limitations of deductive positivistic research and the encouragement that logistics researchers should expand their methodological approaches towards qualitative, inductive or abductive approaches (Golicic, Davis, and McCarthy, 2005; Näslund, 2002; Spens and Kovács, 2006), the deductive approach still prevails, for several reasons. First, by using a deductive approach, a researcher can sample a fraction of the population by a probability selection method and generalize the properties of interest to the entire population with a known degree of accuracy (Davis-Sramek and Fugate, 2007). Second, this approach simplifies the operationalization of complex constructs and allows for the establishment of causal links between the constructs of interest. Third, “if a researcher is using a methodology which is not widely used within a particular academic discipline, it is likely that the research will be misunderstood and subsequently under-valued.” (Lowe, 1999, p. 480) Therefore, logistics researchers might consider it “less

risky” to publish their deductive research in the leading logistics and supply chain management journals.

There are also some very pragmatic reasons for the intensive use of survey-based methods and questionnaires to collect data. First, logistics and supply chain management processes can involve various functions or locations within a firm, and the logistics industry itself is very fragmented. Therefore, large-scale mail surveys are convenient for gathering data from many units (e.g., warehouse operations, plants) within a short period of time and at a reasonable cost. Second, most studies target the upper managerial and executive levels. For this setting, mail surveys are the most effective, and sometimes the only way, of reaching them at their workplace (Greer, Chuchinprakarn, and Seshadri, 2000). Finally, mail surveys can ensure anonymity, standardized wording, and can compensate for drawbacks such as interviewer bias (Bailey, 1994).

Surveys, if correctly conducted, can make statements about a population which are based on information that is obtained from a sample of that population. But before a researcher can generalize the survey findings, the quality of information has to be assessed. In this context, reliability and validity are necessary in order to draw the right conclusions from the gathered information. According to Groves (1989), the four errors that are the most likely to compromise the data quality and result in misleading and inaccurate inferences are: (1) sampling error; (2) coverage error; (3) measurement error; and (4) nonresponse error. The last of these errors is the focus of this study. In the context of logistics research, Lambert and Harrington (1990, p. 21) appropriately observed that “[n]onresponse is always a concern in mail surveys” and that it is critical to “make every effort to identify and correct of its existence.” Other logistics scholars have proposed studying the methodological issues of survey-based logistics research in general and nonresponse in particular. For example, Larson

and Poist (2004, p. 74) asked for more research “to further our knowledge on survey research techniques.” Larson (2005, p. 202) reported the results of a content analysis of mail survey practices in two logistics journals (*International Journal of Physical Distribution and Logistics Management*, *Journal of Business Logistics*) and proposed that the “[c]ontent analysis of journal articles could be expanded to include non-response bias assessment.” Despite its criticality and the explicit calls put forward in the literature, nonresponse has received little attention in logistics research.

The purpose of our study is to close this knowledge gap and to describe how top-tier logistics journals have handled nonresponse and its potential biasing effects. The direction of our study can be summarized by the following research questions: (1) How many studies using mail survey as primary data collection method were published from 1998 to 2007? (2) What were the response rates and sample sizes? (3) How often was nonresponse bias addressed? (4) How many and which techniques were applied to address nonresponse bias? (5) Which details about the applied technique were provided? (6) Which literature was cited in the context of addressing nonresponse bias? and (7) What were the outcomes of the tests to detect nonresponse bias?

Our article proceeds as follows. Section 5.2 gives some theoretical considerations in which the notion of nonresponse, the error potential and the main techniques which can be applied to detect nonresponse bias are described. Section 5.3 presents the results of related studies in other fields of business and management. Section 5.4 defines the research methodology; results and key findings of the content analysis are presented in section 5.5. The last section is devoted to a discussion and offers the implications of the findings for researchers, journal editors, and reviewers.

5.2 Background

Assessing nonresponse bias, and controlling for it when it exists, are neither substitutes for appropriate sampling frames, nor for low survey response rates. Therefore, a brief discussion of some critical issues regarding sampling frames and survey response rates, and their relationship to nonresponse, are warranted.

5.2.1 Sampling frames

Prior to deploying a survey, logistics researchers must determine the sampling frame, which is a list of elements with contact information (e.g., names and contact details of key respondents) of the population of interest (Cochran, 1977). The sampling frame must be representative of the population to which the sample data will be generalized. Even if all elements in the sampling frame have an equal chance of inclusion in the sample, it is impossible to generalize findings to the population if the elements in the sampling frame are not representative of the population. If this is the case, the sampling frame is biased, and an assessment and correction for nonresponse does not alleviate this problem.

Logistics researchers hardly ever deploy their surveys to the entire population of interest (e.g., logistics service firms in the United States). Instead, they rely on sampling frames consisting of members of professional logistics related associations (e.g., CSCMP—Council of Supply Chain Management Professionals; APICS—Association for Operations Management) or industry associations (e.g., FMCSA—Federal Motor Carrier Safety Administration; ATA—American Trucking Association). Therefore, we recommend that logistics researchers carefully judge whether the sampling frame is representative of the subject to be studied.

For example, logistics service firms that are members of CSCMP or APICS will potentially be better informed about leading supply chain and logistics practices and put more emphasis on training and educational activities for their employees than firms that are not members. Therefore, a survey of logistics practices and performance implications of the implementation of such practices based on a CSCMP or APICS sampling frame will lead to biased results. At the very least, the results cannot be generalized to logistics service firms per se, even if nonresponse bias does not exist.

5.2.2 Survey response rates

Attaining high response rates is a challenge for many logistics researchers (Larson, 2005). While low response rates limit the type of statistical techniques that can be applied to small samples (Hair et al., 2006; Hoyle, 1999), they also increase the concern of nonresponse bias and threaten the explanatory power of the results as well as the ability to draw inferences to the population. Therefore, logistics researchers should from the outset of a study apply appropriate response inducement techniques and strive to increase responses (Lambert and Harrington, 1990). As Armstrong and Overton (1977, p. 396) wrote, “[t]he most commonly recommended protection against nonresponse bias has been the reduction of nonresponse itself.” In isolation, the higher the response rate, the lower the nonresponse rate and the less concern there is for nonresponse bias.

Kotzab’s (2005) review of survey research published in the *Journal of Business Logistics* between 1993 and 2003 identified a positive (but not significant) association between the use of response inducement techniques and response rates. Larson and Poist (2004) investigated survey-based research published in the *Transportation Journal* between 1992 and 2003 and found significant relationships between inducement techniques and

response rates. Therefore, logistics researchers should apply and balance the appropriate response inducement techniques which already have been widely discussed and studied (Diamantopoulos and Schlegelmilch, 1996; Frohlich, 2002; Jobber and O'Reilly, 1998).

Diamantopoulos and Schlegelmilch (1996) surveyed marketing directors and managers of marketing research agencies about the effectiveness of several response inducement techniques. They discovered that responses to industrial mail surveys can be induced through survey sponsorship by a university or organization that is familiar to the respondent (e.g., his/her former university). The cover letter should be personalized and appealing, a deadline should be given, the study should not solicit information that is confidential, sensitive or difficult to obtain from the firm, and the questionnaire should be short and limited to closed-end questions. Furthermore, pre-notification and the promise of a report with the study's results will raise response rates.

According to Frohlich (2002), survey researchers should focus on the two main reasons why managers do not respond to surveys. First, a manager's participation in a study is determined by the manager's perception of its relevance. Second, participation will be influenced by the amount of effort that the manager will have to invest in completing the questionnaire. Response rates will be higher if relevance is high and required efforts are low.

Despite the merits of such techniques, there is a danger of using too much pressure to increase survey response rates. Stoop (2005) argues that the overuse of response inducement techniques can worsen the nonresponse bias and negatively influence the data quality.

In sum, if carefully selected and implemented, response inducement techniques can increase response rates and reduce nonresponse bias in logistics research.

5.2.3 The notion of nonresponse

There are two main types of nonresponse with different causes, consequences and solutions. The first, unit nonresponse, is the failure to gather any information from an approached unit of the sampling frame. Causes of unit nonresponse are the inability to deliver the questionnaire to the intended respondent, for example, because of incorrect contact information, delivery errors (e.g., the letter containing the questionnaire does not reach the targeted respondent in the organization), or the respondent's temporary absence or ineligibility. It is also possible that the person might simply refuse to respond, because of strict firm policies against participating in surveys, time constraints, or lack of interest in the survey topic. Three peculiarities when surveying organizations influence the overall response rate and the outcome of tests for nonresponse bias (Tomaskovic-Devey, Leiter, and Thompson, 1994): (1) authority to respond; (2) organizational capacity; and (3) motive to respond. The authority to respond is mostly regulated by company policies and granted to people in selected positions. Especially in large companies with complex organizational structures, members with the authority to respond are distinct to members having the knowledge and/or access to the data needed for responding to the survey (Dillman et al., 2002). This distinction, related to organizational capacity, may lead to researchers receiving responses to the survey after the cutoff-date if the collection period is short. The incentive to respond depends on the respondent's interest in the survey topic and the efforts and resources that he or she needs to respond.

The second type of nonresponse is *item nonresponse*. In this case, the approached unit responded to the survey but one or more items (demographics, scale items, etc.) were not answered. Major sources of item nonresponse include lacking the knowledge to answer a question, unintentional oversight, and intentional nonobservance because the item demands disclosure of sensitive information. Depending on the degree of item nonresponse and the

usability of what was delivered by the respondent with respect to the purpose of the survey, some responses might not be usable and are treated as unit nonresponse.

Although these remarks make clear that knowledge of the cause of both, unit and item nonresponse, is crucial to limit nonresponse bias, survey researchers might often fail to observe the precise cause (Dillman et al., 2002).

The error potential of nonresponse is well understood and can be shown mathematically as follows (Cochran, 1977). The starting point is the basic term which expresses the aim of any survey; this is to determine the sample mean \bar{Y} for any variable in order to generalize the findings to the population from which the sample is drawn.

$$\bar{Y} = r_r \bar{Y}_r + r_n \bar{Y}_n \quad (1)$$

where \bar{Y}_r and \bar{Y}_n are the means of respondents and nonrespondents, respectively. Further, and describe the response and nonresponse rate and the following relation holds valid:

$$r_r + r_n = 1 \quad (2)$$

Thus, the sample mean \bar{Y} consists of the mean value of respondents and the mean value of nonrespondents multiplied by the respective proportion each party has with respect to the sample size. Based on this knowledge, the nonresponse bias (B) can be formalized as follows:

$$B = r_n (\bar{Y}_r - \bar{Y}_n) \quad (3)$$

This expression clearly indicates the two factors that determine not only the existence but also the magnitude and direction of nonresponse bias. First, the degree of bias is directly related to the nonresponse rate; and second, the error potential is influenced by the degree to which the respondents systematically differ from nonrespondents in terms of the variable under

consideration. The latter is the major cause of concern as the nonrespondents' mean is by definition unknown to the researcher. This led Rogelberg et al. (2003, p. 1104) to remark that "[T]he study of individuals who do not complete surveys is a difficult and seemingly paradoxical task."

5.2.4 Techniques to assess nonresponse bias

Several methodological techniques have been developed to detect the existence, direction and magnitude of nonresponse bias. These range from highly sophisticated techniques which require extensive mathematical and statistical knowledge, to less-than-perfect techniques which are better suited to a wider group of researchers (Gentry and Hailey, 1981). The four most commonly applied techniques are briefly discussed below.

Extrapolation, one of the most widely used techniques, is based on the assumption that late respondents are most similar to nonrespondents because their replies took the most effort and the longest time (Armstrong and Overton, 1977). This technique is mostly applied with the following pattern. Sample units who respond prior to the survey deadline, before receiving a reminder, belonging to the first quartile/half of respondents or belonging to an identifiable response wave are compared to those responding after these events or belonging to the last quartile/half or later waves respectively. If no statistical significant differences are found between these respondents, it is assumed that the study has not been impacted by nonresponse bias.

This technique is very easy to apply and requires just an exact recording when returns are received. The main weakness is related to the assumption that late responders are similar to nonresponders. Pace (1939), one of the earliest contributors to this technique, stated that

“the method of comparing early and late returns is not a sufficiently sensitive test to indicate the extent of bias; but it does provide a simple and valuable tool for determining the probable direction of bias” (Pace, 1939, p. 397).

A second frequently used technique is to *compare respondents to the population* on characteristics known a priori. These characteristics are mostly demographic, such as company size, turnover or industry. If the characteristics of respondents do not statistically differ from the population, it is assumed that there are no differences at all, and thus, nonresponse bias is not an issue.

The third technique of *comparing respondents to nonrespondents on characteristics known a priori* follows, in principle, the same procedure. But instead of considering the population, the characteristics (demographic, mainly) of the respondents and the nonrespondents known before receiving any response are compared.

The fourth, and probably most difficult, technique of *sampling nonrespondents*, also known as the follow-up approach, double-sampling (Hansen and Hurwitz, 1946) or “double dipping” is as follows. A randomly selected small sample of nonrespondents is contacted by telephone, mail, or fax after a cutoff date and is requested to complete an abbreviated (in most cases) version of the questionnaire and/or provide selected demographics. The responses are statistically compared with these of respondents of the main survey (i.e., pre-cutoff date responses). If this comparison reveals strong similarities between the two group means, it may be concluded that nonrespondents do not differ significantly from respondents and that nonresponse bias is therefore unlikely to be an issue of study.

In addition to requiring extra money and time, this technique has the following limitations. First, granting anonymity to the respondent, which has a verifiable positive

impact on the total response rate (Greer and Chuchinprakarn, 1999), is not possible. Circumventing this limitation (e.g., by hidden coding) is ethically questionable and considered taboo (Gentry and Hailey, 1981). Second, socially desirable responses are more likely in follow-up interviews (Sosdian and Sharp, 1980). Third, changing the communication channel from self-administered mail surveys to telephone interviews, for example, to get a maximum response rate in the follow-up survey can diminish data quality (Sydow, 2006). This is especially true if items require consultation with colleagues or different departments in order to be answered. In that case the respondent might have to guess instead of making an informed choice. The last two limitations have raised doubts that the resulting differences may be rooted in method effects rather than in the true value (Rogelberg and Stanton, 2007).

Nevertheless this technique has been promoted for logistics oriented surveys. First, Lambert and Harrington (1990, p. 8) described the sampling of nonrespondents as “an excellent way to address the nonresponse bias problem while recognizing pressure caused by budget and time constraints.” Later, Mentzer and Flint (1997) started questioning the current practice at that time. They proposed contacting a random sample of nonrespondents in addition to just comparing early to last respondents. Unlike Lambert and Harrington, however, who gave statistical support about how to derive the optimal sample size of nonrespondents, Mentzer and Flint come up with the number of $n = 30$, which can be considered a reasonable “rule of thumb.”

5.3 The situation in other fields of business and management

As mentioned at the outset, little is known about the application of techniques to assess nonresponse bias in survey-based logistics research. Beyond logistics, however, a few studies that investigate unit nonresponse have recently appeared. Appendix 5-1 summarizes the

studies in business and management, especially in fields such as marketing, strategic management, information systems, human resources, or education. All studies, which are based on content analysis of one or multiple journals, cover time windows of five to ten years. The following objectives are similar across most or all studies and are also reflected in our study: (1) to describe the response rates; (2) to describe how often nonresponse was discussed; (3) to describe the literature cited in handling nonresponse error; and (4) to describe how nonresponse error was assessed. It is apparent that most of these studies have been published within the last couple of years. This might reflect both the increased concern about the error potential that nonresponse can have on survey results, the trend of declining response rates in many social sciences, and the interest in unveiling if, and how, nonresponse has been addressed in academic literature.

Malhotra and Grover (1998) assessed 25 survey-based articles in production and operations management and checked, amongst other things, how often nonresponse bias was estimated. They found that only 44 % of the articles deal with nonresponse bias.

Lindner, Murphy, and Briers (2001), Lindner (2002), and Dooley and Lindner (2003) studied the ways in which nonresponse were described and explored in the *Journal of Agricultural Education*, the *Journal of International Agricultural and Extension Education* and in the *Human Resource Development Quarterly*, respectively. Although different in journal selection and time horizon, all three articles come to the same conclusion; namely that “not mentioning nonresponse error as a threat to external validity of a study, not attempting to control for nonresponse error, or not providing a reference to the literature were unfortunately the norm and not the exception.” (Dooley and Lindner, 2003, p. 108)

Despite higher rates of studies mentioning nonresponse in three information systems journals (*Management Information Systems Quarterly*, *Information Systems Research*,

Journal of Management Information Systems), King and He (2005) come to “the somewhat-startling result ... that well over half of all studies in all three journals (approx. 48 %-70 %) neither mentioned nor performed nonresponse analysis. This outcome appears to reflect a much higher disregard for nonresponse error than is reported in some other social science fields.” (King and He, 2005, pp. 894-895)

A recent review of three marketing journals (*Journal of Marketing*, *Journal of Marketing Research*, *Journal of the Academy of Marketing Science*) by Collier and Bienstock (2007) “demonstrate that the [marketing] discipline as a whole did a poor job in addressing nonresponse error in survey studies” and further, that “studies that did take measures ... often failed to reveal enough information to evaluate if nonresponse error was truly addressed” (Collier and Beinstock, 2007, p. 177). Similar devastating results are achieved by Werner, Praxedes, and Kim (2007). Their exploratory study identified a frequency of nonresponse analyses of less than one-third—even in top-journals such as the *Academy of Management Journal* or the *Journal of Applied Psychology*. Therefore they “encourage researchers to include nonresponse analyses in their research and reviewers to insist on it being reported,” and demand “both empirical and theoretical evidence refuting nonresponse bias whenever the response rate is less than 85 %.” (Werner, Praxedes, and Kim, 2007, p. 293)

Finally Bartlett, Bartlett, and Reio (2008) for the *Delta Pi Epsilon Journal* and Kano et al. (2008) for selected articles among established journals in the education field, found that only 18% and 24% respectively of the analyzed studies discussed how nonresponse can affect the survey results.

In sum, these studies support that nonresponse and its error potential can have negative consequences for the validity and reliability of empirical studies. The consequences, although

widely recognized as non-ignorable, have not been sufficiently addressed in the majority of academic journal articles.

Besides the necessity to investigate unit nonresponse in logistics research (Larson, 2005; Mentzer and Flint, 1997), these studies and their results encouraged further and more detailed research on unit nonresponse. Furthermore, some authors such as Dooley and Lindner (2003, p. 108), “recommend replication of this study for articles published in other scholarly publications to better describe the generalizability of the findings to other publications and applicability of recommendations.”

In contrast to and in extension of the studies in these other fields, our intention is to shed more light on the details about how nonresponse bias has been addressed, including the statistical procedures used, the percentage of nonrespondents contacted, or on which characteristics respondents have been compared to nonrespondents and/or to the population.

5.4 Research methodology

To achieve the goals of our study and to answer the underlying research questions we have chosen to conduct a longitudinal content analysis. In the subsequent sections we describe our research methodology with respect to the sampling and coding process.

5.4.1 Sampling

A major decision in all bibliometric studies is the selection of the research outlets from which relevant articles will be identified for the subsequent content analysis. Based on the following criteria we have chosen three top-tier logistics journals: *International Journal of Physical*

Distribution and Logistics Management (IJPDLM), *Journal of Business Logistics (JBL)*, and *Transportation Journal (TJ)*.

First, the research outlet has to be a scholarly and peer-reviewed journal whose bibliographic records match the time horizon to be analyzed. Second, as similar assessments in other fields have based their analyses on the discipline's flagship journals (Collier and Beinstock, 2007) and because Werner, Praxedes, and Kim (2007) found that the journal tier is a significant predictor for the reporting of nonresponse—higher-ranked journals address nonresponse bias more often—our aim was to focus on prestigious journals in the logistics research community. Thus, we based our choice on evaluations which focus on the academic prestige, readership and impact of logistics journals (Emmelhainze and Stock, 1989; Fawcett, Vellenga, and Truitt, 1995; Gibson, Hanna, and Menachof, 2004; Gibson and Hanna, 2003; Kumar and Kwon, 2004; Menachof et al., 2009). Of course, journal rankings might be viewed ambiguously within the research community. But since all three selected journals achieved high rankings in different assessments, they seem to have been regarded as top journals, and are thus suitable for the analysis. Finally, research outlets known for publishing empirical research articles were needed (Kotzab, 2005; Larson, 2005; Spens and Kovács, 2006).

After identifying the relevant research outlets, the time horizon needs to be set in order to delimit the dataset. Our study is based on articles published from 1998 to 2007. The year 1998 was deliberately chosen as the starting point, because one year earlier Mentzer and Flint (1997) issued their call to approach nonrespondents in order to test for nonresponse bias. A 10-year time window should give sufficient insights to unveil trend effects.

The initial dataset was formed by all items ($n = 969$) within the set time horizon stored for the three journals in the Business Source Complete database provided by EBSCO Host. In the first step, items like book reviews, editorials or obituaries were filtered out ($n = 181$),

which left articles (n = 788) for further analysis. In the second step, each article was perused and coded either as an article reporting empirical results that had been based primarily on mail survey methods (n = 229), or as other (n = 559). The following key-words/phrases were searched in the article in order to identify mail survey articles and the text part devoted to nonresponse bias: “bias;” “nonresponse;” “nonrespondents;” “questionnaire;” “respondent;” “response rate;” and “survey.” These articles formed the final dataset for the main content analysis and were examined along the coding schedule.

Table 5-1: Result of the sampling.

		IJPDLM		JBL		TJ		Total	
		abs.	%	abs.	%	abs.	%	abs.	%
Step 1	All stored items	504		236		229		969	
	Non-articles	67	13%	51	22%	63	28%	181	19%
	Articles	437	87%	185	78%	166	72%	788	81%
Step 2	Articles	437		185		166		788	
	Not reporting mail surveys	344	79%	112	61%	103	62%	559	71%
	Reporting mail surveys	93	21%	73	39%	63	38%	229	29%

5.4.2 Coding schedule

To conduct a content analysis, a well-defined coding schedule is essential. In each relevant article the text section devoted to nonresponse bias, if any, was identified, and this was the core for further analysis. Additional information about the basic data of the reported mail surveys, such as amount of questionnaires mailed and the response rate, were gathered to flank our analysis. For the few articles reporting results of more than one mail survey, we have pooled the data and regarded it as a single survey. The full coding schedule can be found

in Appendix 5-2. It shows all variables on which information was gathered and the possible values for all variables which do not contain numeric or free text values.

5.4.3 Coding process

The coding was done manually by two experienced researchers from separate universities. The coding was conducted independently and an exchange took place only in the design stage of the coding schedule and coding manual, after a pilot coding of 20 articles, and at the end of the coding process in order to assess intercoder agreement and to discuss and clarify potential deviations.

The overall percentage of agreement was 97 %. We then calculated Cohen's Kappa – an intercoder agreement measure that corrects for chance agreement (Cohen, 1960) – and achieved a satisfactory value of $\kappa = 0.86$, a level that indicates “almost perfect agreement” (Landis and Koch, 1977). After the independent coding, the two coders discussed and clarified all deviations, and the first author of this article was consulted on every article that achieved less than 95 % agreement. In total, we created a high quality dataset on which reliable conclusions can be based.

5.5 Analysis and results

We have analyzed the data along with the research questions stated in the introduction and will now present the results.

(1) How many studies using mail survey as the primary data collection method were published from 1998 to 2007?

As described in the previous section, out of 969 items stored for all three journals, 788 articles were analyzed over the set time horizon. Table 5-2 shows the frequency distribution for each journal by year and the percentages of articles reporting the results of mail survey research. Despite some variation over the years, a high affinity for publishing survey research is evident for all three journals. The average of survey-based research was 21 % in *IJPDLM*, 38 % in *TJ* and 39 % in *JBL*. This corresponds to observations in logistics (Kotzab, 2005; Larson, 2005) and operations and production management (Frohlich, 2002; Gupta, Verma, and Victorino, 2006). Frohlich (2002, p. 54) remarked that “the annual number of published survey research studies steadily rose over the last 12 years.” Gupta, Verma, and Victorino (2006, p. 435) found “a large number of studies which use mail, phone, or internet surveys to collect primary data from subjects (managers, employees, or customers) using pre-structured questionnaires.”

(2) What were the response rates and sample sizes?

Some sources report declining response rates in social sciences while others come to different conclusions. Therefore, one objective of this research was to analyze the response rates of the identified mail survey articles to reveal potential trends.

This will help logistics researchers to delineate the consequences for unit nonresponse. After examining the reported details in each article, we discovered that the vast majority do not mention the year in which the survey was conducted. Therefore, the publication year was

taken as proxy. Fifty-six percent of reported mail surveys had a response rate of less than 30 %. Splitting the time horizon into two 5-year windows indicates declining response rates; the proportion was 50 % from 1998 to 2002, and 62 % from 2003 to 2007. This trend can be observed for *IJPDLM* and *JBL*, which show an increase of 32 and 8 percentage points respectively. In contrast, *TJ* reports fewer mail surveys with surveys achieving less than a 30 % percent response rate for the later period (52 %) than for the earlier period (58 %).

Table 5-2: Distribution of total and mail survey articles published.

		Year	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	Total
IJPDLM	Total # of articles		59	36	48	39	42	42	44	41	45	41	437
	Mail survey articles		9	14	4	16	7	9	8	9	11	6	93
	<i>in %</i>		15%	39%	8%	41%	17%	21%	18%	22%	24%	15%	21%
JBL	Total # of articles		22	21	20	18	13	20	19	19	17	16	185
	Mail survey articles		9	7	9	8	7	11	8	3	4	7	73
	<i>in %</i>		41%	33%	45%	44%	54%	55%	42%	16%	24%	44%	39%
TJ	Total # of articles		17	17	16	21	12	14	17	19	15	18	166
	Mail survey articles		6	10	6	9	5	5	8	5	5	4	63
	<i>in %</i>		35%	59%	38%	43%	42%	36%	47%	26%	33%	22%	38%
Total	Total # of articles		98	74	84	78	67	76	80	79	77	75	788
	Mail survey articles		24	31	19	33	19	25	24	17	20	17	229
	<i>in %</i>		24%	42%	23%	42%	28%	33%	30%	22%	26%	23%	29%

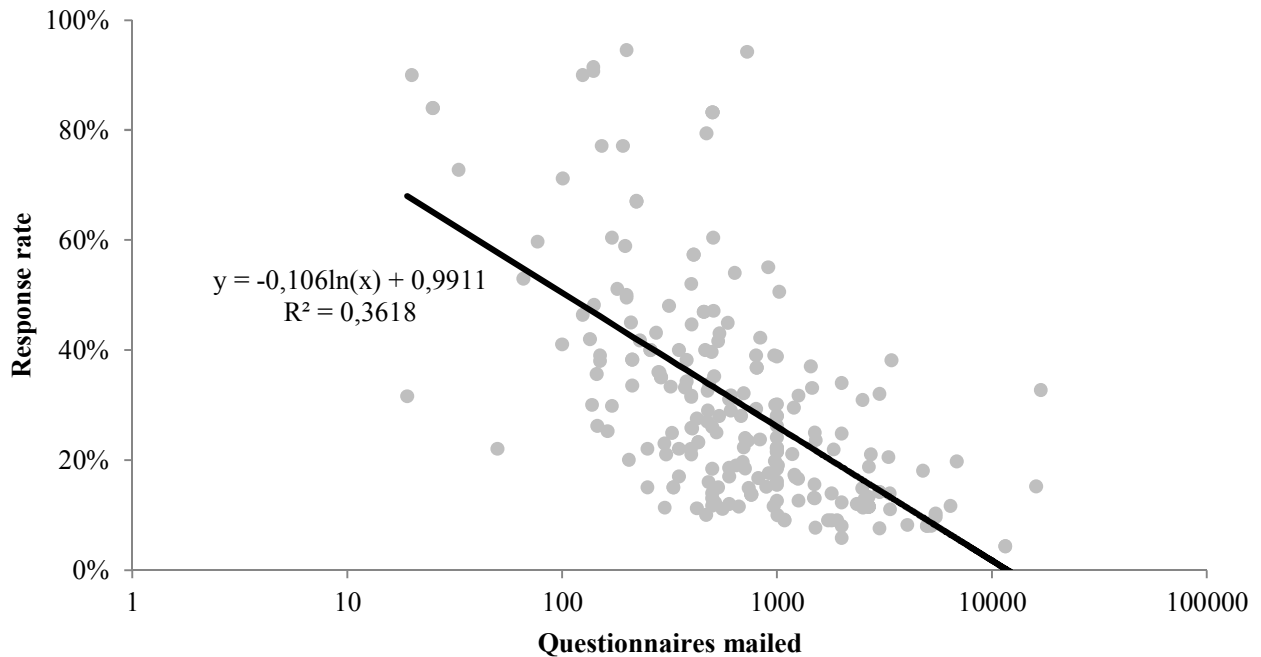
Noteworthy is the fact that 17 articles do not explicitly state the response rate. For 12 articles we inferred the response rate based on the information given about the sample size

and absolute number of responses. This leaves the response rate of five articles unidentified and therefore “not available” (Table 5-3).

Table 5-3: Response rates of published mail surveys.

	IJPDLM		JBL		TJ		Total											
	'98-'02 abs.	'03-'07 %	'98-'02 abs.	'03-'07 %	'98-'02 abs.	'03-'07 %	'98-'02 abs.	'03-'07 %	'98-'07 abs. %									
50%<r≤100%	8	16%	6	14%	5	13%	5	15%	4	11%	5	19%	17	13%	16	16%	33	14%
40%<r≤50%	11	22%	1	2%	4	10%	4	12%	2	6%	0	0%	17	13%	5	5%	22	10%
30%<r≤40%	8	16%	4	9%	10	25%	3	9%	9	25%	6	22%	27	21%	13	13%	40	17%
20%<r≤30%	14	28%	9	21%	8	20%	5	15%	6	17%	4	15%	28	22%	18	17%	46	20%
10%<r≤20%	4	8%	17	40%	10	25%	13	39%	14	39%	8	30%	28	22%	38	37%	66	29%
0%<r≤10%	3	6%	6	14%	3	8%	2	6%	1	3%	2	7%	7	6%	10	10%	17	7%
n/a	2	4%	0	0%	0	0%	1	3%	0	0%	2	7%	2	2%	3	3%	5	2%
Total	50		43		40		33		36		27		126		103		229	

We next analyzed the relationship between the sample size and response rate. Based on information provided in 223 articles (information on both the response rate and the number of questionnaires sent out), we plotted sample units on the horizontal axis (log-base for presentation purposes) against the response rates on the vertical axis and conducted a regression analysis. The resultant trend line in Figure 5-1 shows a negative relationship. In other words, the larger the sampling frame (i.e., the more questionnaires that were mailed out), the smaller the response rate. This indicates that logistics researchers must make a trade-off between large sampling frames and high-quality, but maybe smaller, sampling frames that result in higher response rates.

Figure 5-1: Relationship between sample size and response rate.

(3) How often was nonresponse bias addressed?

Only 129 of the 229 articles (56 %) that we studied addressed the issue of nonresponse bias. In comparison to other fields of business and management (see section 5.3), this percentage is above average. The analysis for each analyzed journal, however, reveals a different picture. *IJPDLM* and *TJ* address nonresponse bias in only 47 % and 43 % of the articles respectively. In contrast, 79 % of the articles published in *JBL* address nonresponse bias. This is the highest proportion among all journals on which similar studies have been conducted. The trend in the proportion of articles addressing nonresponse shows a clear increase from 1998 to 2007. We also analyzed if the application of nonresponse assessment depends on sample size, but did not find such a link.

In order to ascertain the coverage of nonresponse in each article, the relevant text was copied or transcribed manually into our database. The analysis of these items revealed huge differences as the text devoted to nonresponse bias ranged from one sentence to entire sections. In terms of characters, the average length of text is 703 characters with a standard

deviation of 485, and minimum/maximum values of 100/2,588 respectively. The differences among the three journals are rather small with the following mean values for each journal: *IJPDLM* = 804; *JBL* = 615; and *TJ* = 723. Of course, the length of the text section is not a predictor of the quality of nonresponse analysis, results and interpretation. By comparing all articles with respect to the same potential error, this analysis offers intriguing insight into the emphasis or importance researchers ascribed to nonresponse bias.

Of the 100 articles that did not mention nonresponse bias, only five explain the reasons for doing so. One example is Novack and Thomas (2004) who state that “(b)ecause the respondents came from a convenience sample and the questions were open-ended, non-response bias was not considered an issue.” Another example is Wood and Nelson (1999): “Respondents were not asked to identify themselves, so there was neither a second mailing nor an attempt to analyze differences between respondents and non-respondents.” In the remaining 95 articles, nonresponse bias is completely ignored, as is the adverse effect it might have on the generalizability of the findings.

Related to this research question we also found noteworthy insights with respect to item nonresponse. In this context our starting point for investigation was the stated information about the number of absolute responses received, and differentiated strictly between the declaration of “responses received” and “usable responses received.” Some authors gave both values and explained the differences while others gave only one value without explanation. Although less important at first glance, this distinction is not trivial. The careful reader might be interested in the number of unusable responses and their underlying causes. The percentage of unusable responses and the reasons for nonresponse can be used to interpret the quality of the survey instrument.

Table 5-4: What was reported as response?

	IJPDLM		JBL		TJ		Total	
	abs.	%	abs.	%	abs.	%	abs.	%
Only responses received	49	54%	40	55%	31	51%	120	53%
Only usable responses received	24	26%	12	17%	20	33%	56	25%
Responses and usable responses received with explaining differences	11	12%	12	17%	5	8%	28	13%
Responses and usable responses received without explaining differences	7	8%	9	13%	5	8%	21	9%
Total^a	91		73		61		226	

^a The difference to the total number of mail survey articles included in Tables 1, 2, 3 and 5 is related to the four articles not reporting the absolute number of responses.

Our investigation revealed the information summarized in Table 5-4. On the one hand, 120 articles report the number of responses received. On the other hand, 56 articles label the returns as usable responses, leaving ample room for interpretation. Questions such as the following arise: How many were received? How many were discarded? How many due to item nonresponse? How many due to other reasons, such the respondent’s knowledge about the subject?

More information is given in the 21 articles which report both responses and usable responses. However, no information is given on why some responses are considered non-usable. This failure is overcome in the last category of 28 articles that identified and explicitly stated the reason for the differences. In 23 out of the 28 cases, responses were not considered due to too many items blank on the returned questionnaire. For example, Lippert and Forman (2006) removed a considerable number of questionnaires, 222, from the 671 that had been returned because they were incomplete.

After uncovering these results it is surprising that only one article (Moore and Cunningham III, 1999) dealt explicitly with the issue of item nonresponse and imputed values using regression imputation.

(4) How many and which techniques were applied to address nonresponse bias?

The majority of studies apply only one technique to address nonresponse bias. Across all journals, the application of two techniques was found only 25 times and three techniques were applied in only four articles (Table 5-5).

Table 5-5: Number of techniques applied.

	IJPDLM		JBL		TJ		Total	
	abs.	%	abs.	%	abs.	%	abs.	%
0	49	53%	15	21%	36	57%	100	44%
<hr/>								
Subtotal								
Nonresponse not addressed	49	53%	15	21%	36	57%	100	44%
<hr/>								
1	36	39%	42	57%	22	35%	100	44%
2	7	7%	15	21%	3	5%	25	11%
3	1	1%	1	1%	2	3%	4	2%
<hr/>								
Subtotal								
Nonresponse addressed	44	47%	58	79%	27	43%	129	56%
<hr/>								
Total^a	93		73		63		129	

Table 5-6 gives an overview of which technique(s) were applied to address nonresponse bias. Our analysis revealed that extrapolation (early vs. late respondents and wave analysis) is the dominant technique: applied in 81 % of articles across all three journals which handle nonresponse. Therefore extrapolation can be labeled as “standard.” In contrast, although recognized as useful, the sampling of nonrespondents is rarely applied and thus cannot be considered the standard technique. Surprisingly, the comparison of respondents to

nonrespondents, and respondents to the population, on characteristics known a priori, was applied in only 12 % to 13 % of articles.

Table 5-6: Type of techniques applied per article.

	IJPDLM		JBL		TJ		Total	
	abs.	% ^a	abs.	% ^a	abs.	% ^a	abs.	% ^a
Extrapolation	31	70%	51	88%	22	81%	104	81%
Sample nonrespondents	8	18%	13	22%	4	15%	25	19%
Compare respondents to nonrespondents	9	20%	5	9%	3	11%	17	13%
Compare respondents to population	5	11%	6	10%	5	18%	16	12%

^a The difference to the total number of mail survey articles included in Tables 1, 2, 3 and 5 is related to the four articles not reporting the absolute number of responses.

(5) Which details about the applied technique were provided?

In most similar studies in other fields of business and management (see section 3), the authors explained the poor reporting of the techniques by saying that “simply stating that a comparison of early and late respondents was performed does not give the reader enough information to determine if nonresponse was adequately addressed.” (Collier and Beinstock, 2007, p. 179) Therefore, we decided to study the exact reporting of such details for the three “more advanced” techniques (sampling nonrespondents, comparing respondents to nonrespondents, and comparing respondents to population).

Sampling Nonrespondents

As mentioned above, 25 mail surveys applied the technique of resurveying nonrespondents just for the purpose of assessing a potential nonresponse bias. Of these 25 articles, 18 report the number of nonrespondents contacted; this number ranges from 20 to 529 resurveyed nonrespondents. The ratio of contacted nonrespondents to all nonrespondents is mostly less than 10 %. In just three articles, considerable efforts were undertaken and 30 %, 77 % and

100 % of nonrespondents, respectively, were contacted. Asking for the communication mode of all 25 articles, we found 12 articles not reporting any detail. In the remaining articles, most of the nonrespondents were contacted via telephone. In only four cases, mail surveys were used again and one study reported the use of fax. In terms of the statistical test procedure used, 68 % do not report anything on this important detail. The remainder explicitly state which test procedure was used: t-tests lead the ranking, followed by ANOVA, MANOVA and Chi-square tests. Finally, as suggested by many survey methodologists, the majority resurveyed only a selection of study variables instead of asking all questions from the original questionnaire.

Comparing Respondents to Nonrespondents

When comparing respondents to nonrespondents, the survey researcher needs information on characteristics for every unit in the sample—regardless of whether the unit belongs to the respondents or nonrespondents. With this in mind, our analysis revealed that more than 82 % compared two characteristics, with the combination of annual sales and number of employees applied most often. Further respondents and nonrespondents were compared on the affiliation to their industry sector. Within this technique, the Chi-square test was used most often (65 %) followed by t-tests and ANOVA, each of which was used once (6 %). The remaining 23 % did not report the test procedure.

Comparing Respondents to the Population

As with to the previous technique, we extracted information pertaining to the characteristics that researchers used to compare respondents with the entire population. Industry was the most common characteristic. Others were the zip code, the location of the company, and the size of the work force. Again the Chi-square test procedure was most often used.

(6) Which literature was cited in the context of addressing nonresponse bias?

As shown in Table 5-7 approximately 25 % of the articles addressing nonresponse cite at least two references. The variation among the journals if two or more references were cited is rather low. The majority of the articles, 44 % across all journals (36 % for *IJPDLM*, 45 % for *JBL*, and 56 % for *TJ*), cite only one reference. Most of the time (in 51 out of 57 instances), this reference is Armstrong and Overton (1977). Furthermore, 31 % of the articles addressing nonresponse do not cite any reference. *IJPDLM* has the highest proportion of articles not citing any reference, followed by *TJ*; *JBL* accounts for the lowest value.

Table 5-7: Number of references cited per article.

	IJPDLM		JBL		TJ		Total	
	abs.	%	abs.	%	abs.	%	abs.	%
0	19	43%	13	22%	8	30%	40	31%
1	16	36%	26	45%	15	56%	57	44%
2	6	14%	13	22%	1	4%	20	16%
>2	3	7%	6	10%	3	11%	12	9%
Total	44		58		27		129	

The content analysis of the text sections relating to nonresponse bias revealed that across all journals and over the entire time horizon, authors cited 25 different references to support their treatment of nonresponse. Most of these are of minor importance as they were cited only once or twice and because many are only indirectly related to nonresponse error and mentioned to flank the analysis. Table 5-8 lists the six most cited references in articles addressing nonresponse bias and its frequency. This list of references shows that Armstrong and Overton (1977) is by far still the most popular reference to cite in nonresponse sections. However, given that the extrapolation technique proposed by Armstrong and Overton (1977) should now be supplemented with other techniques – especially the sampling of

nonrespondents (Lambert and Harrington, 1990; Mentzer and Flint, 1997) – logistics researchers still cite the Armstrong and Overton (1977) reference to justify their limited attempts to assess and control for nonresponse bias. The full list of references used to back up the nonresponse section of the articles can be found in the coding schedule (see Appendix 5-2).

Table 5-8: Top 6 references cited in the context of addressing nonresponse bias.

	IJPDLM	JBL	TJ	Total
Armstrong and Overton (1977)	24	42	15	81
Lambert and Harrington (1990)	5	8	2	15
Mentzer and Flint (1997)	3	6	0	9
Boyson et al. (1999)	1	2	2	5
Babbie (1990)	1	2	1	4
Salant and Dillman (1994)	1	2	1	4
Others ^a	5	9	9	23

^a Each article pooled under this category was cited only one or two times across all journals.

(7) What were the outcomes of the tests to detect nonresponse bias?

An examination of the text sections in the 129 articles on nonresponse bias revealed that a bias on some study variables and/or demographics was found in only 20 of these articles. In all 20 articles, the authors concluded that nonresponse bias does not have a negative influence on the validity and reliability of the study. For example, Murphy and Poist (1998) found statistically significant differences on three out of 85 variables and concluded, that “[b]ecause this is fewer than would be expected by chance occurrence, nonresponse bias does not appear to be a major issue in the present study.” (p. 29) Thus we found no article in which an overall bias was detected and no article used weighting techniques to account for the differences.

Most of the differences between respondents and nonrespondents have been unveiled through extrapolation (in 13 studies). Both the sampling of nonrespondents and the comparison of respondents to the population revealed differences in three studies, whereas the fourth technique, comparing respondents to nonrespondents, found differences in only one article. Although this could be indicative of the effectiveness of each technique, we believe that the number of studies that revealed differences between respondents and nonrespondents (20) is too small to draw a sound conclusion, so we need to leave this to future research. An intriguing fact in this context is that we found only one article in which the conducted test for measuring nonresponse bias is considered a limitation to the entire research study (Rafiq and Jaafar, 2007). Its authors call for the sampling of nonrespondents in addition to extrapolation, as the latter “is not a true test of nonresponse” (Rafiq and Jaafar, 2007, p. 169) and the approach of nonrespondents “would then provide stronger evidence [about] nonresponse bias than the Armstrong and Overton test alone.” (p. 169)

When we focused on the verbal precision of the final conclusion, we found a spectrum of stated “certainty.” Some researchers are more cautious in their conclusions, as they do not

rule out nonresponse bias but believe that it has no negative impact. Others state that based on their analysis, nonresponse bias is not present while others find no statistically significant differences, but fail to mention the effect on nonresponse bias. The following examples, depicted in Table 5-9, exemplify the broad spectrum of conclusions stated by the authors.

Table 5-9: Spectrum of phrased conclusions with respect to nonresponse bias.

Conclusion	Source
“Study respondents did not differ significantly from the nonrespondents in terms of age or education.” (p. 182)	Esper et al. (2003)
“[N]onresponse bias may not a major concern in this study.” (p. 10)	Cheng and Yeh (2007)
“These findings, thus, minimized concerns about non-response bias.” (p. 5)	Maloni and Jackson (2005)
“Both assessments indicate no evidence of non-response bias.” (p. 43)	Germain and Lyer (2006)
“These results collectively suggest that non-response bias is not present in the data.” (p. 187)	Sanders (2007)

5.6 Discussion, implications, and limitations

The results of our content analysis of survey research on all articles of three flagship logistics journals (*IJPDLM*, *JBL* and *TJ*) aimed to generate knowledge of how top-tier logistics journals have handled nonresponse and its potential biasing effects. Therefore, we have advanced our understanding of how logistics researchers assess and report nonresponse bias in research practice (Larson, 2005). Our study covering the 10-year time horizon from 1998 through 2007 revealed several salient findings.

First, logistics oriented surveys suffer consistently from high nonresponse rates as the majority of examined studies achieved response rates below 30 %, increasing from 50 % from 1998 to 2002 to 62 % from 2003 to 2007.

Second, the authors of 56 % of the articles were aware that nonresponse bias can cause problems with the validity and reliability of their studies and therefore examined whether or

not nonresponse bias has an impact on their surveys' outcomes and reported their analysis of nonresponse in their articles. While this latter finding draws a slightly more positive picture for the logistics discipline than do similar studies in some other fields of business and management (where on average a smaller percentage of articles reports on nonresponse), logistics researchers still have a way to go in using survey-based methodologies if they are firmly to dismiss the concern of nonresponse bias, which can severely compromise the generalizability of survey results. This is particularly the case due to the declining response rates.

Third, while our analysis can attest that many logistics researchers have improved the quantity and quality of their nonresponse analysis, there is still substantial room for improvement because only 56 % of the articles even mentioned the issue of nonresponse.

The in-depth analysis of the quantity and quality of nonresponse tests reported in the logistics journals produce some additional noteworthy insights into how logistics researchers handle nonresponse in practice.

The more (and the more rigorous) tests logistics researchers apply, the more confident they can be in generalizing their survey results to the population. Despite the critique of not conducting more rigorous nonresponse tests in mail surveys (Lambert and Harrington, 1990; Mentzer and Flint, 1997) and more recently web-based surveys (Griffis, Goldsby, and Cooper, 2003), extrapolation was by far still the most frequently applied technique. The application of more rigorous techniques of comparing respondents to the population or to nonrespondents on characteristics known a priori, and of sampling nonrespondents, is the exception rather than the norm in logistics research. Logistics researchers should combine some of these techniques since "each method has distinct limitations (and) the best way to

show that nonresponse bias does not exist is to use a number of the procedures and show convergence.” (Werner, Praxedes, and Kim, 2007, p. 288)

None of the articles reporting on nonresponse concluded that nonresponse bias might be a potential problem. Given that most logistics researchers apply only a single technique – mostly extrapolation – we question that the claimed nonexistence of nonresponse bias was always a valid conclusion. To firmly dismiss nonresponse bias in the data, the authors would need to apply several and more rigorous techniques. At least, the potential of nonresponse bias due to less rigorous tests would need to be stated as a limitation of the articles. This was done only by one article which stated the limitation of extrapolation and proposed sampling nonrespondents as an additional technique what would have been desirable.

Logistics researchers seem to “follow the crowd” in citing Armstrong and Overton (1977) in support of their procedure to test for nonresponse. Besides the fact that this reference was already published in the 1970’s, logistics researchers seem to have neglected the critique of Armstrong and Overton’s technique that has been brought forward by logistics scholars (Lambert and Harrington, 1990; Mentzer and Flint, 1997). Even the other references cited were published, on average, almost 20 years ago. This “age structure” does not indicate that state-of-the-art publications on research methodology were considered. This seems troublesome since considerable efforts have been undertaken in many disciplines to increase rigor of survey research.

In sum, this study provides a new repository of the current practice of conducting and reporting tests for nonresponse bias. Furthermore, we point out various ways in which logistics researchers can increase the validity and reliability of their research by properly testing for and reporting nonresponse bias in their survey-based research. Researchers must take the necessary efforts to address nonresponse bias and more often and more thoroughly,

even if response rates are high. We encourage researchers to include more detailed information not only with respect to the nonresponse section but also to basic conditions such as the response rate, the year of the survey, geographical scope of sampling frame, or the exact sponsor of the survey. Journal reviewers and editors should pay special attention to nonresponse tests in survey-based research. If this is not the case yet, it should be the norm that reviewers and editors ask the authors to provide additional information and to conduct more tests if not reported in submitted manuscripts. In particular, reviewers and editors should push authors to conduct multiple and more rigorous tests and report the results of the statistical analysis in more detail. In light of the increasing difficulty of realizing high response rates in mail surveys, we hope that our study supports researchers, journal reviewers and editors in dealing better with nonresponse bias.

As with every study, ours is not without limitations. We can state with confidence, however, that nonresponse is not a problem in our study. We were in the lucky position to obtain data from the entire population; i.e., all articles reporting mail surveys in three flagship logistics journals. While our findings are representative for *IJPDLM*, *JBL* and *TJ*, a major limitation of our study is that we only examined these three journals. Therefore, we urge caution in generalizing our results to other journals.

Another limitation is the exploratory nature of our study. While we put together a repository of current practices and were able to draw conclusions and provide recommendations on how to deal with nonresponse, many questions remain still unanswered and are left to future research. In the context of nonresponse, it is worthwhile to survey researchers to understand why they have (or have not) reported nonresponse in their articles, why they have applied certain techniques, and whether they have attempted to collect additional data from nonrespondents, but did not succeed. Furthermore, are certain types of

survey-based research in logistics more inclined to nonresponse bias than others (e.g., survey of logistics service firms vs. survey of manufacturing firms)?

We hope that our study not only increases the concern for sample representativeness and nonresponse in logistics research, but also encourages researchers to conduct more research on the methodological aspects of logistics research. Both endeavors will increase the rigor of research studies.

Appendix 5-1: Overview of related studies in other fields of business and management.

Source	Journals analyzed ^d	Total # of articles/ # of mail survey articles/ (in %)	Mean response rate	Percentage mentioning nonresponse ^b	Time frame	Stated purpose of the study
Malhotra and Grover (1998)	DS, JOM, MS, POM	n/a / 25	n/a	44%	1990-1995	To provide a normative perspective on 'good survey research practices'.
Lindner, Murphy, and Briers (2001)	JAE	364 / 304 (84%)	82%	65%	1990-1999	To describe and explore how nonresponse in the [Journal] has been handled historically.
Lindner (2002)	JIAEE	87 / 52 (60%)	87%	47%	1995-1999	
Dooley and Lindner (2003)	HRDQ	158 / 81 (51%)	76%	60%	1990-1999	
King and He (2005)	MISQ	n/a / 22	36%	64%	1999-2004	To identify the frequency with which coverage and nonresponse errors are dealt with and reported in IS empirical research.
	ISR	n/a / 18	45%	44%		
	JMIS	n/a / 41	33%	46%		
Collier and Beinstock (2007)	JM	170 / 136 ^a	63% ^c	65%	1999-2003	To take a critical look at the marketing discipline to explore and describe how nonresponse is currently being addressed.
	JMR	192 / 233 ^a	92% ^c	36%		
	JAMS	173 / 121 ^a	65% ^c	53%		
Werner, Praxedes, and Kim (2007)	AMJ	329 / 128 (39%)	56%	30%	2000-2004	To identify how frequently nonresponse analyses are reported and what variables affect these rates.
	ASQ	127 / 15 (12%)	50%	47%		
	JAP	487 / 166 (34%)	58%	28%		
	HR	299 / 26 (9%)	52%	23%		
	JOB	262 / 167 (64%)	58%	33%		
	JoM	213 / 68 (32%)	46%	40%		
	JSMB	151 / 77 (51%)	33%	35%		
	GOM	103 / 35 (34%)	47%	20%		
SAM	125 / 23 (18%)	36%	13%			
Bartlett, Bartlett, and Reio (2008)	DPE	166 / 85 (51%)	62%	18%	1995-2004	To examine the research methods that impact the external validity of survey-based research articles.
Kano et al. (2008)	multiple ^e	n/a / 100	n/a	24%	2000-2007	To examine the extent to which survey methods and results were comprehensively and accurately reported

a) If articles reported multiple surveys, each survey was analyzed independently. Thus, the counting is different from the other studies. b) If not stated in the study percentage was calculated as follows: # of articles mentioning nonresponse divided by # of articles based on less than 100% response rate. c) Approximation based on own computations.

d) AMJ = *Academy of Management Journal*, ASQ = *Administrative Science Quarterly*, DPE = *Delta Pi Epsilon*, DS = *Decision Sciences*, GOM = *Group and Organization Management*, HR = *Human Relations*, HRDQ = *Human Resource Development Quarterly*, ISR = *Information Systems Research*, JAE = *Journal of Agricultural Education*, JAMS = *Journal of the Academy of Marketing Science*, JAP = *Journal of Applied Psychology*, JIAEE = *Journal of International Agricultural and Extension Education*, JM = *Journal of Marketing*, JMIS = *Journal of Management Information Systems*, JMR = *Journal of Marketing Research*, JOB = *Journal of Business*, JoM = *Journal of Management*, JOM = *Journal of Operations Management*, JSMB = *Journal of Small Business Management*, MISQ = *Management Information Systems Quarterly*, MS = *Management Science*, POM = *Production and Operations Management*, SAM = *SAM Advanced Management Journal*. e) Selected articles found by key word search in multiple databases are from 68 journals representing a broad range of established journals in the education field

Appendix 5-2: Coding schedule.

Variables	Group A			Group B										Group C			Group D		Group E		Group F																																																		
	A.01	A.02	A.03	B.01	B.02	B.03	B.04	B.05	B.06	B.07	B.08	B.09	B.10	C.01	C.02	C.03	D.01	D.02	E.01	E.02	F.01	F.02																																																	
Entries	@	@	1	#	X	#	#	1	#	X	#	#	#	@	#	@	#	X	#	X	@	1																																																	
Variable values	<table border="1"> <tr> <td rowspan="3">A.03</td> <td>IJPDLM</td> </tr> <tr> <td>JBL</td> </tr> <tr> <td>TJ</td> </tr> <tr> <td rowspan="4">B.02</td> <td>Returned undelivered</td> </tr> <tr> <td>Unwilling to participate</td> </tr> <tr> <td>Respondent left company</td> </tr> <tr> <td>Not relevant/not eligible</td> </tr> <tr> <td rowspan="2">B.04</td> <td>B.01 minus B.03</td> </tr> <tr> <td></td> </tr> <tr> <td rowspan="2">B.05</td> <td>Responses received</td> </tr> <tr> <td>Usable responses received</td> </tr> <tr> <td rowspan="3">B.07</td> <td>Too many items blank</td> </tr> <tr> <td>Criteria not met by respondent</td> </tr> <tr> <td>n/a</td> </tr> </table>			A.03	IJPDLM	JBL	TJ	B.02	Returned undelivered	Unwilling to participate	Respondent left company	Not relevant/not eligible	B.04	B.01 minus B.03		B.05	Responses received	Usable responses received	B.07	Too many items blank	Criteria not met by respondent	n/a	<table border="1"> <tr> <td rowspan="14">D.01</td> <td>Alreck and Settle (1985)</td> </tr> <tr> <td>Armstrong and Overton (1977)</td> </tr> <tr> <td>Assael and Keon (1982)</td> </tr> <tr> <td>Babbie (1990)</td> </tr> <tr> <td>Biemer (1991)</td> </tr> <tr> <td>Boyson et al. (1999)</td> </tr> <tr> <td>Ellis, Endo, and Armer (1970)</td> </tr> <tr> <td>Fawcett, Stanley, and Smith (1997)</td> </tr> <tr> <td>Flynn et al. (1990)</td> </tr> <tr> <td>Hair et al. (1995)</td> </tr> <tr> <td>Kanuk and Berenson (1975)</td> </tr> <tr> <td>Knemeyer and Murphy (2005)</td> </tr> <tr> <td>Lambert and Harrington (1990)</td> </tr> <tr> <td>Li and Calantone (1998)</td> </tr> <tr> <td>Lohr (1999)</td> </tr> </table>										D.01	Alreck and Settle (1985)	Armstrong and Overton (1977)	Assael and Keon (1982)	Babbie (1990)	Biemer (1991)	Boyson et al. (1999)	Ellis, Endo, and Armer (1970)	Fawcett, Stanley, and Smith (1997)	Flynn et al. (1990)	Hair et al. (1995)	Kanuk and Berenson (1975)	Knemeyer and Murphy (2005)	Lambert and Harrington (1990)	Li and Calantone (1998)	Lohr (1999)	<table border="1"> <tr> <td rowspan="10">D.01</td> <td>Malhotra and Grover (1998)</td> </tr> <tr> <td>Mentzer and Flint (1997)</td> </tr> <tr> <td>Sabherwal (1990)</td> </tr> <tr> <td>Salant and Dillman (1994)</td> </tr> <tr> <td>Shang and Marlow (2005)</td> </tr> <tr> <td>Siegel (1956)</td> </tr> <tr> <td>Suzuki and Williams (1998)</td> </tr> <tr> <td>Teo and King (1997)</td> </tr> <tr> <td>Yu and Cooper (1983)</td> </tr> <tr> <td>Zhao, Dröge, and Stank (2001)</td> </tr> <tr> <td rowspan="3">E.02</td> <td>Extrapolation</td> </tr> <tr> <td>Sampling nonrespondents</td> </tr> <tr> <td>Comparing respondents to nonrespondents</td> </tr> <tr> <td rowspan="2">F.02</td> <td>Comparing respondents to population</td> </tr> <tr> <td>Yes/No</td> </tr> </table>					D.01	Malhotra and Grover (1998)	Mentzer and Flint (1997)	Sabherwal (1990)	Salant and Dillman (1994)	Shang and Marlow (2005)	Siegel (1956)	Suzuki and Williams (1998)	Teo and King (1997)	Yu and Cooper (1983)	Zhao, Dröge, and Stank (2001)	E.02	Extrapolation	Sampling nonrespondents	Comparing respondents to nonrespondents	F.02	Comparing respondents to population	Yes/No
A.03	IJPDLM																																																																						
	JBL																																																																						
	TJ																																																																						
B.02	Returned undelivered																																																																						
	Unwilling to participate																																																																						
	Respondent left company																																																																						
	Not relevant/not eligible																																																																						
B.04	B.01 minus B.03																																																																						
B.05	Responses received																																																																						
	Usable responses received																																																																						
B.07	Too many items blank																																																																						
	Criteria not met by respondent																																																																						
	n/a																																																																						
D.01	Alreck and Settle (1985)																																																																						
	Armstrong and Overton (1977)																																																																						
	Assael and Keon (1982)																																																																						
	Babbie (1990)																																																																						
	Biemer (1991)																																																																						
	Boyson et al. (1999)																																																																						
	Ellis, Endo, and Armer (1970)																																																																						
	Fawcett, Stanley, and Smith (1997)																																																																						
	Flynn et al. (1990)																																																																						
	Hair et al. (1995)																																																																						
	Kanuk and Berenson (1975)																																																																						
	Knemeyer and Murphy (2005)																																																																						
	Lambert and Harrington (1990)																																																																						
	Li and Calantone (1998)																																																																						
Lohr (1999)																																																																							
D.01	Malhotra and Grover (1998)																																																																						
	Mentzer and Flint (1997)																																																																						
	Sabherwal (1990)																																																																						
	Salant and Dillman (1994)																																																																						
	Shang and Marlow (2005)																																																																						
	Siegel (1956)																																																																						
	Suzuki and Williams (1998)																																																																						
	Teo and King (1997)																																																																						
	Yu and Cooper (1983)																																																																						
	Zhao, Dröge, and Stank (2001)																																																																						
E.02	Extrapolation																																																																						
	Sampling nonrespondents																																																																						
	Comparing respondents to nonrespondents																																																																						
F.02	Comparing respondents to population																																																																						
	Yes/No																																																																						

Appendix 5-2: Coding schedule (continued).

Group		Group G																																																																																													
Variables	Group G																																																																																														
	G.01	G.02	G.03	G.04	G.05	G.06	G.07	G.08	G.09	G.10	G.11	G.12	G.13	G.14	G.15	G.16	G.17	G.18	G.19	G.20	G.21	G.22	G.22																																																																								
Entries	1	1	1	1	X	X	1	#	#	X	1	1	X	X	1	1	X	X	1	1	X	X	1																																																																								
Variable values	<table border="1"> <tr><td rowspan="6">G.01</td><td>First quartile</td></tr> <tr><td>First three quartiles</td></tr> <tr><td>First wave</td></tr> <tr><td>Received within x days of initial mailing</td></tr> <tr><td>First 50%</td></tr> <tr><td>Others</td></tr> </table>	G.01	First quartile	First three quartiles	First wave	Received within x days of initial mailing	First 50%	Others	<table border="1"> <tr><td rowspan="6">G.04</td><td>All items/demographics</td></tr> <tr><td>Selection of items/demographics</td></tr> <tr><td rowspan="6">G.05</td><td>T-Test</td></tr> <tr><td>MANOVA</td></tr> <tr><td>ANOVA</td></tr> <tr><td>F-Test</td></tr> <tr><td>Chi-Square</td></tr> <tr><td>ANCOVA Models</td></tr> <tr><td>Hotelling-Lawley-Trace</td></tr> <tr><td>Mann-Whitney Test</td></tr> <tr><td>Kolmogorov-Smirnov</td></tr> <tr><td>G.06</td><td>=> D.01</td></tr> <tr><td>G.07</td><td>=> F.02</td></tr> <tr><td rowspan="3">G.10</td><td>Telephone</td></tr> <tr><td>Fax</td></tr> <tr><td>Mail</td></tr> </table>	G.04	All items/demographics	Selection of items/demographics	G.05	T-Test	MANOVA	ANOVA	F-Test	Chi-Square	ANCOVA Models	Hotelling-Lawley-Trace	Mann-Whitney Test	Kolmogorov-Smirnov	G.06	=> D.01	G.07	=> F.02	G.10	Telephone	Fax	Mail	<table border="1"> <tr><td>G.11</td><td>=> G.03</td></tr> <tr><td>G.12</td><td>=> G.04</td></tr> <tr><td>G.13</td><td>=> G.05</td></tr> <tr><td>G.14</td><td>=> D.01</td></tr> <tr><td>G.15</td><td>=> F.02</td></tr> <tr><td rowspan="6">G.16</td><td>Annual sales</td></tr> <tr><td>Number of employees</td></tr> <tr><td>Industry/SIC code</td></tr> <tr><td>Age</td></tr> <tr><td>Experience</td></tr> <tr><td>Education level</td></tr> <tr><td>Gender</td></tr> <tr><td>Assets</td></tr> <tr><td>Ownership</td></tr> <tr><td>Geographical area</td></tr> <tr><td>G.17</td><td>=> G.05</td></tr> </table>	G.11	=> G.03	G.12	=> G.04	G.13	=> G.05	G.14	=> D.01	G.15	=> F.02	G.16	Annual sales	Number of employees	Industry/SIC code	Age	Experience	Education level	Gender	Assets	Ownership	Geographical area	G.17	=> G.05	<table border="1"> <tr><td>G.18</td><td>=> D.01</td></tr> <tr><td>G.19</td><td>=> F.02</td></tr> <tr><td>G.20</td><td>=> G.16</td></tr> <tr><td>G.21</td><td>=> G.05</td></tr> <tr><td>G.22</td><td>=> D.01</td></tr> <tr><td>G.23</td><td>=> F.02</td></tr> </table>	G.18	=> D.01	G.19	=> F.02	G.20	=> G.16	G.21	=> G.05	G.22	=> D.01	G.23	=> F.02	<table border="1"> <tr><th colspan="2">List of abbreviations</th></tr> <tr><td>1</td><td>Only one item possible or n/a</td></tr> <tr><td>X</td><td>Multiple items possible or n/a</td></tr> <tr><td>#</td><td>Numeric value or n/a</td></tr> <tr><td>@</td><td>Text value or n/a</td></tr> <tr><td>n/a</td><td>Not available</td></tr> </table>	List of abbreviations		1	Only one item possible or n/a	X	Multiple items possible or n/a	#	Numeric value or n/a	@	Text value or n/a	n/a	Not available															
			G.01	First quartile																																																																																											
				First three quartiles																																																																																											
				First wave																																																																																											
				Received within x days of initial mailing																																																																																											
				First 50%																																																																																											
	Others																																																																																														
	G.04	All items/demographics																																																																																													
		Selection of items/demographics																																																																																													
		G.05	T-Test																																																																																												
			MANOVA																																																																																												
			ANOVA																																																																																												
			F-Test																																																																																												
	Chi-Square																																																																																														
	ANCOVA Models																																																																																														
	Hotelling-Lawley-Trace																																																																																														
	Mann-Whitney Test																																																																																														
	Kolmogorov-Smirnov																																																																																														
	G.06	=> D.01																																																																																													
	G.07	=> F.02																																																																																													
G.10	Telephone																																																																																														
	Fax																																																																																														
	Mail																																																																																														
G.11	=> G.03																																																																																														
G.12	=> G.04																																																																																														
G.13	=> G.05																																																																																														
G.14	=> D.01																																																																																														
G.15	=> F.02																																																																																														
G.16	Annual sales																																																																																														
	Number of employees																																																																																														
	Industry/SIC code																																																																																														
	Age																																																																																														
	Experience																																																																																														
	Education level																																																																																														
Gender																																																																																															
Assets																																																																																															
Ownership																																																																																															
Geographical area																																																																																															
G.17	=> G.05																																																																																														
G.18	=> D.01																																																																																														
G.19	=> F.02																																																																																														
G.20	=> G.16																																																																																														
G.21	=> G.05																																																																																														
G.22	=> D.01																																																																																														
G.23	=> F.02																																																																																														
List of abbreviations																																																																																															
1	Only one item possible or n/a																																																																																														
X	Multiple items possible or n/a																																																																																														
#	Numeric value or n/a																																																																																														
@	Text value or n/a																																																																																														
n/a	Not available																																																																																														
<table border="1"> <tr><td rowspan="14">G.02</td><td>Last quartile</td></tr> <tr><td>Second/last wave</td></tr> <tr><td>Received after x days of initial mailing</td></tr> <tr><td>Second 50%</td></tr> <tr><td>Others</td></tr> <tr><td rowspan="3">G.03</td><td>Study variables</td></tr> <tr><td>Study variables & demographics</td></tr> <tr><td>Demographics</td></tr> </table>	G.02	Last quartile	Second/last wave	Received after x days of initial mailing	Second 50%	Others	G.03	Study variables	Study variables & demographics	Demographics	<table border="1"> <tr><td rowspan="14">G.18</td><td>=> D.01</td></tr> <tr><td rowspan="14">G.19</td><td>=> F.02</td></tr> <tr><td rowspan="14">G.20</td><td>=> G.16</td></tr> <tr><td rowspan="14">G.21</td><td>=> G.05</td></tr> <tr><td rowspan="14">G.22</td><td>=> D.01</td></tr> <tr><td rowspan="14">G.23</td><td>=> F.02</td></tr> </table>	G.18	=> D.01	G.19	=> F.02	G.20	=> G.16	G.21	=> G.05	G.22	=> D.01	G.23	=> F.02	<table border="1"> <tr><th colspan="2">List of abbreviations</th></tr> <tr><td>1</td><td>Only one item possible or n/a</td></tr> <tr><td>X</td><td>Multiple items possible or n/a</td></tr> <tr><td>#</td><td>Numeric value or n/a</td></tr> <tr><td>@</td><td>Text value or n/a</td></tr> <tr><td>n/a</td><td>Not available</td></tr> </table>	List of abbreviations		1	Only one item possible or n/a	X	Multiple items possible or n/a	#	Numeric value or n/a	@	Text value or n/a	n/a	Not available																																																											
		G.02	Last quartile																																																																																												
			Second/last wave																																																																																												
			Received after x days of initial mailing																																																																																												
			Second 50%																																																																																												
			Others																																																																																												
			G.03	Study variables																																																																																											
				Study variables & demographics																																																																																											
				Demographics																																																																																											
			G.18	=> D.01																																																																																											
				G.19	=> F.02																																																																																										
					G.20	=> G.16																																																																																									
						G.21	=> G.05																																																																																								
							G.22	=> D.01																																																																																							
G.23	=> F.02																																																																																														
	List of abbreviations																																																																																														
	1	Only one item possible or n/a																																																																																													
	X	Multiple items possible or n/a																																																																																													
	#	Numeric value or n/a																																																																																													
	@	Text value or n/a																																																																																													
	n/a	Not available																																																																																													
	<table border="1"> <tr><td rowspan="14">G.03</td><td>First quartile</td></tr> <tr><td>First three quartiles</td></tr> <tr><td>First wave</td></tr> <tr><td>Received within x days of initial mailing</td></tr> <tr><td>First 50%</td></tr> <tr><td>Others</td></tr> <tr><td rowspan="3">G.02</td><td>Last quartile</td></tr> <tr><td>Second/last wave</td></tr> <tr><td>Received after x days of initial mailing</td></tr> <tr><td>Second 50%</td></tr> <tr><td>Others</td></tr> <tr><td rowspan="3">G.01</td><td>Study variables</td></tr> <tr><td>Study variables & demographics</td></tr> <tr><td>Demographics</td></tr> </table>	G.03						First quartile	First three quartiles	First wave	Received within x days of initial mailing	First 50%	Others	G.02	Last quartile	Second/last wave	Received after x days of initial mailing	Second 50%	Others	G.01	Study variables	Study variables & demographics	Demographics	<table border="1"> <tr><td rowspan="14">G.04</td><td>All items/demographics</td></tr> <tr><td>Selection of items/demographics</td></tr> <tr><td rowspan="6">G.05</td><td>T-Test</td></tr> <tr><td>MANOVA</td></tr> <tr><td>ANOVA</td></tr> <tr><td>F-Test</td></tr> <tr><td>Chi-Square</td></tr> <tr><td>ANCOVA Models</td></tr> <tr><td>Hotelling-Lawley-Trace</td></tr> <tr><td>Mann-Whitney Test</td></tr> <tr><td>Kolmogorov-Smirnov</td></tr> <tr><td>G.06</td><td>=> D.01</td></tr> <tr><td>G.07</td><td>=> F.02</td></tr> <tr><td rowspan="3">G.10</td><td>Telephone</td></tr> <tr><td>Fax</td></tr> <tr><td>Mail</td></tr> </table>	G.04	All items/demographics	Selection of items/demographics	G.05	T-Test	MANOVA	ANOVA	F-Test	Chi-Square	ANCOVA Models	Hotelling-Lawley-Trace	Mann-Whitney Test	Kolmogorov-Smirnov	G.06	=> D.01	G.07	=> F.02	G.10	Telephone	Fax	Mail	<table border="1"> <tr><td>G.11</td><td>=> G.03</td></tr> <tr><td>G.12</td><td>=> G.04</td></tr> <tr><td>G.13</td><td>=> G.05</td></tr> <tr><td>G.14</td><td>=> D.01</td></tr> <tr><td>G.15</td><td>=> F.02</td></tr> <tr><td rowspan="6">G.16</td><td>Annual sales</td></tr> <tr><td>Number of employees</td></tr> <tr><td>Industry/SIC code</td></tr> <tr><td>Age</td></tr> <tr><td>Experience</td></tr> <tr><td>Education level</td></tr> <tr><td>Gender</td></tr> <tr><td>Assets</td></tr> <tr><td>Ownership</td></tr> <tr><td>Geographical area</td></tr> <tr><td>G.17</td><td>=> G.05</td></tr> </table>	G.11	=> G.03	G.12	=> G.04	G.13	=> G.05	G.14	=> D.01	G.15	=> F.02	G.16	Annual sales	Number of employees	Industry/SIC code	Age	Experience	Education level	Gender	Assets	Ownership	Geographical area	G.17	=> G.05	<table border="1"> <tr><td>G.18</td><td>=> D.01</td></tr> <tr><td>G.19</td><td>=> F.02</td></tr> <tr><td>G.20</td><td>=> G.16</td></tr> <tr><td>G.21</td><td>=> G.05</td></tr> <tr><td>G.22</td><td>=> D.01</td></tr> <tr><td>G.23</td><td>=> F.02</td></tr> </table>	G.18	=> D.01	G.19	=> F.02	G.20	=> G.16	G.21	=> G.05	G.22	=> D.01	G.23	=> F.02	<table border="1"> <tr><th colspan="2">List of abbreviations</th></tr> <tr><td>1</td><td>Only one item possible or n/a</td></tr> <tr><td>X</td><td>Multiple items possible or n/a</td></tr> <tr><td>#</td><td>Numeric value or n/a</td></tr> <tr><td>@</td><td>Text value or n/a</td></tr> <tr><td>n/a</td><td>Not available</td></tr> </table>	List of abbreviations		1	Only one item possible or n/a	X	Multiple items possible or n/a	#	Numeric value or n/a	@	Text value or n/a	n/a	Not available
								G.03	First quartile																																																																																						
			First three quartiles																																																																																												
			First wave																																																																																												
			Received within x days of initial mailing																																																																																												
			First 50%																																																																																												
			Others																																																																																												
G.02			Last quartile																																																																																												
			Second/last wave																																																																																												
			Received after x days of initial mailing																																																																																												
Second 50%																																																																																															
Others																																																																																															
G.01			Study variables																																																																																												
			Study variables & demographics																																																																																												
	Demographics																																																																																														
G.04	All items/demographics																																																																																														
	Selection of items/demographics																																																																																														
	G.05	T-Test																																																																																													
		MANOVA																																																																																													
		ANOVA																																																																																													
		F-Test																																																																																													
		Chi-Square																																																																																													
		ANCOVA Models																																																																																													
	Hotelling-Lawley-Trace																																																																																														
	Mann-Whitney Test																																																																																														
	Kolmogorov-Smirnov																																																																																														
	G.06	=> D.01																																																																																													
	G.07	=> F.02																																																																																													
	G.10	Telephone																																																																																													
Fax																																																																																															
Mail																																																																																															
G.11	=> G.03																																																																																														
G.12	=> G.04																																																																																														
G.13	=> G.05																																																																																														
G.14	=> D.01																																																																																														
G.15	=> F.02																																																																																														
G.16	Annual sales																																																																																														
	Number of employees																																																																																														
	Industry/SIC code																																																																																														
	Age																																																																																														
	Experience																																																																																														
	Education level																																																																																														
Gender																																																																																															
Assets																																																																																															
Ownership																																																																																															
Geographical area																																																																																															
G.17	=> G.05																																																																																														
G.18	=> D.01																																																																																														
G.19	=> F.02																																																																																														
G.20	=> G.16																																																																																														
G.21	=> G.05																																																																																														
G.22	=> D.01																																																																																														
G.23	=> F.02																																																																																														
List of abbreviations																																																																																															
1	Only one item possible or n/a																																																																																														
X	Multiple items possible or n/a																																																																																														
#	Numeric value or n/a																																																																																														
@	Text value or n/a																																																																																														
n/a	Not available																																																																																														

6 CONCLUSION

This research undertaking was persistently guided by the belief that the outcome of any academic research endeavor must be developed in a rigorous and scientifically sound way, while both relevant and comprehensible to certain target groups, instead of interesting and intellectually tangible to only a few. Only the combination and reasonable balancing of relevance and rigor guarantees high quality research which is usable for both scholar and practitioners. Consequently each of the four studies presented above were thoroughly planned according to scientific standards.

Besides answering contemporary research questions in each study, one objective of this research endeavor is to nurture the understanding and to increase the awareness of gathering data by means of content analysis on secondary data sources. This concluding chapter is dedicated to briefly recap and share the main experiences and challenges made with using secondary data sources and content analysis as main data collection method. Furthermore, key learnings for the research community, especially regarding the experiences made with editors and reviewers in the course of publishing the above paper, are derived.

The four empirical studies presented in the previous chapters provide interesting insights and answers to contemporary research questions which might have been different, opposite, or even still unveiled if other research methods had been applied. Therefore, the overall conclusion is certainly in favor of secondary data and content analysis as its combination offers many methodological benefits and allows alternate perspectives. In a nutshell, both help generating new knowledge and confirming/adjusting existing knowledge in logistics and SCM research. Despite the positive assessment of this methodological approach, some experiences are not corresponding to attributes provided in the literature.

One attribute which is often assigned in the literature to secondary data is cost-effectiveness (e.g., Rabinovich and Cheon, 2011). The rationale is that the use of secondary data should be less expensive than self-generated (primary) data, e.g., by means of surveys, as secondary data principally already exists. Reflecting the experiences made within this dissertation project, this proposition is, however, too general. For example, retrieving sales figures of firms is, of course, significantly faster and easier when using commercial databases such as *Compustat* instead of laboriously gathering the data by getting every annual report and manually extracting each figure. However, although such databases are part of the infrastructure of business schools, their use is not for free. Furthermore, if the necessary data is not available in a processable format or not ‘existent’ and to be unveiled by means of content analysis, labor-intensive resources are necessary to adapt and collect the data. For instance, just the coding procedures within each of the four empirical studies took several hundred working hours. Furthermore, the collection of data was very complex and time-consuming. While downloading all 10-K forms for each firm in study 2 and 3 from the SEC’s EDGAR web-based database was relatively easy, we also obtained the biographical data for the identified set of more than 3,500 executives by virtually ‘chasing’ each person in online-databases, on corporate websites, and in news articles. This part of the process was essential to fill data warehouses and had turned out to be a critical success factor, yet it was extremely time consuming and cumbersome. Therefore, the first important learning when using secondary data, is that “the researcher might get a cheap ride, but it is not a free ride” (Cowton, 1998, p. 427).

A second learning is that editors and reviewers of logistics and SCM oriented journals are definitely not averse to empirical studies using secondary data. No reviewer has criticized the use of our sources, although, for example, 10-K filings are hardly found in logistics and SCM studies. However, when using secondary data editors and reviewers seem to expect a

panel study. The received review comments indicate that reviewers expect more than just cross-sectional analyses as they are too narrow, lacking the necessary depth to derive the right conclusions. One reviewer of the second study even criticized that our dataset might be restricted, considering the limited time range of six years. Thus, it is recommended to deliberately select the start and end point of the time frame.

When solely relying on secondary data, one must consider availability issues of data depending on the research question as exemplified along the second study. In study 2 the effects of Chief Supply Chain Officer (CSCO) presence on corporate performance was analyzed. Therefore key performance indicators such as the operating margin, in the years after the CSCO was present, were needed. However, this procedure leads inevitably to a time delay between the observations and its performance implications. The analyzed time window in the second study is 2004-2009. The 10-K files of all sampled firms were, however, not available earlier than mid 2010. As we analyzed lagged effects up to two years, the necessary performance figures of the annual year 2011 were not available until mid 2012. This delay is a key limitation if only secondary data is used. In contrast, when the data is derived by interviews, for example, the respondent could be asked for performance implications of CSCO presence and thus, the results would be available significantly earlier. However, the results could have been completely different.

Although content analysis has been rarely used in logistics and SCM research (Rabinovich and Cheon, 2011), it has long history in other disciplines. Therefore, as already stated in the introduction, this data collection technique is conceptually well developed and empirically tested. This circumstance was a clear advantage in conducting our research studies. However, in the course of the studies, we encountered one major challenge which was of motivational and concentration nature.

Due to the research questions, sample sizes, and selected secondary data sources a huge amount of text was coded. For study 1, the risk sections of 438 annual reports were extracted, thoroughly examined, and coded. For study 2 and 3 more than 1,200 annual reports and biographical data of more than 3,500 executives were manually coded. In study 4, several hundred scientific journal papers were assessed and the method section in all survey-based articles was manually coded. Nevertheless, although the research projects were exiting and the involved researchers gave their full support, the activity of coding mountains of text along a complex coding schedule is not only exhausting, tiring, and monotone, it is, after all, not very thrilling. Therefore, permanently motivating the entire research team, especially the coder, and showing that this procedure is of high value for the research process, is essential and critical for the success as otherwise the data quality is significantly compromised.

Secondary data analysis and content analysis as main data collection method is, with respect to logistics and SCM research, still in its infancy. However, logistics and SCM scholars should take advantage of the increasing amount of secondary data available, especially on the internet, and should recognize the huge potential of these sources in increasing rigor of our discipline. Especially, while it gets more and more difficult to access managers by means of interviews and questionnaire-based surveys, logistics and SCM research could benefit a lot by utilizing secondary data analysis more often. Indeed, generating information from annual reports, corporate websites, and other textual sources is time-consuming, cumbersome, and challenging. These drawbacks, however, should not exclude this approach as, again, “high quality research must use the most rigorous research methods possible” (Flynn, 2008, p. 66) and not the most convenient one. Therefore, I hope that the prediction by Spens and Kovács (2012) will turn into reality that the methodological approach of using secondary data and applying content analysis will be used more in the future of logistics and SCM research.

7 REFERENCES

- Abernathy, J.L., Kubick, T.R., Masli, A., 2013. The economic relevance of chief marketing officers in firms' top management teams. *Journal of Business & Economics Research* 11(12), 555-568.
- Abrahamson, E., 1996. Management fashion. *Academy of Management Review* 21(1), 254-285.
- Alreck, P.L., Settle, R.B., 1985. *The Survey Research Handbook*. Homewood, IL: Richard D. Irwin.
- Ammer, D.S., 1974. Top management's view of the purchasing function. *Journal of Purchasing & Materials Management* 10(3), 5-15.
- Andersen, P.H., Rask, M., 2003. Supply chain management: New organisational practices for changing procurement realities. *Journal of Purchasing & Supply Management* 9(2), 83-85.
- Angwin, D., Paroutis, S., Mitson, S., 2009. Connecting up strategy: Are senior strategy directors missing the link? *California Management Review* 51(3), 74-94.
- Aquino, D., Draper, L., 2008. *Supply Chain Talent: State of the Discipline*. Boston, MA: AMR Research.
- Armstrong, J.S., Overton, T.S., 1977. Estimating nonresponse bias in mail surveys. *Journal of Marketing Research* 14(3), 396-402.
- Assael, H., Keon, J., 1982. Nonsampling vs. sampling errors in survey research. *Journal of Marketing* 46(2), 114-123.
- Ayers, J.B., 2000. *Handbook of Supply Chain Management*. Boca Raton, FL: St. Lucie Press.
- Babbie, E.A., 1990. *Survey Research Methods (Vol. 2)*. Belmont, CA: Wadsworth Publishing.
- Bailey, K.D., 1994. *Methods of Social Research (Vol. 4)*. New York, NY: The Free Press.
- Bailey, K.D., 1994. *Typologies and Taxonomies: An Introduction to Classification Techniques*. Thousand Oaks, CA: Sage Publications.
- Baker Hughes, 2014. *Bylaws of Baker Hughes Incorporated – Restated as of June 5, 2014*, <http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9MTc1NzM4fENoaWxkSUQ9LTF8VHlwZT0z&t=1>., Accessed July 30, 2014.
- Ballinger, G.A., 2004. Using generalized estimating equations for longitudinal data analysis. *Organizational Research Methods* 7(2), 127-150.
- Bantel, K.A., Jackson, S.E., 1989. Top management and innovations in banking: Does the composition of the top team make a difference? *Strategic Management Journal* 10(S1), 107-124.
- Bartlett, J.E., Bartlett, M.E., Reio, T.G., 2008. Analysis of nonresponse bias in research for business education. *The Delta Pi Epsilon Journal* L(1), 45-58.
- Berelson, B., 1952. *Content Analysis in Communication Research*. Glencoe, IL: Free Press.
- Beretta, S., Bozzolan, S., 2004. A framework for the analysis of firm risk communication. *International Journal of Accounting* 39(3), 265-288.

- Biemer, P.P., 1991. *Measurement Errors in Surveys*. New York, NY: John Wiley & Sons.
- Bienstock, C.C., 1996. Sample size determination in logistics simulations. *International Journal of Physical Distribution & Logistics Management* 26(2), 43-50.
- Blau, P.M., 1977. *Inequality and Heterogeneity: A Primitive Theory of Social Structure*. New York, NY: Free Press.
- Boal, K.B., Hooijberg, R., 2000. Strategic leadership research: Moving on. *The Leadership Quarterly* 11(4), 515-549.
- Boeker, W., 1997. Strategic change: The influence of managerial characteristics and organizational growth. *Academy of Management Journal* 40(1), 152-170.
- Boone, C., van Witteloostuijn, A., 2007. Individual-level heterogeneity and macro-level outcomes. *Strategic Organization* 5(3), 259-270.
- Boyatzis, R.E., 1998. *Transforming Qualitative Information: Thematic Analysis and Code Development*. Thousand Oaks, CA: Sage Publications.
- Boyd, D.E., Chandy, R.K., Cunha, M. Jr., 2010. When do chief marketing officers affect firm value? A customer power explanation. *Journal of Marketing Research* 47(6), 1162-1176.
- Boyer, K.K., Swink, M.L., 2008. Empirical elephants - why multiple methods are essential to quality research in operations and supply chain management. *Journal of Operations Management* 26(3), 338-344.
- Boyson, S., Corsi, T., Dresner, M., Rabinovich, E., 1999. Managing effective third party logistics partnerships: What does it take? *Journal of Business Logistics* 20(1), 73-100.
- Bragg, S.M., 2009. *Running a Public Company: From IPO to SEC Reporting*. Hoboken, NJ: John Wiley & Sons.
- Busse, C., 2010. A procedure for secondary data analysis: Innovation by logistics service providers. *Journal of Supply Chain Management* 46(4), 44-58.
- Buyl, T., Boone, C., Matthyssens, P., 2011. Upper echelons research and managerial cognition. *Strategic Organization* 9(3), 240-246.
- Byrne, D.E., 1971. *The Attraction Paradigm*. New York, NY: Academic Press.
- Calantone, R.J., Vickery, S.K., 2010. Introduction to the special topic forum: Using archival and secondary data sources in supply chain management research. *Journal of Supply Chain Management* 46(4), 3-11.
- Cannella, A.A. Jr., Park, J.-H., Lee, H.-U., 2008. Top management team functional background diversity and firm performance: Examining the roles of team member colocation and environmental uncertainty. *Academy of Management Journal* 51(4), 768-784.
- Carlson, R.O., 1972. *School Superintendents: Career and Performance*. Columbus, OH: Merrill.
- Carpenter, M.A., Geletkanycz, M.A., Sanders, W.G., 2004. Upper echelons research revisited: Antecedents, elements, and consequences of top management team composition. *Journal of Management* 30(6), 749-778.
- Cavinato, J.L., 2004. Supply chain logistics risks: From the back room to the board room. *International Journal of Physical Distribution & Logistics Management* 34(5), 383-387.

- Chandler, A.D., 1962. *Strategy and Structure: Chapters in the History of the American Industrial Enterprise*. Cambridge, MA: MIT Press.
- Cheng, Y.H., Yeh, C.Y., 2007. Core competencies and sustainable competitive advantage in air-cargo forwarding: Evidence from Taiwan. *Transportation Journal* 46(3), 5-21.
- Child, J., 1972. Organizational structure, environment, and performance: The role of strategic choice. *Sociology* 6(1), 1-22.
- Chopra, S., Sodhi, M.S., 2004. Managing risk to avoid supply-chain breakdown. *Sloan Management Review* 46(1), 53-56.
- Christopher, M., Peck, H., 2004. Building the resilient supply chain. *The International Journal of Logistics Management* 15(2), 1-13.
- Cochran, W.G., 1977. *Sampling Techniques (Vol. 3)*. New York, NY: John Wiley & Sons.
- Cohen, J., 1960. A coefficient of agreement for nominal scales. *Educational and Psychological Measurement* 20(1), 37-46.
- Collier, J.E., Bienstock, C.C., 2007. An analysis of how nonresponse error is assessed in academic marketing research. *Marketing Theory* 7(2), 163-183.
- Cooper, A.C., Bruno, A.V., 1977. Success among high-technology firms. *Business Horizons* 20(2), 16-22.
- Cowton, C.J., 1998. The use of secondary data in business ethics research. *Journal of Business Ethics* 17(4), 423-434.
- Croom, S., Romano, P., Giannakis, M., 2000. Supply chain management: An analytical framework for critical literature review. *European Journal of Purchasing & Supply Management* 6(1), 67-83.
- CSC, 2007. *The Fifth Annual Global Survey of Supply Chain Progress*. Waltham, MA: Computer Sciences Corporation.
- CSC, 2010. *The Eighth Annual Global Survey of Supply Chain Progress*. Falls Church, VA: Computer Sciences Corporation.
- CSC, 2012. *The Ninth Annual Global Survey of Supply Chain Progress*. Falls Church, VA: Computer Sciences Corporation.
- CSCMP, 2010. *Careers in Supply Chain Management*. <http://www.careersinsupplychain.org>, Accessed Aug 1, 2011.
- Cyert, R.M., March, J.G., 1963. *A Behavioral Theory of the Firm*. Englewood Cliffs, NJ: Prentice-Hall.
- Davis-Sramek, B., Fugate, B.S., 2007. State of logistics: A visionary perspective. *Journal of Business Logistics* 28(2), 1-34.
- Dearborn, D.C., Simon, H.A., 1958. Selective perception: A note on the departmental identifications of executives. *Sociometry* 21(2), 140-144.
- Denton, D.K., 1994. Top management's role in inventory control. *Industrial Engineering* 26(8), 26-27.
- Diamantopoulos, A., Schlegelmilch, B.B., 1996. Determinants of industrial mail survey response: A survey-on-surveys analysis of researchers' and managers' views. *Journal of Marketing Management* 12(6), 505-531.

- Dillman, D.A., Eltinge, J.L., Groves, R.M., Little, R.J.A., 2002. Survey nonresponse in design, data collection, and analysis. In: Dillman, D.A., Eltinge, J.L., Groves, R.M., Little, R.J.A., (Eds.), *Survey Nonresponse*. New York, NY: John Wiley & Sons, pp. 3-26.
- Dobbin, F., Dierkes, J., Zorn, D.M., Kwok, M.-S., 2003. The rise of the COO: From luxury sidekick to a significant player in corporate management. *American Sociological Association Annual Meeting*, Atlanta, GA.
- Dooley, L.M., Lindner, J.R., 2003. The handling of nonresponse error. *Human Resource Development Quarterly* 14(1), 99-110.
- Dundas, K.N.M., Richardson, P.R., 1982. Implementing the unrelated product strategy. *Strategic Management Journal* 3(4), 287-301.
- Eisenhardt, K.M., Schoonhoven, C.B., 1990. Organizational growth: Linking founding team, strategy, environment, and growth among U.S. Semiconductor ventures, 1978-1988. *Administrative Science Quarterly* 35(3), 504-529.
- Ellinger, A.E., Natarajathinam, M., Adams, F.G., Gray, J.B., Hofman, D., O'Marah, K., 2011. Supply chain management competency and firm financial success. *Journal of Business Logistics* 32(3), 214-226.
- Ellis, R.A., Endo, C.M., Armer, J.M., 1970. The use of potential nonrespondents for studying nonresponse bias. *Pacific Sociological Review* 13(2), 103-109.
- Ellram, L.M., 1996. The use of the case study method in logistics research. *Journal of Business Logistics* 17(2), 93-138.
- Ellram, L.M., Carr, A., 1994. Strategic purchasing: A history and review of the literature. *International Journal of Purchasing & Materials Management* 30(2), 9-18.
- Elmuti, D., 2002. The perceived impact of supply chain management on organizational effectiveness. *Journal of Supply Chain Management* 38(3), 49-57.
- Emmelhainze, L.W., Stock, J.R., 1989. An evaluation of logistics and related journals. *International Journal of Physical Distribution & Logistics Management* 19(12), 40-45.
- Esper, T.L., Jensen, T.D., Turnipseed, F.L., Burton, S., 2003. The last mile: An examination of effects of online retail delivery strategies on consumers. *Journal of Business Logistics* 24(2), 177-203.
- Eyefortransport, 2011. *Global Chief Supply Chain Officer Strategy*. London: Eyefortransport.
- Fawcett, S.E., Magnan, G.M., McCarter, M.W., 2008. Benefits, barriers, and bridges to effective supply chain management. *Supply Chain Management: An International Journal* 13(1), 35-48.
- Fawcett, S.E., Stanley, L.L., Smith, S.R., 1997. Developing a logistics capability to improve the performance of international operations. *Journal of Business Logistics* 18(2), 101-127.
- Fawcett, S.E., Vellenga, D.B., Truitt, L.J., 1995. An evaluation of logistics and transportation professional organizations, programs, and publications. *Journal of Business Logistics* 16(1), 299-314.
- FD Wire, 2009. Full Year 2009 Siemens AG Earnings Conference - Final, FD (Fair Disclosure) Wire, December 3, 2009.

- Fearon, H.E., 1988. Organizational relationships in purchasing. *Journal of Purchasing & Materials Management* 24(4), 2-12.
- Fearon, H.E., Leenders, M.R., 1995. *Purchasing's Organizational Roles and Responsibilities*. Tempe, AZ: Center for Advanced Purchasing Studies.
- Finkelstein, S., Hambrick D.C., 1990. Top-management-team tenure and organizational outcomes: The moderating role of managerial discretion. *Administrative Science Quarterly* 35(3), 484-503.
- Finkelstein, S., Hambrick, D.C., Cannella, A.A. Jr., 2009. *Strategic Leadership - Theory and Research on Executives, Top Management Teams, and Boards*. New York, NY: Oxford University Press.
- Fischer, T.M., Vielmeyer, U., 2004. Analyse von Risk Disclosure Scores: Risikoorientierte Unternehmenspublizität der DAX 100-Unternehmen. *Zeitschrift für Internationale und Kapitalmarktorientierte Rechnungslegung* 4(11), 459-474.
- Flynn, B.B., 2008. Having it all: Rigor versus relevance in supply chain management research. *Journal of Supply Chain Management* 44(2), 63-67.
- Flynn, B.B., Sakakibara, S., Schroeder, R.G., Bates, K.A., Flynn, E.J., 1990. Empirical research methods in operations management. *Journal of Operations Management* 9(2), 250-284.
- Frohlich, M.T., 2002. Techniques for improving response rates in OM survey research. *Journal of Operations Management* 20(1), 53-62.
- Frohlich, M.T., Westbrook, R., 2001. Arcs of integration: An international study of supply chain strategies. *Journal of Operations Management* 19(2), 185-200.
- Gabarro, J.J., 1987. *The Dynamics of Taking Charge*. Boston, MA: Harvard Business School Press.
- Galbraith, J.R., 1983. Strategy and organization planning. *Human Resource Management* 22(1-2), 63-77.
- Garver, M.S., Mentzer, J.T., 1999. Logistics research methods: Employing structural equation modeling to test for construct validity. *Journal of Business Logistics* 20(1), 33-57.
- Gentry, D.L., Hailey, W.A., 1981. Industrial survey sampling. *Industrial Marketing Management* 10(2), 183-189.
- Germain, R., Lyer, K.N.S., 2006. The interaction of internal and downstream integration and its association with performance. *Journal of Business Logistics* 27(2), 29-52.
- Ghisletta, P., Spini, D., 2004. An introduction to generalized estimating equations and an application to assess selectivity effects in a longitudinal study on very old individuals. *Journal of Educational and Behavioral Statistics* 29(4), 421-437.
- Gibson, B., Hanna, J., Menachof, D., 2004. Periodical usefulness: An international perspective. *International Journal of Logistics: Research & Applications* 7(3), 297-311.
- Gibson, B.J., Hanna, J.B., 2003. Periodical usefulness: The U.S. logistics educator perspective. *Journal of Business Logistics* 24(1), 221-240.
- Gibson, B.J., Mentzer, J.T., Cook, R.L., 2005. Supply chain management: The pursuit of a consensus definition. *Journal of Business Logistics* 26(2), 17-25.

- Goffin, K., Raja, J.Z., Claes, B., Szwejczewski, M., Martinez, V., 2012. Rigor in qualitative supply chain management research: Lessons from applying repertory grid technique. *International Journal of Physical Distribution & Logistics Management* 42(8/9), 804-827.
- Golicic, S.L., Davis, D.F., 2012. Implementing mixed methods research in supply chain management. *International Journal of Physical Distribution & Logistics Management* 42(8/9), 726-741.
- Golicic, S.L., Davis, D.F., McCarthy, T.M., 2005. A balanced approach to research in supply chain management. In: Kotzab, H., Seuring, S., Müller, M., Reiner, G., (Eds.), *Research Methodologies in Supply Chain Management*. New York, NY: Physica, pp. 15-29.
- Greer, T.V., Chuchinprakarn, N., 1999. Business respondents' behavior: Main and interaction effects of delivery method, questionnaire length, and time of the week. *Journal of Business-to-Business Marketing* 6(1), 59-88.
- Greer, T.V., Chuchinprakarn, N., Seshadri, S., 2000. Likelihood of participating in mail survey research. *Industrial Marketing Management* 29(2), 97-109.
- Griffis, S.E., Goldsby, T.J., and Cooper, M., 2003. Web-based and mail surveys: A comparison of response, data, and cost. *Journal of Business Logistics* 24(2), 237-258.
- Grimm, C.M., Smith, K.G., 1991. Management and organizational change: A note on the railroad industry. *Strategic Management Journal* 12(7), 557-562.
- Grover, V., Jeong, S.-R., Kettinger, W.J., Lee, C.C., 1993. The chief information officer: A study of managerial roles. *Journal of Management Information Systems* 10(2), 107-130.
- Groves, R.M., 1989. *Survey Errors and Survey Costs*. New York, NY: John Wiley & Sons.
- Guadalupe, M., Li, H., Wulf, J., 2014. Who lives in the C-suite? Organizational structure and the division of labor in top management. *Management Science* 60(4), 824-844.
- Gupta, S., Verma, R., Victorino, L., 2006. Empirical research published in production and operations management (1992-2005): Trends and future research directions. *Production & Operations Management* 15(3), 432-448.
- Hair, J.F., Anderson, R.E., Tatham, R.L., Black, B., 1995. *Multivariate Data Analysis with Readings* (Vol. 4). Englewood Cliffs, NJ: Prentice-Hall.
- Hair, J.F., Black, B., Babin, B., Anderson, R.E., Tatham, R.L., 2006. *Multivariate Data Analysis* (Vol. 6). Upper Saddle River, NJ: Prentice Hall.
- Haleblian, J., Finkelstein, S., 1993. Top management team size, CEO dominance, and firm performance: The moderating roles of environmental turbulence and discretion. *Academy of Management Journal* 36(4), 844-863.
- Hall, R.W., 1983. *Zero Inventories*. Homewood, IL: Dow Jones-Irwin.
- Halldórsson, Á., Larson, P.D., Poist, R.F., 2008. Supply chain management: A comparison of Scandinavian and American perspectives. *International Journal of Physical Distribution & Logistics Management* 38(2), 126-142.
- Hallikas, J., Karvonen, I., Pulkkinen, U., Virolainen, V.-M., Tuominen, M., 2004. Risk management processes in supplier networks. *International Journal of Production Economics* 90(1), 47-58.
- Hambrick, D.C., 2007. Upper echelons theory: An update. *Academy of Management Review* 32(2), 334-343.

- Hambrick, D.C., Cannella, A.A. Jr., 2004. CEOs who have COOs: Contingency analysis of an unexplored structural form. *Strategic Management Journal* 25(10), 959-979.
- Hambrick, D.C., D'Aveni, R.A., 1992. Top team deterioration as part of the downward spiral of large corporate bankruptcies. *Management Science* 38(10), 1445-1466.
- Hambrick, D.C., Finkelstein, S., 1987. Managerial discretion: A bridge between polar views of organizational outcomes. In: Cummings, L.L., Staw, B.M., (Eds.), *Research in Organizational Behavior*. Greenwich, CT: JAI Press, pp. 369-406.
- Hambrick, D.C., Geletkanycz, M.A., Fredrickson, J.W., 1993. Top executive commitment to the status quo: Some tests of its determinants. *Strategic Management Journal* 14(6), 401-418.
- Hambrick, D.C., Mason, P.A., 1984. Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review* 9(2), 193-206.
- Hambrick, D.C., Schecter, S.M., 1983. Turnaround strategies for mature industrial-product business units. *Academy of Management Journal* 26(2), 231-248.
- Hanley, J.A., Negassa, A., Edwardes, M.D.d., Forrester, J.E., 2003. Statistical analysis of correlated data using generalized estimating equations: An orientation. *American Journal of Epidemiology* 157(4), 364-375.
- Hansen, M.H., Hurwitz, W.N., 1946. The problem of nonresponse in sample surveys. *Journal of the American Statistical Association* 41(236), 517-529.
- Heckmann, P., Shorten, D., Engel, H., 2003. *Supply Chain Management at 21: The Hard Road to Adulthood*. New York, NY: Booz Allen Hamilton.
- Helmich, D.L., Brown, W.B., 1972. Successor type and organizational change in the corporate enterprise. *Administrative Science Quarterly* 17(3), 371-381.
- Hendricks, K.B., Hora, M., Singhal, V.R., 2015. An empirical investigation on the choices of supply chain and operations management executives. *Management Science*, forthcoming.
- Hendricks, K.B., Singhal, V.R., 2005. An empirical analysis of the effect of supply chain disruptions on the long-run stock price performance and equity risk of the firm. *Production & Operations Management* 14(1), 35-52.
- Higgins, M.C., Gulati, R., 2006. Stacking the deck: The effects of top management backgrounds on investor decisions. *Strategic Management Journal* 27(1), 1-25.
- Holsti, O.R., 1969. *Content Analysis for the Social Sciences and Humanities*. Reading, MA: Addison-Wesley.
- Hoskisson, R.E., 1987. Multidivisional structure and performance: The contingency of diversification strategy. *Academy of Management Journal* 30(4), 625-644.
- Hoyle, R.H., 1999. *Statistical Strategies for Small Sample Research*. Thousand Oaks, CA: Sage Publications.
- Hsu, C.-C., Tan, K.-C., Kannan, V.R., Keong Leong, G., 2008. Supply chain management practices as a mediator of the relationship between operations capability and firm performance. *International Journal of Production Research* 47(3), 835-855.
- IBM, 2009. *The Smarter Supply Chain of the Future: Global Chief Supply Chain Officer Study*. New York, NY: IBM.

- Jensen, M.C., Zajac, E.J., 2004. Corporate elites and corporate strategy: How demographic preferences and structural position shape the scope of the firm. *Strategic Management Journal* 25(6), 507-524.
- Jobber, D., O'Reilly, D., 1998. Industrial mail surveys. *Industrial Marketing Management* 27(2), 95-107.
- Johnson, P.F., Leenders, M.R., Fearon, H.E., 1999. The chief purchasing officer: Previous background and experience. *European Journal of Purchasing & Supply Management* 5(2), 95-101.
- Johnson, P.F., Leenders, M.R., 2006. A longitudinal study of supply organizational change. *Journal of Purchasing & Supply Management* 12(6), 332-342.
- Johnson, P.F., Leenders, M.R., Fearon, H.E., 2006. Supply's growing status and influence: A sixteen-year perspective. *Journal of Supply Chain Management* 42(2), 33-43.
- Jüttner, U., 2005. Supply chain risk management: Understanding the business requirements from a practitioner perspective. *The International Journal of Logistics Management* 16(1), 120-141.
- Kajüter, P., Winkler, C., 2003. Praxis der Risikoberichterstattung deutscher Konzerne. *Die Wirtschaftsprüfung* 3(5), 217-228.
- Kano, M., Franke, T., Afifi, A.A., Bourque, L.B., 2008. Adequacy of reporting results of school surveys and nonresponse effects: A review of the literature and a case study. *Educational Researcher* 37(8), 480-490.
- Kanuk, L., Berenson, C., 1975. Mail surveys and response rates: A literature review. *Journal of Marketing Research* 12(4), 440-453.
- Karaevli, A., 2007. Performance consequences of new CEO 'outsiderness': Moderating effects of pre- and post-succession contexts. *Strategic Management Journal* 28(7), 681-706.
- Keck, S.L., 1990. Determinants and consequences of top executive team structure. PhD dissertation, Columbia University, New York.
- Kefalas, A., Schoderbek, P.P., 1973. Scanning the business environment: Some empirical results. *Decision Sciences* 4(1), 63-74.
- Ketchen, D.J., Jr., Hult, G.T.M., 2007. Bridging organization theory and supply chain management: The case of best value supply chains. *Journal of Operations Management* 25(2), 573-580.
- Kim, S.W., 2007. Organizational structures and the performance of supply chain management. *International Journal of Production Economics* 106(2), 323-345.
- King, W.R., He, J., 2005. External validity in IS survey research. *Communications of the Association for Information Systems* 16(1), 880-894.
- Kini, O., Dass, N., Onal, B., Wang, J., Nanda, V.K., 2010. Supply-chain directors: Bridging the information gap, 23rd Australasian Finance and Banking Conference, Sydney, Available at SSRN: <http://ssrn.com/abstract=1663584>.
- Kleindorfer, P.R., Saad, G.H., 2005. Managing disruption risks in supply chains. *Production & Operations Management* 14(1), 53-68.
- Knemeyer, A.M., Murphy, P.R., 2005. Exploring the potential impact of relationship characteristics and customer attributes on the outcomes of third-party logistics arrangements. *Transportation Journal* 44(1), 5-19.

- Knight, D., Pearce, C.L., Smith, K.G., Olian, J.D., Sims, H.P., Jr., Smith, K.A., Flood, P., 1999. Top management team diversity, group process, and strategic consensus. *Strategic Management Journal* 20(5), 445-465.
- Kotin, J., Sharaf, M.R., 1967. Management succession and administrative style. *Psychiatry* 30(3), 237-248.
- Kotzab, H.W., 2005. The role and importance of survey research in the field of supply chain management. In: Kotzab, H., Seuring, S., Müller, M., Reiner, G., (Eds.), *Research Methodologies in Supply Chain Management*. New York, NY: Physica, pp. 125-137.
- Kraljic, P., 1983. Purchasing must become supply management. *Harvard Business Review* 61(5), 109-117.
- Krippendorff, K., 2004. *Content Analysis: An Introduction to its Methodology*. Thousand Oaks, CA: Sage Publications.
- Kumar, V., Kwon, I.W.G., 2004. A pilot study on normalized weighted approach to citation study. *International Journal of Physical Distribution & Logistics Management* 34(10), 811-826.
- La Londe, B.J., 1978. An editorial perspective. *Journal of Business Logistics* 1(1), v-viii.
- Lajili, K., Zéghal, D., 2005. A content analysis of risk management disclosures in Canadian annual reports. *Canadian Journal of Administrative Sciences* 22(2), 125-142.
- Lambert, D.M., Harrington, T.C., 1990. Measuring nonresponse bias in customer service mail surveys. *Journal of Business Logistics* 11(2), 5-25.
- Lambert, D.M., Stock, J.R., Ellram, L.M., 1998. *Fundamentals of Logistics Management*. Boston, MA: Irwin McGraw-Hill.
- Lancaster, G., 2005. *Research Methods in Management*. Amsterdam: Elsevier.
- Lancioni, R.A., 2000. New developments in supply chain management for the millennium. *Industrial Marketing Management* 29(1), 1-6.
- Landis, J.R., Koch, G.G., 1977. The measurement of observer agreement for categorical data. *Biometrics* 33(1), 159-174.
- Larson, P.D., 2005. A note on mail surveys and response rates in logistics research. *Journal of Business Logistics* 26(2), 211-222.
- Larson, P.D., Poist, R.F., 2004. Improving response rates to mail surveys: A research note. *Transportation Journal* 43(4), 67-74.
- Larson, P.D., Poist, R.F., Halldórsson, Á., 2007. Perspectives on logistics vs SCM: A survey of SCM professionals. *Journal of Business Logistics* 28(1), 1-24.
- Lee, H.L., Wolfe, M., 2003. Supply chain security without tears. *Supply Chain Management Review* 7(1), 12-20.
- Li, S., Ragu-Nathan, B., Ragu-Nathan, T.S., Rao, S.S., 2006b. The impact of supply chain management practices on competitive advantage and organizational performance. *Omega* 34(2), 107-124.
- Li, T., Calantone, R.J., 1998. The impact of market knowledge competence on new product advantage: Conceptualization and empirical examination. *Journal of Marketing* 62(4), 13-29.

- Li, Y., Chuan-Hoo, T., Hock-Hai, T., Tan, B.Y., 2006a. Innovative usage of information technology in Singapore organizations: Do CIO characteristics make a difference? *IEEE Transactions on Engineering Management* 53(2), 177-190.
- Liang, K.Y., Zeger, S.L., 1986. Longitudinal data analysis using generalized linear models. *Biometrika* 73(1), 13-22.
- Lindner, J.R., 2002. Handling of nonresponse error in the journal of international agricultural and extension education. *Journal of International Agricultural and Extension Education* 9(3), 55-60.
- Lindner, J.R., Murphy, T.H., Briers, G.E., 2001. Handling nonresponse in social science research. *Journal of Agricultural Education* 42(4), 43-53.
- Lippert, S.K., Forman, H., 2006. A supply chain study of technology trust and antecedents to technology internalization consequences. *International Journal of Physical Distribution & Logistics Management* 36(4), 271-288.
- Lohr, S.L., 1999. *Sampling: Design and Analysis*. Pacific Grove, CA: Duxbury Press.
- Lorsch, J.W., Allen, S.A., III., 1973. *Managing Diversity and Interdependence: An Organizational Study of Multidivisional Firms*. Boston, MA: Graduate School of Business Administration, Harvard University.
- Lowe, A., 1999. Developing a research framework: guidelines for dissertations. In: Kitchen, P.J., (Ed.), *Marketing Communications: Principles and Practice*. London: Thomson Learning, pp. 477-488.
- Malhotra, M.K., Grover, V., 1998. An assessment of survey research in POM: From constructs to theory. *Journal of Operations Management* 16(4), 407-425.
- Maloni, M., Jackson, E.C., 2005. North American container port capacity: An exploratory analysis. *Transportation Journal* 44(3), 1-22.
- Mangan, J., Christopher, M., 2005. Management development and the supply chain manager of the future. *The International Journal of Logistics Management* 16(2), 178-191.
- Mangan, J., Lalwani, C., Gardner, B., 2004. Combining quantitative and qualitative methodologies in logistics research. *International Journal of Physical Distribution & Logistics Management* 34(7), 565-578.
- Manuj, I., Mentzer, J.T., 2008. Global supply chain risk management. *Journal of Business Logistics* 29(1), 133-155.
- Marcel, J.J., 2009. Why top management team characteristics matter when employing a chief operating officer: A strategic contingency perspective. *Strategic Management Journal* 30(6), 647-658.
- March, J.C., March, J.G., 1977. Almost random careers – the Wisconsin school superintendency 1940-1972. *Administrative Science Quarterly* 22(3), 377-409.
- March, J.G., Simon, H.A., 1958. *Organizations*. New York, NY: Wiley.
- Martha, J., Subbkrishna, S., 2002. Targeting a just-in-case supply chain for the inevitable next disaster. *Supply Chain Management Review* 6(5), 18-23.
- McKinnon, A., 2006. Life without trucks: The impact of a temporary disruption of road freight on a national economy. *Journal of Business Logistics* 27(2), 227-250.

- Medcof, J.W., 2008. The organizational influence of the chief technology officer. *R&D Management* 38(4), 406-420.
- Menachof, D.A., Gibson, B.J., Hanna, J.B., Whiteing, A.E., 2009. An analysis of the value of supply chain management periodicals. *International Journal of Physical Distribution & Logistics Management* 39(2), 145-166.
- Mentzer, J.T., DeWitt, W., Keebler, J.S., Min, S., Nix, N.W., Smith, C.D., Zacharia, Z.G., 2001. Defining supply chain management. *Journal of Business Logistics* 22(2), 1-25.
- Mentzer, J.T., Flint, D.J., 1997. Validity in logistics research. *Journal of Business Logistics* 18(1), 199-216.
- Mentzer, J.T., Kahn, K.B., 1995. A framework of logistics research. *Journal of Business Logistics* 16(1), 231-250.
- Menz, M., 2012. Functional top management team members: A review, synthesis, and research agenda. *Journal of Management* 38(1), 45-80.
- Menz, M., Scheef, C., 2014. Chief strategy officers: Contingency analysis of their presence in top management teams. *Strategic Management Journal* 35(3), 461-471.
- Merton, R.K., 1968. *Social Theory and Social Structure*. New York, NY: Free Press.
- Mian, S., 2001. On the choice and replacement of chief financial officers. *Journal of Financial Economics* 60(1), 143-175.
- Michel, J.G., Hambrick, D.C., 1992. Diversification posture and top management team characteristics. *Academy of Management Journal* 35(1), 9-37.
- Miles, R.E., Snow, C.C., 2007. Organization theory and supply chain management: An evolving research perspective. *Journal of Operations Management* 25(2), 459-463.
- Miyazaki, A.D., Phillips, J.K., Phillips, D.M., 1999. Twenty years of JBL: An analysis of published research. *Journal of Business Logistics* 20(2), 1-19.
- Mol, M.J., 2003. Purchasing's strategic relevance. *Journal of Purchasing & Supply Management* 9(1), 43-50.
- Mollenkopf, D., Gibson, A., Ozanne, L., 2000. The integration of marketing and logistics functions: An empirical examination of New Zealand firms. *Journal of Business Logistics* 21(2), 89-112.
- Monczka, R.M., Handfield, R.B., Giunipero, L.C., Patterson, J.L., 2005. *Purchasing and Supply Chain Management*. Cincinnati, OH: South Western College Publishing.
- Moore, K.R., Cunningham III, W.A., 1999. Social exchange behavior in logistics relationships: A shipper perspective. *International Journal of Physical Distribution & Logistics Management* 29(1/2), 103-121.
- Mulder, M., Wesselink, R., Bruijstens, H.C.J., 2005. Job profile research for the purchasing profession. *International Journal of Training and Development* 9(3), 185-204.
- Munich, Re, 2010. *Natural Catastrophes 2010: Analyses, Assessments, Positions*. Munich: Munich Re Publications.
- Murphy, P.R., Poist, R.F., 1998. Third-party logistics usage: An assessment of propositions based on previous research. *Transportation Journal* 37(4), 26-35.

- Nagurney, A., Cruz, J., Dong, J., Zhang, D., 2005. Supply chain networks, electronic commerce, and supply side and demand side risk. *European Journal of Operational Research* 164(1), 120-142.
- Näslund, D., 2002. Logistics needs qualitative research - especially action research. *International Journal of Physical Distribution & Logistics Management* 32(5), 321-338.
- Nath, P., Mahajan, V., 2008. Chief marketing officers: A study of their presence in firms' top management teams. *Journal of Marketing* 72(1), 65-81.
- Nath, P., Mahajan, V., 2011. Marketing in the C-suite: A study of chief marketing officer power in firms' top management teams. *Journal of Marketing* 75(1), 60-77.
- Nelder, J.A., Wedderburn, R.W.M., 1972. Generalized linear models. *Journal of the Royal Statistical Society, Series A* 135(3), 370-384.
- Neuendorf, K.A., 2002. *The Content Analysis Guidebook*. Thousand Oaks, CA: Sage Publications.
- New, S.J., Payne, P., 1995. Research frameworks in logistics. *International Journal of Physical Distribution & Logistics Management* 25(10), 60-77.
- Nielsen, S., 2009. Why do top management teams look the way they do? A multilevel exploration of the antecedents of TMT heterogeneity. *Strategic Organization* 7(3), 277-305.
- Nielsen, S., 2010. Top management team diversity: A review of theories and methodologies. *International Journal of Management Reviews* 12(3), 301-316.
- Norrman, A., Lindroth, R., 2004. Categorization of supply chain risk and risk management. In: Brindley, C., (Ed.), *Supply Chain Risk*. Hampshire: Ashgate, pp. 14-27.
- Novack, R.A., Thomas, D.J., 2004. The challenges of implementing the perfect order concept. *Transportation Journal* 43(1), 5-16.
- Ocasio, W., Kim, H., 1999. The circulation of corporate control: Selection of functional backgrounds of new CEOs in large US manufacturing firms, 1981-1992. *Administrative Science Quarterly* 44(3), 532-562.
- Pace, R.C., 1939. Factors influencing questionnaire returns from former university students. *Journal of Applied Psychology* 23(3), 388-397.
- Palepu, K., 1985. Diversification strategy, profit performance and the entropy measure. *Strategic Management Journal* 6(3), 239-255.
- Palmer, D., Barber, B.M., 2001. Challengers, elites, and owning families: A social class theory of corporate acquisitions in the 1960s. *Administrative Science Quarterly* 46(1), 87-120.
- Payne, G., Payne, J., 2004. *Key Concepts in Social Research*. London: Sage Publications.
- Petersen, K.J., Frayer, D.J., Scannell, T.V., 2000. An empirical investigation of global sourcing strategy effectiveness. *Journal of Supply Chain Management* 36(1), 29-38.
- Pettigrew, A.M., 1992. On studying managerial elites. *Strategic Management Journal* 13(S2), 163-182.
- Pitcher, P., Smith, A.D., 2001. Top management team heterogeneity: Personality, power, and proxies. *Organization Science* 12(1), 1-18.

- Preston, D.S., Karahanna, E., Rowe, F., 2006. Development of shared understanding between the chief information officer and top management team in U.S. and French organizations: A cross-cultural comparison. *IEEE Transactions on Engineering Management* 53(2), 191-206.
- Rabinovich, E., Cheon, S., 2011. Expanding horizons and deepening understanding via the use of secondary data sources. *Journal of Business Logistics* 32(4), 303-316.
- Rafiq, M., Jaafar, H.S., 2007. Measuring customers' perceptions of logistics service quality of 3PL service providers. *Journal of Business Logistics* 28(2), 159-175.
- Rajab, B., Handley-Schachler, M., 2009. Corporate risk disclosure by UK firms: Trends and determinants. *World Review of Entrepreneurship, Management and Sustainable Development* 5(3), 224-243.
- Rao, V.R., Agarwal, M.K., Dahlhoff, D., 2004. How is manifest branding strategy related to the intangible value of a corporation?. *Journal of Marketing* 68(4), 126-141.
- Richey, R.G., Wheeler, A.R., 2004. A new framework for supply chain manager selection. *Journal of Marketing Channels* 11(4), 89-103.
- Rogelberg, S.G., Convey, J.M., Sederburg, M.E., Spitzmülller, C., Aziz, S., Knight, W.E., 2003. Profiling active and passive nonrespondents to an organizational survey. *Journal of Applied Psychology* 88(6), 1104-1114.
- Rogelberg, S.G., Stanton, J.M., 2007. Introduction understanding and dealing with organizational survey nonresponse. *Organizational Research Methods* 10(2), 195-209.
- Ronay, A., 2006. FTSE 100: Miss out on the power of marketing. *The Marketer* 28(10), 34.
- Rossetti, C.L., Dooley, K.J., 2010. Job types in the supply chain management profession. *Journal of Supply Chain Management* 46(3), 40-56.
- Rumelt, R.P., 1974. *Strategy, Structure and Economic Performance*. Boston, MA: Harvard University Press.
- Sabherwal, R., 1990. The relationship between information system planning sophistication and information system success: An empirical assessment. *Decision Sciences* 30(1), 137-167.
- Sachan, A., Datta, S., 2005. Review of supply chain management and logistics research. *International Journal of Physical Distribution & Logistics Management* 35(9/10), 664-705.
- Salant, P., Dillman, D.A., 1994. *How to Conduct Your Own Survey*. New York, NY: John Wiley & Sons.
- Sandberg, E., Abrahamsson, M., 2010. The role of top management in supply chain management practices. *International Journal of Retail & Distribution Management* 38(1), 57-69.
- Sanders, N., Wagner, S.M., 2011. Multidisciplinary and multimethod research for addressing contemporary supply chain challenges. *Journal of Business Logistics* 32(4), 317-323.
- Sanders, N.R., 2007. The benefits of using e-business technology: The supplier perspective. *Journal of Business Logistics* 28(2), 177-207.
- Sarathy, R., 2006. Security and the global supply chain. *Transportation Journal* 45(4), 28-51.

- Smaltz, D.H., Sambamurthy, V., Agarwal, R., 2006. The antecedents of CIO role effectiveness in organizations: An empirical study in the healthcare sector. *IEEE Transactions on Engineering Management* 53(2), 207-222.
- Schneider, B., 1983. The attraction-selection-attrition framework. In: Camron, K.S., Wetten, D.A., (Eds.), *Organizational Effectiveness: A Comparison of Multiple Models*. New York, NY: Academic Press, pp. 27-54.
- SCM World, 2010. *The SCM World Chief Supply Chain Officer Report 2010*. London, UK: Rapture World.
- Seaker, R.F., Waller, M.A., Dunn, S.C., 1993. A note on research methodology in business logistics. *Logistics and Transportation Review* 29(4), 383-387.
- SEC, 2010. 17 CFR 229.401 (Item 401): Directors, executive officers, promoters and control persons. Washington, D.C.: Securities and Exchange Commission.
- SEC, 2010. 17 CFR 229.503 (Item 503): Prospectus summary, risk factors, and ratio of earnings to fixed charges. Washington, D.C.: Securities and Exchange Commission.
- Shang, K.C., Marlow, P.B., 2005. Logistics capability and performance in Taiwan's major manufacturing firms. *Transportation Research Part E: Logistics and Transportation Review* 41(3), 217-234.
- Shin, H., Collier, D.A., Wilson, D.D., 2000. Supplier management orientations and supplier/buyer performance. *Journal of Operations Management* 18(3), 317-333.
- Short, J.C., Broberg, J.C., Gogliser, C.C., Brigham, K.H., 2010. Construct validation using computer-aided text analysis(CATA): An illustration using entrepreneurial orientation. *Organizational Research Methods* 13(2), 320-347.
- Siegel, S., 1956. *Nonparametric Statistics for the Behavioral Sciences*. New York, NY: McGraw-Hill.
- Singhal, K., Singhal, J., 2012. Imperatives of the science of operations and supply-chain management. *Journal of Operations Management* 30(3), 237-244.
- Skorna, A.C.H., Bode, C., Wagner, S.M., 2009. Technology-enabled risk management along the transport logistics chain. In: Wagner, S.M, Bode, C., (Eds.), *Managing Risk and Security: The Safeguards of Long-Term Success for Logistics Service Providers*. Bern: Haupt, pp. 197-220.
- Soni, G., Kodali, R., 2012. A critical review of empirical research methodology in supply chain management. *Business Process Management Journal* 23(6), 753-779.
- Sosdian, C.P., Sharp, L.M., 1980. Nonresponse in mail surveys: Access failure or respondent resistance. *Public Opinion Quarterly* 44(3), 396-402.
- Spekman, R.E., Davis, E.W., 2004. Risky business: Expanding the discussion on risk and the extended enterprise. *International Journal of Physical Distribution & Logistics Management* 34(5), 414-433.
- Spens, K.M., Kovács, G., 2006. A content analysis of research approaches in logistics research. *International Journal of Physical Distribution & Logistics Management* 36(5), 374-390.
- Spens, K.M., Kovács, G., 2012. Mixed methods in logistics research: The use of case studies and content analysis. *International Journal of Physical Distribution & Logistics Management* 42(3).

- Stevens, J.M., Beyer, J.M., Trice, H.M., 1978. Assessing personal, role, and organizational predictors of managerial commitment. *Academy of Management Journal* 21(3), 380-396.
- Stock, J.R., 1988. A compendium of doctoral research in logistics: 1970-1986. *Journal of Business Logistics* 8(2), 123-202.
- Stock, J.R., Zinszer, P.H., 1982. The use of external consultants in addressing future logistics problems and issues. *Journal of Business Logistics* 3(2), 104-122.
- Stoop, I.A.L., 2005. *The Hunt for the Last Respondent: Nonresponse in Sample Surveys*. Den Haag: Social and Planning Office.
- Storey, J., Emberson, C., Godsell, J., Harrison, A., 2006. Supply chain management: Theory, practice and future challenges. *International Journal of Operations & Production Management* 26(7), 754-774.
- Strand, R., 2013. The chief officer of corporate social responsibility: A study of its presence in top management teams. *Journal of Business Ethics* 112(4), 721-734.
- Stump, R.L., Heide, J.B., 1996. Controlling supplier opportunism in industrial relationships. *Journal of Marketing Research* 33(4), 431-441.
- Suzuki, Y., Williams, L.R., 1998. Analysis of EDI resistance behavior. *Transportation Journal* 37(4), 36-44.
- Svensson, G., 2000. A conceptual framework for the analysis of vulnerability in supply chains. *International Journal of Physical Distribution & Logistics Management* 30(9), 731-749.
- Swaminathan, J.M., 2003. SARS exposes risks of global supply chains. *Journal of Commerce* 4(23), 38.
- Sydow, N., 2006. *Methodology of Correcting Non-response Bias: Introducing Another Bias? The Case of the Swiss Innovation Survey 2002, KOF-Arbeitspapiere/Working Papers No. 152, October, Zurich*.
- Tan, K.C., Kannan, V.R., Handfield, R.B., 1998. Supply chain management: Supplier performance and firm performance. *International Journal of Purchasing and Materials Management* 34(3), 2-9.
- Tan, K.C., Kannan, V.R., Handfield, R.B., Ghosh, S., 1999. Supply chain management: An empirical study of its impact on performance. *International Journal of Operations & Production Management* 19(10), 1034-1052.
- Tassabehji, R., Moorhouse, A., 2008. The changing role of procurement: Developing professional effectiveness. *Journal of Purchasing & Supply Management* 14(1), 55-68.
- Teo, T.S.H., King, W.R., 1997. Integration between business planning and information systems planning: An evolutionary-contingency perspective. *Journal of Management Information Systems* 14(1), 185-214.
- Thomas, R.W., Defee, C.C., Randall, W.S., Williams, B., 2011. Assessing the managerial relevance of contemporary supply chain management research. *International Journal of Physical Distribution & Logistics Management* 41(7), 655-667.
- Tomaskovic-Devey, D., Leiter, J., Thompson, S., 1994. Organizational survey nonresponse. *Administrative Science Quarterly* 39(3), 439-457.

- Tracey, M., Lim, J.S., Vonderembse, M.A., 2005. The impact of supply-chain management capabilities on business performance. *Supply Chain Management: An International Journal* 10(3), 179-191.
- Tracey, M., Vonderembse, M.A., Lim J.S., 1999. Manufacturing technology and strategy formulation: Keys to enhancing competitiveness and improving performance. *Journal of Operations Management* 17(4), 411-428.
- Trent, R.J., 2004. The use of organizational design features in purchasing and supply management. *Journal of Supply Chain Management* 40(3), 4-18.
- Tulimieri, P., Banai, M., 2010. The CEO and CFO - a partnership of equals. *Organizational Dynamics* 39(3), 240-247.
- Tushman, M.L., Romanelli, E., 1985. Organizational evolution: A metamorphosis model of convergence and reorientation. In: Cummings, L.L., Staw, B.M., (Eds.), *Research in Organizational Behavior*. Greenwich, CT: JAI Press, pp. 171-222.
- Vafeas, N., Vlittis, A., 2009. Stock market reaction to chief marketing officer appointment announcements. *Journal of Business & Economics Research* 7(11), 29-39.
- Verhoeven, P., 2014. Communications officers and the C-suite: A study of Financial Times Global 500 companies. *Public Relations Review* 40(3), 606-608.
- Vinod, H.D., Geddes, R.R., 2003. Generalized estimating equations for panel data and managerial monitoring in electric utilities. In: Balakrishnan, N. (Ed.), *Advances on Methodological and Applied Aspects of Probability and Statistics*. London, UK: Taylor & Francis, pp. 597-617.
- Vroom, V.H., Pahl, B., 1971. Relationship between age and risk-taking among managers. *Journal of Applied Psychology* 55(5), 399-405.
- Wagner, S.M., Bode, C., 2008. An empirical examination of supply chain performance along several dimensions of risk. *Journal of Business Logistics* 29(1), 307-325.
- Wagner, S.M., Bode, C., Kemmerling, R., 2012. Internal versus external supply chain risks: A risk disclosure analysis. In: Essig, M., Hülsmann, M., Kern, E.M., Klein-Schmeink, S., (Eds.), *Supply Chain Safety Management – Security and Robustness in Logistics*. Berlin: Springer, pp. 109-122.
- Wagner, S.M., Bode, C., Kemmerling, R., 2015. When do firms employ chief supply chain officers in their top management teams?. Working Paper.
- Wagner, S.M., Bode, C., Koziol, P., 2009. Supplier default dependencies: Empirical evidence from the automotive industry. *European Journal of Operational Research* 199(1), 150-161.
- Wagner, S.M., Grosse-Ruyken, P.T., Erhun, F., 2012. The link between supply chain fit and financial performance of the firm. *Journal of Operations Management* 30(4), 340-353.
- Wagner, S.M., Kemmerling, R., 2010. Handling nonresponse in logistics research. *Journal of Business Logistics* 31(2), 357-381.
- Wagner, S.M., Kemmerling, R., 2014. Supply chain management executives in corporate upper echelons. *Journal of Purchasing & Supply Management* 20(3), 156-166.
- Wagner, S.M., Silveira-Camargos, V., 2012. Managing risks in just-in-sequence supply networks: Exploratory evidence from automakers. *IEEE Transactions on Engineering Management* 59(1), 52-64.

- Waller, M.A., Fawcett, S.E., van Hoeck, R., 2012. Thought leaders and thoughtful leaders: Advancing logistics and supply chain management. *Journal of Business Logistics* 33(2), 75-77.
- Waller, M.J., Huber, G.P., Glick, W.H., 1995. Functional background as a determinant of executives' selective perception. *Academy of Management Journal* 38(4), 943-974.
- Walsh, J.P., 1988. Selectivity and selective perception: An investigation of managers' belief structures and information processing. *Academy of Management Journal* 31(4), 873-896.
- Walton, L.W., 1997. Telephone survey: Answering the seven Rs to logistics research. *Journal of Business Logistics* 18(1), 217-231.
- Weber, R.P., 1990. *Basic Content Analysis*. Newbury Park, CA: Sage Publications.
- Weinzimmer, L.G., Bond, E.U., III., Houston, M.B., Nystrom, P.C., 2003. Relating marketing expertise on the top management team and strategic market aggressiveness to financial performance and shareholder value. *Journal of Strategic Marketing* 11(2), 133-159.
- Werner, S., Praxedes, M., Kim, H.-G., 2007. The reporting of nonresponse analyses in survey research. *Organizational Research Methods* 10(2), 287-295.
- Wiersema, M.F., Bantel, K.A., 1992. Top management team demography and corporate strategic change. *Academy of Management Journal* 35(1), 91-121.
- Wiersema, M.F., Bantel, K.A., 1993. Top management team turnover as an adaptation mechanism: The role of the environment. *Strategic Management Journal* 14(7), 485-504.
- Wilding, R., Waller, A., Silvia, R., Clive, G., Steve, M., Roberto, C., Clare, M., 2010. *Supply Chain Strategy in the Board Room*. Bedfordshire: Cranfield University.
- Wood, D.F., Nelson, R.S., 1999. Industrial transportation management: What's new?. *Transportation Journal* 39(2), 26-30.
- Yu, J., Cooper, H., 1983. A quantitative review of research design effects on response rates to questionnaires. *Journal of Marketing Research* 20(1), 36-44.
- Zeger, S.L., Liang, K.Y., 1986. Longitudinal data analysis for discrete and continuous outcomes. *Biometrics* 42(1), 121-130.
- Zhang, Y., 2006. The presence of a separate COO/president and its impact on strategic change and CEO dismissal. *Strategic Management Journal* 27(3), 283-300.
- Zhao, M., Dröge, C., Stank, T.P., 2001. The effects of logistics capabilities on firm performance: Customer-focused versus information-focused capabilities. *Journal of Business Logistics* 22(2), 91-107.
- Zheng, J., Knight, L., Harland, C., Humby, S., James, K., 2007. An analysis of research into the future of purchasing and supply management. *Journal of Purchasing & Supply Management* 13(1), 69-83.
- Zorn, D.M., 2004. Here a chief, there a chief the rise of the CFO in the American firm. *American Sociological Review* 69(3), 345-364.
- Zsidisin, G.A., Melnyk, S.A., Ragatz, G.L., 2005. An institutional theory perspective of business continuity planning for purchasing and supply management. *International Journal of Production Research* 43(16), 3401-3420.

Zsidisin, G.A., Wagner, S.M., 2010. Do perceptions become reality? The moderating role of supply risk resiliency on disruption occurrence. *Journal of Business Logistics* 31(2), 1-20.