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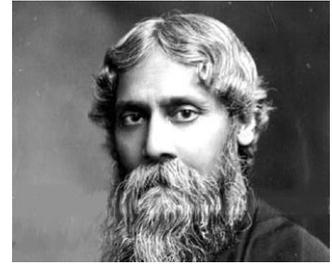
Disentangling the Labyrinth of Supply Management in Multinational Corporations (MNCs)

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“I have become my own version of an optimist. If I can't make it through one door, I'll go through another door – or I'll make a door. Something terrific will come, no matter how dark the present is”



*~ Rabindranath Tagore
Nobel Prize in Literature (1913)*

Abstract

This research is about the intricacies of supply management in multinational corporations (MNCs). Supply chain research is at least three decades old. Over this period, supply chain researchers have conceptualized the focal firm in the supply chain as a single organization. The present research diverges from this monolithic view of focal firms and contends that large MNCs that apply corporate strategies such as outsourcing and global sourcing, are also structurally complex. This research further argues that the structural complexity of MNCs affects the organization of the purchasing function. One direct implication of this is that, theories and models that have been proposed assuming a single, unified organization as a point of departure do not fit the realities of these large MNCs.

This research highlights these misalignments between theory and practice by systematically combining modules of studies. The primary study, an in-depth investigation of a global conglomerate, applied a mixture of case study and collaborative management research methodologies. The next two studies were guided by case study design and strove to make sense of, validate, and analytically generalize the findings of the first study.

The main contribution of this thesis to the field of purchasing and supply management is to demonstrate the effects of the structural complexity (i.e., vertical, horizontal, and spatial complexities) on the organization of the purchasing function. It is argued that academics and practitioners should look beyond the centralized, decentralized, and hybrid structures of the purchasing organization and also take into account the internal structural complexities of MNCs. The four appended papers illustrate how vertical, horizontal, and spatial complexities affect the organization of the purchasing function as well as demonstrate the misalignments between theory and practice. The first paper examines the effects of vertical complexity. It illustrates how the purchasing function is divided into different roles and responsibilities within an MNC. This division of labor makes the management of supply risk a fragmented, multilevel, and time-dependent activity. This challenges the conventions and norms of risk management theories, models, and standards that assume that risk management in practice is a holistic, integrated, and time-independent activity. Grounded in theories such as bounded rationality and contingency theory, the second paper examines the effects of both vertical and spatial complexity. The paper explains why risk management in practice is silo-based and illustrates how silos are created by the division of labor and contingencies in MNCs. The third paper examines the effects of horizontal complexity. The paper illustrates how an MNC can create purchasing synergy through the development and implementation of a one-size-fits-all

supplier segmentation model. The fourth paper extends the understanding of the effects of structural complexity by illustrating how the supply management function is organized in three leading MNCs of the world. It identifies a need to distinguish between the concepts of supply segmentation and supplier segmentation so that existing models can fit the realities of MNCs.

Keywords: Supply Chain Management, Purchasing and Supply Management, Supply Base Segmentation, Supply Chain Risk Management, Risk Visibility

Sommario

Questa tesi riguarda la complessità della gestione degli approvvigionamenti in aziende multinazionali (MNC). La ricerca in ambito Supply Chain ha almeno tre decenni di storia; in questo periodo, la maggior parte dei ricercatori hanno concettualizzato e studiato la *focal company* come un'unica organizzazione. La presente ricerca si discosta da questa visione monolitica della *focal company* partendo dalla considerazione che le grandi aziende multinazionali che applicano strategie quali l'*outsourcing* e il *global sourcing* possono anche essere organizzazioni strutturalmente complesse. L'ipotesi alla base dello studio è che la complessità strutturale delle multinazionali influenza anche l'organizzazione della funzione approvvigionamenti e acquisti. Conseguenza diretta di tutto questo è che le teorie e i modelli che sono stati proposti assumendo una struttura monolitica dell'organizzazione non necessariamente si adattano alla specificità di organizzazioni complesse quali le grandi multinazionali.

La ricerca nel suo complesso mira a mettere in evidenza i disallineamenti tra teoria e pratica, combinando sistematicamente moduli di singoli studi specifici (corrispondenti a singoli articoli). Lo studio primario è un'indagine approfondita dell'organizzazione e dei processi di gestione degli approvvigionamenti in un grande gruppo globale, adotta una metodologia di ricerca di tipo collaborativo e si divide in due articoli. I due lavori successivi sono basati su studi di caso multipli e intendono estendere, convalidare e generalizzare i risultati del primo studio.

Il contributo originale principale di questa tesi è quello di dimostrare l'effetto della complessità strutturale (nelle sue dimensioni verticale, orizzontale e spaziale) sull'organizzazione della funzione acquisti nelle aziende multinazionali (MNC). La raccomandazione finale è che accademici e professionisti guardino al di là della struttura organizzativa della funzione acquisti (centralizzata, decentralizzata o ibrida) tenendo in maggior considerazione i fattori di complessità strutturale interni all'azienda. I quattro documenti allegati illustrano come i tre fattori di complessità (verticale, orizzontale e spaziale) influenzano l'organizzazione della funzione acquisti inducendo significativi disallineamenti tra teoria e pratica. Il primo articolo esamina gli effetti della complessità verticale, mettendo in luce come la funzione acquisti è nella pratica suddivisa in diversi ruoli e responsabilità all'interno di una MNC. La parcellizzazione dei compiti e delle responsabilità rende la gestione dei rischi di approvvigionamento (elemento chiave per l'allineamento strategico) un processo frammentato, multilivello e asincrono in

molte sue fasi. Questa evidenza sfida le teorie e le norme di gestione del rischio, le quali rappresentano tale processo come olistico, integrato e sincronizzato all'interno dell'organizzazione. Riferendosi alle teorie della razionalità limitata (*bounded rationality theory*) e della contingenza (*contingency theory*), il secondo articolo esamina gli effetti della complessità verticale e spaziale, spiegando perché in organizzazioni complesse, quali le MNC, la gestione dei rischi di approvvigionamento è nella realtà *silos-based*; illustra come i silos sono creati dalla divisione del lavoro e da elementi contingenti, fornendo infine dei criteri per valutare quali tipologie di rischi possono gestiti in modo efficace anche in un modello a *silos*. Il terzo articolo esamina invece gli effetti della complessità orizzontale. In particolare, viene illustrato come all'interno di una MNC sia possibile ottenere sinergie di gestione degli approvvigionamenti attraverso lo sviluppo e l'implementazione di un modello integrato di segmentazione dei fornitori (*one-size-fits-all*). Il quarto articolo estende la comprensione degli effetti della complessità strutturale mettendo a confronto l'organizzazione della funzione approvvigionamenti di tre MNC. In particolare, si mette in evidenza la necessità di distinguere tra segmentazione delle forniture (classi merceologiche) e segmentazione dei fornitori, in modo che compiti specifici allocati a diversi livelli dell'organizzazione possano essere adeguatamente supportati dai modelli di segmentazione oggi esistenti.

Parole chiave: Supply Chain Management, Approvvigionamenti e Acquisti, Segmentazione dei fornitori, Gestione del Rischio, Visibilità nella filiera

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I describe myself as a born misfit. This acknowledgement is to the crazy ones who survived and may be appreciated my rebellious nature.

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List of appended papers

This thesis builds on a cover essay and four appended papers. The papers are denoted in the text as Roman numerals (I-IV).

Paper I: The Paradox of Risk Management: A Supply Management Practice Perspective (under review in Journal of Risk Research)

Paper II: Internal Visibility of External Supplier Risks and the Dynamics of Risk Management Silos (published in IEEE Transactions of Engineering Management)

Paper III: When one size must fit all: Enabling Purchasing Centralization through a Supplier Segmentation Model (submitted to Journal of Business Logistics)

Paper IV: Supply versus supplier segmentation: evidence from complex organizations (under review in Journal of Purchasing and Supply Management)

List of additional articles

In addition to the appended papers, I authored other articles during my doctoral study. These publications are mainly the pre-versions of the final appended papers. They are listed below in chronological order.

1. Sarker S., Trucco P. Angelis J. (2013). A 360 Degree View on Supply Chain Risk Identification, 17th Cambridge International Manufacturing Symposium, Cambridge, UK. (pre-version of paper I)
2. Sarker, S., Engwall, M., Trucco, P. & Feldmann A. (2014). “Effects of product criticality and supplier criticality on resilience capabilities: An empirical analysis of a global supply chain”, No 2014/7, INDEK Working Paper Series, Department of Industrial Economics and Management, Royal Institute of Technology. (Pre-version of paper I and II)
3. Sarker, S., Trucco, P. & Engwall, M. (2014). “Assessing Supply Risk: A multi actor empirical study”, 21st EurOMA Conference, Palermo, Italy. (Pre-version of Paper I)
4. Sarker, S., Feldmann A, Engwall, M., Trucco, P. (2015). “Supply Risk Management Must Become Supplier Risk Management”, POMS 26th Annual Conference 2015, Washington, D.C., USA. (Pre-version of paper II)
5. Sarker, S., Engwall, M., Trucco, P. & Feldmann A. (2015). “Internal Visibility of External Supplier Risk”, 2nd EDIM International Conference, Milan, Italy. (Pre-version of paper II)
6. Teaching Case: Sarker, S. (2016). Supplier Segmentation in Global Organizations: Beyond Models, in Sage Business Case Collection, Sage Publications Limited. (Pre-version of Paper III)

Table of Contents

1. Introduction	1
1.1. Background	1
1.2. Research gap and positioning	2
1.3. Research Purpose	3
1.4. Research Questions	4
1.5. Type of thesis and its outline	5
2. Theoretical Background	6
2.1. The Strategic Supply Wheel	6
2.1.1. Corporate & supply strategy and purchasing organization structure	6
2.1.2. Corporate & supply strategy and portfolio of relationships	7
2.1.3. Purchasing organization structure and portfolio of relationships	8
2.2. A structural complexity perspective of the supply management function	9
2.3. Bounded rationality	11
2.4. Contingency theory	12
2.5. Summary	13
3. Research Design	14
3.1. Overall research approach	14
3.2. Case Study Design	15
3.2.1. Selection of cases	15
3.2.2. Number of cases	16
3.2.3. Unit of analysis	16
3.2.4. Data collection	16
3.2.5. Data analysis	17
3.2.6. Reliability and validity of the data	17
3.3. Collaborative management research	18
3.3.1. The role of the researcher	20
3.3.2. The collaborative research process	20
3.4. Summary of the methods used in the appended papers	20
4. Empirical Settings	22
4.1. Case I	22
4.1.1. Structural complexity of the organization	23
4.1.2. Organization of purchasing function	24
4.2. Case II	24
4.2.1. Structural complexity of the organization	24
4.2.1. Organization of purchasing function	25
4.3. Case III	26
4.3.1. Structural complexity of the organization	26
4.3.2. Organization of the purchasing function	27
4.4. Summary of the studied cases	27
5. Summary of the appended papers	29
5.1. Paper- I: The paradox of risk management: a supply management practice perspective	29

5.2.	Paper - II: Internal Visibility of External Supplier Risks and the Dynamics of Risk Management Silos	30
5.3.	Paper III: When one size must fit all: enabling purchasing centralization through a supplier segmentation model	31
5.4.	Paper IV: Supply versus supplier segmentation: evidence from complex organizations.....	32
6.	Synthesis	34
6.1.	Creation of silos: the effect of complexity on the relationship between corporate & supply strategy and organization structure.....	35
6.2.	Managing Silos: controlling the effect of complexity on the relationship between corporate & supply strategy and organization structure.....	37
6.3.	Purchasing discord: the effect of complexity on the relationship between corporate & supply strategy and the portfolio of relationships	38
6.4.	Creating purchasing synergy: minimizing the effect of complexity on the relationship between corporate & supply strategy and the portfolio of relationships....	39
6.5.	A misfit between theory and practice: the effect of complexity on the relationship between organization structure and the portfolio of relationships	39
6.6.	Divide and rule: managing the effect of complexity on the relationship between organization structure and the portfolio of relationships	40
6.7.	Summary.....	41
7.	Implications	42
7.1.	Theoretical implications.....	42
7.2.	Managerial implications	44
7.3.	Limitations	45
7.4.	Avenues for future research	46
7.5.	End note	47
8.	References	48

Lists of figures and tables

List of figures

FIGURE 1: STRATEGIC SUPPLY WHEEL (COUSINS 2002)	3
FIGURE 2: THEORETICAL FRAMEWORK	4
FIGURE 3: STRUCTURAL DIFFERENTIATION OF THE SUPPLY MANAGEMENT FUNCTION IN MNCs	10
FIGURE 4: THE OVERALL RESEARCH PROCESS; ADAPTED FROM KOVÁCS AND SPENS (2005)	14
FIGURE 5: STRUCTURAL COMPLEXITY OF CASE I	23
FIGURE 6: STRUCTURAL COMPLEXITY OF CASE II.....	25
FIGURE 7: STRUCTURAL COMPLEXITY OF CASE III.....	26
FIGURE 8: THEORETICAL FRAMEWORK, RESEARCH QUESTIONS, AND PAPERS.....	34

List of tables

TABLE 1: OVERVIEW OF DATA COLLECTION IN THE CASES.....	17
TABLE 2: ASSESSING THE TRUSTWORTHINESS OF THE STUDY.....	18
TABLE 3: SUMMARY OF METHODS USED IN THE APPENDED PAPERS	21
TABLE 4: AN OVERVIEW OF THE CASES	22

1. Introduction

1.1. Background

The area of purchasing and supply management has received enormous attention from academicians since the 1970s, mainly due to a clear trend toward global sourcing and outsourcing among multi-national corporations (MNCs) such as Ford, and Coca-Cola (Levitt 1983; Arnold 1989; Schneider and Wallenburg 2013). While global sourcing entails exposing the organization to the international market-place (Arnold 1989), outsourcing involves “buying” more than “making” (McIvor 2005; Dabhilkar 2011). The extent of global sourcing by large corporations is increasing continuously. A US Census Bureau Report reports that in the 1980s, about \$250 billion was spent on purchasing products from foreign countries. In comparison, the figure was \$937 billion in 1999 (Cho and Kang 2001) and \$2800 billion in 2014 (U.S. Census Bureau 2016). Similarly, during the 1980s, companies such as Ford and General Motors owned almost their entire supply chains, producing as much as 80% of their automobile parts in house (Monteverde and Teece 1982). Nowadays, several studies (e.g., Schneider and Wallenburg 2013) report that outsourcing rates, and sourcing volumes often exceed 50% of a company’s expenditures.

A global sourcing strategy provides organizations with benefits such as cost reduction, increased quality, and availability of purchased materials (Cho and Kang 2001). In comparison, an outsourcing strategy can result in at least two benefits: first, a significant reduction in cost (10–40%) by carrying out production in low-cost countries (e.g., producing apparel in India and China rather than in Europe); second, an increased management focus on the core competencies of the firm (Jiang, Belohlav, and Young 2007). While both these strategies are economically beneficial, neither of them is free of challenges (Cho and Kang 2001; Handley and Benton 2013). Both global sourcing and outsourcing expose firms to a number of risks from external suppliers (Zsidisin 2003; Narasimhan and Talluri 2009). These strategies are also criticized for creating integration and coordination issues that act as barriers to realizing the true benefits of both strategies (Rozemeijer 2000; Faes, Matthyssens, and Vandenbempt 2000; Rozemeijer, van Weele, and Weggeman 2003). Moreover, both outsourcing and global sourcing strategies can create a supply base which is spread across the globe. Managing such a global supply base is challenging because of issues such as ensuring supplier compliance and creating visibilities in supply network (Tse and Tan 2012; Grimm, Hofstetter, and Sarkis 2014).

Against this background, a recent review (Schneider and Wallenburg 2013) of 50 years of research into the organization of the purchasing function reports that the critical challenge for researchers in

the field is not the question of whether we already know what we need to know, but to understand the changing contexts of present-day organizations and to inform research and practice accordingly about the possible solutions. Consequently, the present study anchors itself in three large MNCs in order to understand the dynamic contexts of contemporary organizations and to inform research and practice about the possible solutions to deal with the changing contexts.

1.2. Research gap and positioning

Outsourcing and global sourcing strategies can create competitive advantages for organizations. Not surprisingly, both these strategies have received substantial attention in prior research (Kotabe and Murray 2004). Regarding global sourcing, drawing on Levitt's (1983) call for the globalization of markets, Arnold (1989) highlights the need for procurement to have a global sourcing perspective; later the author identifies three ideal organizational types for global sourcing (Arnold 1999). Cho and Kang (2001) discuss the benefits and challenges of global sourcing from the perspectives of US retail apparel firms. Trent and Monzcka (2003) highlight the difference between international purchasing and global sourcing. Trautmann, Bals, and Hartmann (2009a) discuss how to achieve category-level integration for global sourcing and provide guidance for managers to help them achieve corporate purchasing synergies. Trautmann, Turkulainen, Hartmann, and Bals (2009b) identify three contingency variables, i.e., category characteristics, supply environment characteristics, and interdependence of the purchasing units, by which MNC integration approaches vary.

Regarding outsourcing, Lei and Hitt (1995) present a conceptual framework for examining the relationship between corporate restructuring and the outsourcing of key value-adding activities to external suppliers and partners. Parker and Russell (2004) conclude that the success or failure of an outsourcing strategy largely depends on behavioral issues such as inter/intra-workgroup psychological contracts, power, and trust. Jiang et al. (2007) discuss the impact of outsourcing on manufacturing firm's value. Li and Choi (2009) distinguish between manufacturing and service outsourcing and argue that, unlike manufacturing outsourcing, in which the buyer acts as a bridge between supplier and customer, in service outsourcing, the supplier becomes the bridge between customer and buyer.

Despite the significant attention to both outsourcing and global sourcing strategy, prior research reports several knowledge gaps and suggests avenues for future research. For instance, according to Johnson and Leenders (2006), the purchasing literature largely ignores the environment-strategy-structure fit. The authors claim that central purchasing officers (CPOs) in organizations face the daunting challenge of managing organizational structure and steering it toward either

greater centralization or greater decentralization. Similarly, Schneider and Wallenburg (2013) suggest that future research should scrutinize in detail the growing importance of the purchasing function in organizations by adopting effective and efficient organizational structures. According to these authors, a key challenge is to align purchasing strategy with other functional strategies and with the purchasing organization structure to fulfill both functional and corporate objectives. Likewise, Glock and Hochrein (2014) suggest investigating the relationship between contextual variables and purchasing organization structure.

The growing interest in purchasing organization structure is probably due to its direct link with the increased organizational complexity resulting from global sourcing and outsourcing to meet the needs of local customers (Schneider and Wallenburg 2013). Hence, the present study positions itself in the shaded areas of the “strategic supply wheel” (Cousins 2002) presented in Figure 1. It endeavors to understand the organization of the purchasing function in MNCs by investigating links between corporate & supply strategy, purchasing organization structure, and portfolio of relationships.

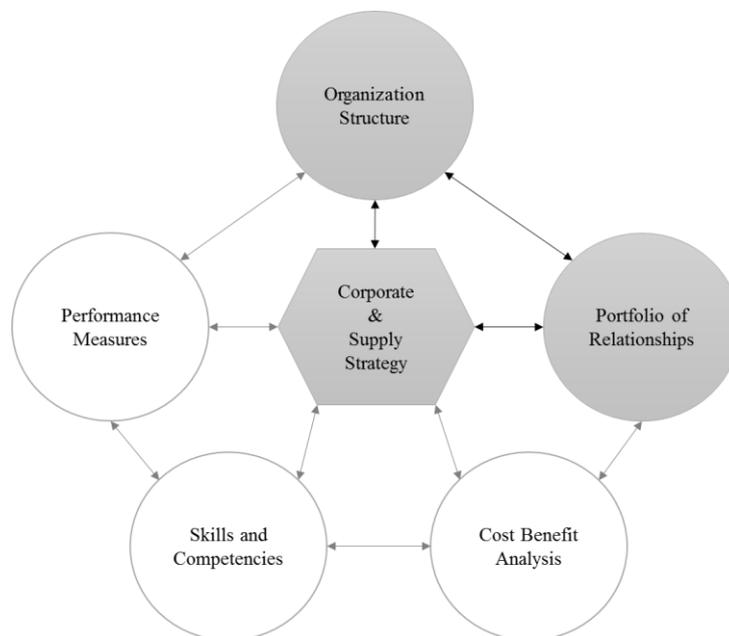


Figure 1: Strategic supply wheel (Cousins 2002)

1.3. Research Purpose

Given the challenges (e.g., risk exposure and supply base management) that outsourcing and global sourcing supply strategies entail for MNCs, along with the gaps in prior research, this thesis strives to build an in-depth understanding of the supply management/purchasing function in MNCs. To achieve this purpose, the supply management processes of three MNCs are examined.

As the purchasing and supply management literature has been strongly criticized for its theoretical and methodological limitations (Spina et al. 2013), the present research examines the organization of the supply management function through the lenses of complexity, bounded rationality, and contingency theories. Furthermore, this thesis combines case study research (Yin 2009) with collaborative management research (Shani, David, and Willson 2004; Pasmore et al. 2008) to overcome the shortcomings of the dominant approaches of previous research and to increase the relevance of this research to the field of purchasing and supply management (Halldórsson, Hsuan, and Kotzab 2015).

1.4. Research Questions

Based on the research aim and the positioning of this research within the strategic supply wheel (Cousins 2002), the guiding research question of this thesis is:

RQ: How does organizational complexity influence supply management in MNCs?

The notion of complexity applied here is taken from Dooley (2002), who referred to organizational complexity as the structural differentiation of the organization. This guiding research question is broken down into three sub-questions to relate the principal research question to the three elements of the strategic supply wheel (see Figure 2):

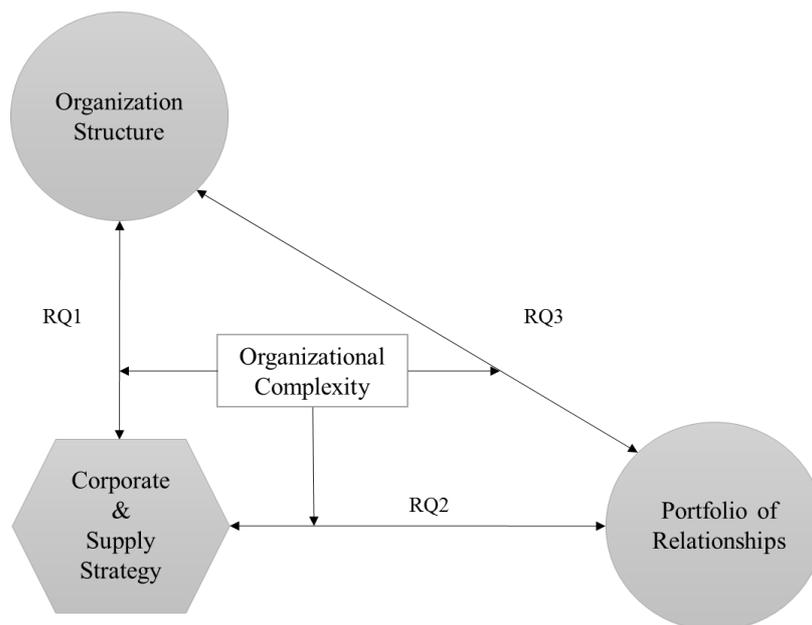


Figure 2: Theoretical framework

RQ1: How does organizational complexity influence the relationship between purchasing organization structure and corporate & supply strategy?

RQ2: How does organizational complexity influence the relationship between corporate & supply strategy and the portfolio of relationships?

RQ3: How does organizational complexity influence the relationship between purchasing organization structure and the portfolio of relationships?

It is worth mentioning that the appended papers only partially address the three sub-research questions. This is because, it is beyond the limits of the appended papers to fully demonstrate the effects of organizational complexity on the elements of the strategic supply wheel that are relevant to this thesis. However, collectively the appended papers do provide a comprehensive answer to the principal research question.

1.5. Type of thesis and its outline

A thesis comprising of a compilation of papers may take various forms. The first form is merely a synthesis of the research conducted. The second form is a more holistic analysis of how the constituent papers contribute to a shared objective. In the third form, the compiled papers are used to theorize further, and such a thesis can do more than merely relating what was performed during the research process. The last approach potentially contributes more to our knowledge, as it does not focus on descriptions and summarization as traditional theses do, but rather on presenting new ideas and formulations not found elsewhere in the appended papers (Frishammar 2005). The present thesis follows the last approach, providing new insights into the supply management function in MNCs, insights that could not be captured within the page limits of the individual papers.

This thesis consists of seven chapters and four appended papers. In chapter 2, the theoretical framework is outlined. Chapter 3 discusses the research approach. Chapter 4 describes the empirical settings. The four appended papers are summarized in chapter 5. In chapter 6, the results are synthesized based on the theoretical framework of the thesis. Finally, chapter 7 presents the theoretical and practical implications along with the limitations of the research and suggests avenues for future research.

2. Theoretical Background

This section discusses the positioning of this research within the strategic supply wheel and the overall theoretical frameworks of this thesis. Each of the four constituent papers contains specific research frameworks, which are critical for the analysis in the respective paper. Hence, this section particularly emphasizes on the general theoretical concepts to comprehensively address the principal research question.

2.1. The Strategic Supply Wheel

The strategic supply wheel (see Figure 1) was proposed by Cousins (2002) to support the growing importance (i.e., from routine to strategic) of the purchasing function in organizations. The model is concerned with searching for the optimal corporate & supply strategy balancing these five elements. The author argues that to ensure strategic supply, one must balance all the elements of this model, i.e., purchasing organization structure, portfolio of relationships, cost–benefit analysis, skills and competence, and performance measures.

As mentioned in the Introduction, this thesis limits itself to the links between corporate & supply strategy, on one hand, and purchasing organization structure and the portfolio of relationships, on the other hand. The following subsections delineate the elements of the strategic supply wheel that are relevant to this research.

2.1.1. Corporate & supply strategy and purchasing organization structure

Discussions about corporate & supply strategy and purchasing organization structure follow the Alfred Chandler's (1962) guidelines for strategy-structure fit. These discussions attracted attention in the purchasing literature with the rise of global sourcing and outsourcing among MNCs (Arnold 1999). The structure of a purchasing organization (or purchasing department) can take three forms: centralized, decentralized, and hybrid (Stanley 1993). If an organization has a divisional form (e.g., product or regional divisions), a centralized purchasing structure means that the divisions do not have separate purchasing departments and the purchasing function is carried out from a central purchasing department in the corporate headquarters (Daft 2010). In comparison, in a decentralized purchasing structure, each division has its own purchasing department, and there is no corporate purchasing department. The hybrid structure, also known as the centralized–decentralized structure, has both a corporate purchasing department and a separate purchasing department in each division (Van Weele 2005).

There have been several previous in-depth investigations of how to achieve strategic fit between a corporate & supply strategy (e.g., outsourcing or global sourcing) and purchasing organization structure. For instance, Stanley (1993) developed a contingency model linking purchasing department performance (e.g., effectiveness, efficiency, and adaptiveness) with the structural dimensions of the organization (e.g. centralization, formalization, and complexity/specialization).

The author presents five propositions to be tested by future research. Two of these five propositions are about the purchasing function and structural dimensions: (1) The degree of centralization of the purchasing function is positively related to the degree of formalization; (2) The degree of centralization of the purchasing function is positively related to the specialization of each department member.

Arnold (1999) suggested three models (i.e., outsourcing, coordination, and centralized purchasing models) of how the purchasing function can be structured to fit the global sourcing strategy. Despite the significant attention of prior research to improving the fit between corporate & supply strategy and purchasing organization structure, recent research notes several shortcomings. Bals, Laiho, and Laine (2014) argue that previous research failed to look beyond a limited set of structural dimensions (e.g., centralization, standardization, formalization, specialization, size, and participation). Furthermore, Johnson and Leenders (2006) call for future research into environment–strategy–structure relationship; these authors also ask future researchers to go beyond examining the various contingency factors, and to scrutinize internal organizational decisions concerning the structure, resources, roles, and responsibilities of the purchasing function in MNCs. Similarly Glock and Hochrein (2011) highlight that prior research is inconsistent in its treatment of contextual variables and purchasing function structure. Scholars also call for an improved understanding of the effects of complexity on the organization of the purchasing function as well as its links with structural elements (Schneider and Wallenburg 2013). This thesis addresses these calls by performing in-depth investigations of the supply management / sourcing / purchasing departments of three MNCs through the lenses of contingency theory and bounded rationality.

2.1.2. Corporate & supply strategy and portfolio of relationships

Research that relates corporate and supply strategy to the portfolio of relationships can be classified into two broad areas. The first area of relationship is the relationship between corporate & supply strategy and external suppliers. For instance, strategies such as outsourcing and global sourcing expose organizations to various supply risks; as a result, a key concern here is how to

manage a global supply base (Zsidisin 2003; Gelderman and Semeijn 2006). Gelderman and Semeijn (2006) note two challenges for managing a global supply base. The first challenge is the resultant organizational complexity due to managing suppliers dispersed across a wide range of countries. The second challenge is the high learning cost of handling intercultural relationships with suppliers from diverse cultural contexts.

The second area of relationship is the relationship between the globally dispersed purchasing departments located at the business units and the corporate purchasing department located at the headquarters in large MNCs. The purchasing literature (Faes, Matthyssens, and Vandembemt 2000; Rozemeijer 2000; Rozemeijer, van Weele, and Weggeman 2003; Foss and Pedersen 2004; Smart and Dudas 2007), in this case, builds on the conceptual underpinnings of the scholars such as Lawrence and Lorsch (1967), Ghoshal and Bartlett (1988), and Ghoshal and Nohria (1989;1993) in order to suggest prescriptions for enabling integration, alignment, synergy among, as well as establishing corporate control over the globally dispersed and autonomous business units of large MNCs. In spite of the works of above scholars, researchers highlight several inadequacies in our understanding about the contextual factors that hinder integration (Rozemeijer, van Weele, and Weggeman 2003; Mikalef et al. 2015). The present research overcomes the shortcomings of past research by looking into the contextual variables that can limit the risk visibility of the purchasing professionals in large MNCs. The current research also reveals the contextual variables that act as barriers to achieving corporate purchasing synergy among the autonomous purchasing units of large MNCs.

2.1.3. Purchasing organization structure and portfolio of relationships

Of the three elements of the strategic purchasing wheel that are principal interests of this research, the links between purchasing organization structure and the portfolio of relationships with suppliers or internal business units have received limited attention in the purchasing and supply management literature. However, recent research has shown increased interest in these matters. For instance, Trautmann et al. (2009a) propose a conceptual purchasing portfolio model to create category-level integration among the dispersed and autonomous purchasing units of large MNCs. Hesping and Schiele (2015) have taken the hierarchical view of the purchasing organization structure into consideration, and stratified the purchasing literature into five levels, i.e., the firm, purchasing function, sourcing, category, and supplier levels. But, Hesping and Schiele (2015) also highlight that extant research lacks empirical evidence regarding the hierarchical conceptualization of the purchasing function. Moreover, Luzzini, Caniato, Ronchi, and Spina (2012) criticize the current purchasing and supply management literature for being limited to classifying categories

and to setting the strategic priorities of the categories. According to the authors extant purchasing and supply management literature fails to consider differences in categories and priorities. Additionally, Schneider and Wallenburg (2013) contend that prior research has been unsuccessful in adequately comprehending the roles and responsibilities (i.e., who at what levels are responsible for managing the purchasing function) within the hierarchical structure of the purchasing organization (Schneider and Wallenburg 2013).

The present study fills the aforementioned gaps by using bounded rationality as a theoretical lens for making sense of different roles and responsibilities within the purchasing function in large MNCs. Furthermore, the hierarchical depiction of the purchasing function as well as the fit of current portfolio models of MNCs are also illustrated in this research.

2.2. A structural complexity perspective of the supply management function

The notion of complexity can be found in a range of disciplines (Iván Tarride and Zuñiga 2010), such as systems theory (Boulding 1956), information theory (Shannon and Weaver 1963), and cybernetics (Ashby 1957). The notion has also been borrowed by the organization theory and design literature (Ranson, Hinings, and Greenwood 1980; Lissack 1999; Dooley 2002), strategy research (Johnson, Whittington, and Melin 2003), and supply chain research (Choi, Dooley, and Rungtusanatham 2001; Choi and Hong 2002; Choi and Krause 2006).

Reviewing the extant literature on complexity, Engelhardt-Nowitzki, Gerschberger, and Staberhofer (2012) note that complexity can be described using a set of parameters. According to these authors, these parameters are:

- the numerousness of elements and interrelations that make up the system;
- the degree of uncertainty that enters the system;
- the product variety requested by the customers;
- the inherent dynamics of the system; and
- the geographical components that act on the system.

As the present research was conducted in MNCs, “complexity” in this thesis refers to the structural differentiation of the organization (Dooley 2002). Hall (1982) describes three components of structural complexity (Mckinley 1987): the first one is horizontal complexity, which is horizontal differentiation among organizational subunits; the second one is vertical complexity, which is vertical differentiation of tasks into distinct hierarchical levels; and the third one is spatial complexity, which is the spatial dispersion of the subunits of an organization (Price 1997).

Following this notion of structural complexity, a large MNC, typically will have all three components of structural complexity.

Consequently, the degree of complexity in a large MNC can be measured simplistically by counting the number of elements in various hierarchical levels (Vachon and Klassen 2002). For example, an MNC with three distinct hierarchical levels is more vertically complex than is an MNC with two hierarchical levels. Likewise, an MNC with 120 elements in a particular hierarchical level is significantly more complex than is an MNC with five elements in the same hierarchical level. Similarly, an organization that operates in 180 countries is more spatially complex than an organization that operates in 70 countries.

Drawing on the above conceptualization of structural differentiation, the complexity of the supply management function in MNCs is depicted in Figure 3. The headquarters of large MNCs that drive the purchasing or supply management function, are denoted as the headquarters level. The divisions that have their own purchasing units, are denoted as the divisional level. Business units that owns independent purchasing departments, is denoted as the entity level. In this depiction of the supply management function (see Figure 3), the vertical complexity is due to the three hierarchical levels, the horizontal complexity encompasses the three divisions in the divisional level, while the spatial complexity entails the geographic dispersion of the divisions into the three regions of the world (i.e., the Americas, Europe, and Asia Pacific).

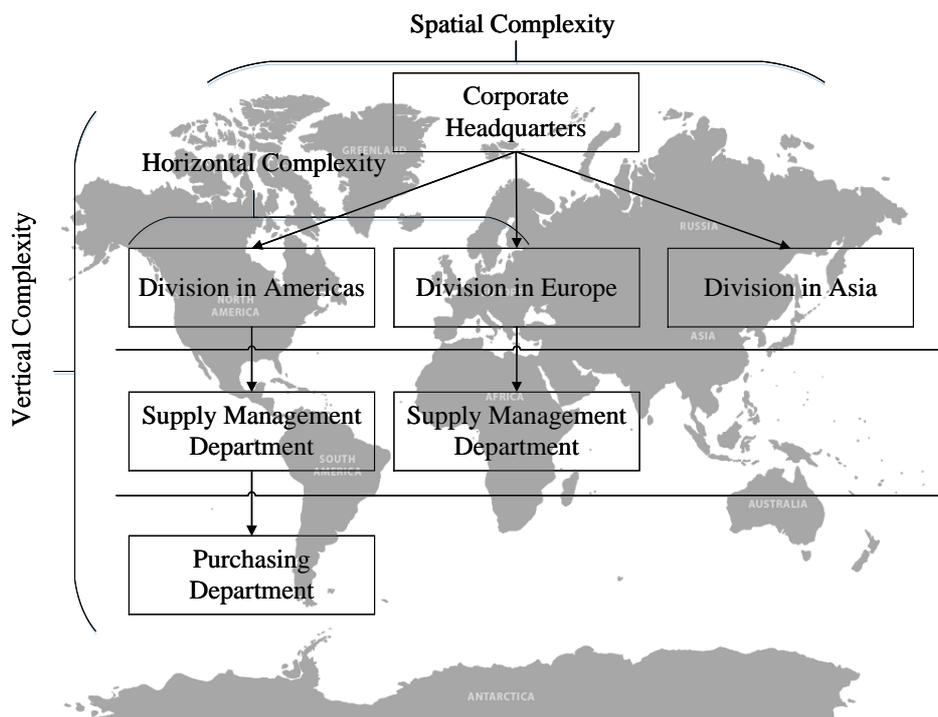


Figure 3: Structural differentiation of the supply management function in MNCs

The structural complexity conceptualization of the supply management function complements the purchasing and supply management literature (Schneider and Wallenburg 2013) by taking into account the hierarchical divisions (vertical complexity) of purchasing roles together with the geographical dispersion (spatial complexity) of business units. The division of roles and responsibilities among various actors in the purchasing function creates bounded rationality for these actors (Simon 1955). The geographical dispersion of divisions or business units translates into different contingencies of these divisions (Fiedler 1967).

Consequently, along with complexity as a theoretical lens, the two-other theoretical lenses applied in this thesis are bounded rationality and contingency theory. Moreover, horizontal complexity (e.g., number of divisions at a certain level) entails differentiation (Lawrence and Lorsch 1967) in terms of products, regions, or departments. Such differentiation of the divisions by products or regions implies that the same process of purchasing or supply management or sourcing is repeated in these divisions. Thus, the horizontal dimension of structural complexity relates this research to the purchasing synergy literature (Faes, Matthyssens, and Vandenbempt 2000). Faes, Matthyssens, and Vandenbempt (2000) defined purchasing synergy as “the value that is added when two or more business units (or purchasing departments) join their forces (e.g., combined buying) and/or share resources, information, and/or knowledge in the area of purchasing.” Hence, when differentiation between divisions exists the true potential of purchasing function can be realized if the differentiated divisions can join their forces to share resources, information and knowledge.

2.3. Bounded rationality

Bounded rationality is a school of thought regarding decision making that emerged due to dissatisfaction with comprehensively rational and economic decision theory models of choice (Jones 1999). The term “bounded rationality” was coined by Simon (1955), who argues that the concept of “economic man” in economic theory is flawed. This is because, economic man in economic theory refers to a rational man, who is assumed to have knowledge about all relevant aspects of his environment, a stable choice of preference, and an ability to calculate the cost of alternative courses of action. From Simon's (1955) perspective, the decision making capabilities of organisms (e.g., people in organizations) are limited by two things: first, access to information and, second, information-processing capability or cognitive limitations. Since, the emergence of the bounded rationality concept, it has been accoladed for accurately describing the choice behavior of organisms. It is also regarded as sensibly accommodating the information gathering and processing capabilities of human beings (March 1978).

Scholars recognize the theoretical underpinnings of bounded rationality not only at an individual level but also at an organizational level (Holmstrom and Tirole 1989). Consequently, many organizational theories (e.g., organization learning theory, institutional theory, knowledge-based theory of firms, transaction cost economics theory, agency theory, the resource-based view, and network theory) have explicitly adopted bounded rationality as an underlying assumption (Williamson 1979; DiMaggio and Powell 1983; Eisenhardt 1989a; Zander 2007; Halldorsson et al. 2007).

In purchasing and supply management literature, scholars frequently apply theories such as transaction cost economics (Luzzini et al. 2012), agency theory (Zsidisin and Ellram 2003), the resource-based view (Day, Lichtenstein, and Samouel 2015), and network theory (Hearnshaw et al. 2013). Therefore, bounded rationality is not at all an alien theoretical lens in the field of purchasing and supply management. However, the conceptual underpinnings of bounded rationality are rarely used in isolation (not under any theories) in the field of purchasing and supply management. This research address this gap by applying bounded rationality as a theoretical lens to examine the effects of organizational complexity on the purchasing function. Bounded rationality is also deemed important for this research because it is considered as one of the two key perspectives (the other is expected utility) for studying risk perception of individuals (White 1995).

2.4. Contingency theory

Contingency theory provides a major framework for organizational design (Donaldson 2001). It builds on two core assumptions: (1) There is no single best way to organize; (2) No single way of organizing is equally effective in all situations (Fiedler 1967). Based on the above assumptions, contingency theory suggests that organizations must adapt their structures to fit their contextual factors in order to achieve high performance (Lawrence and Lorsch 1967). Lawrence and Lorsch (1967) propose two solutions to achieve the desired fit. The first solution is creating differentiation, which means the organization of each sub-task in a manner that enables effective performance of each sub-task. The second solution is enabling integration between differentiated sub-tasks to ensure successful completion of the whole task (Galbraith 1973).

It is possible to derive theoretical and managerial contributions from the underpinnings of contingency theory by taking a step-by-step approach. The first step is to identify critical contingency variables from diverse contexts. The second step is to group diverse contexts based on different contingency variables. The third step is to determine internal organization design features to fit each major group (Donaldson 2001).

After reviewing the state of the art of contingency theory in broader operations management (OM) research, Sousa and Voss (2008) conclude that the OM field is deeply rooted in the contingency paradigm. A similar conclusion can be reached for purchasing and supply management research as well because of the increasing popularity of contingency theory among researchers in the field (Spina et al. 2013). Scholars in the field have applied the contingency lens to study risk (Grötsch, Blome, and Schleper 2013), buyer–supplier relationships (Saccani and Perona 2007), corporate purchasing synergy (Rozemeijer, van Weele, and Weggeman 2003), and purchasing department structure (Stanley 1993); all these key concepts are studied here.

Consequently, the above provides the rationale for applying contingency theory in this research. Contingency theory can explain the structural differentiation of an organization based on the diversity of its contexts (e.g., contexts of different regional divisions). It can also provide a framework for identifying the contingency variables of different contexts. Furthermore, it can also explain the behaviors of actors in various contexts (Sousa and Voss 2008).

2.5. Summary

To summarize, this thesis uses complexity as a perspective, underpinned by the theoretical lenses of contingency and bounded rationality. Both these theories have been applied as part of a complexity perspective in prior research (Amit and Schoemaker 1993; Caridi et al. 2010), probably because the rationality of individuals positioned at various hierarchical levels of a large MNC can be bounded by the complex nature of the organization. Similarly, when the purchasing function of a large MNC has naturally dispersed into diverse contexts, contingency theory can play a key role in explaining the effects of those contexts. Moreover, both bounded rationality and contingency theory complement each other because the former reveals that human actions are rational within the limits of the situational factors of organizations (Cyert and March 1963), while the latter directs our attention to how these actions are constrained and influenced by different organizational contexts (Lawrence and Lorsch 1967).

3. Research Design

3.1. Overall research approach

The overall research approach of this thesis is qualitative case research grounded in abductive reasoning (Dubois and Gadde 2002). The rationale for adopting an abductive approach in this research is that abductive approach is considered suitable for studying organizations in supply chains (Benedikte Borgström 2012). An abductive approach is a mixed-method design combining the underpinnings of both inductive and deductive approaches. While deductive approaches rely on developing propositions or hypotheses from current theories and making them testable in the empirical world, the inductive approaches, in comparison, use real-world observations to build new theories (Kovács and Spens 2005).

The abductive approach in this research (see Figure 4) started by scanning the current literature of supply chain risk management. When the researcher had gained sufficient understanding of the process of supply chain risk management from the literature, a case (case I) was sought to study supply risk management practice in a large MNC. To gain full access to the data on supply risk, the researcher was asked to assist in developing and implementing a supplier segmentation model for the studied organization. This collaboration moved the research from a pure case study design to collaborative management research (Shani, David, and Willson 2004; Pasmore, Woodman, and Simmons 2008).

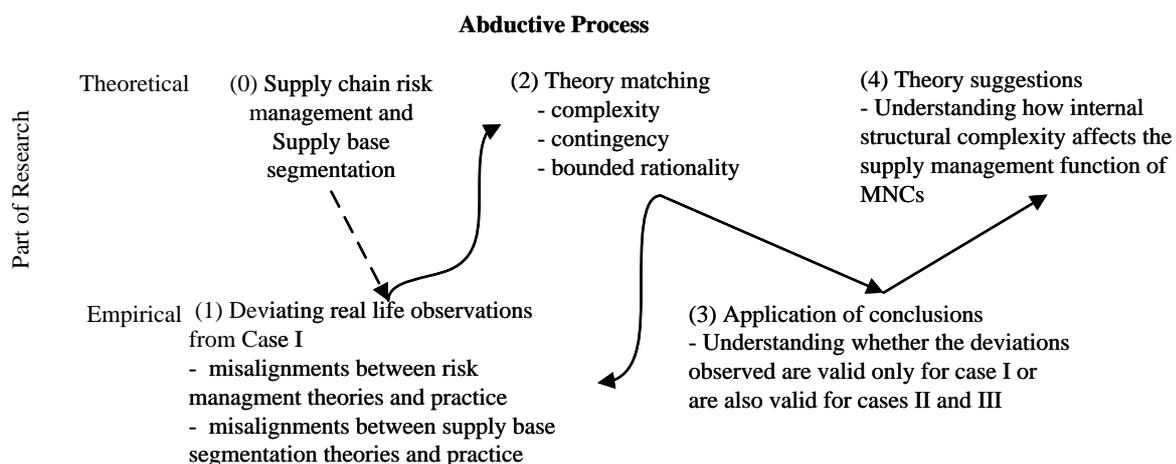


Figure 4: The overall research process; adapted from Kovács and Spens (2005)

During the data collection in case I, two misalignments between theory and practice were observed. The first misalignment was attributed to the holistic assumptions of risk management theories and models that did not fit the complex nature of the supply management function in the case organization. The second misalignment was that the extant portfolio models in the purchasing

and supply management literature did not fit the complex requirements for a supplier segmentation model in the studied MNC. The rich data gathered from case I are examined from the perspectives of complexity, bounded rationality, and contingency theory in order to make sense of these misalignments.

To find out whether the misalignments between theory and practice observed in the first case were also present in other organizations, data about supply risk management and supply base segmentation models were collected from two more cases. These two supporting cases (cases II and III) helped the researcher gain rich insights into the effects of structural complexity on the organization of the supply management function in global organizations. The path dependency of this research limits itself to a qualitative research design with multiple cases studied at different times. The conclusions drawn from this research are therefore limited in terms of statistical generalizability (Yin 2009).

3.2. Case Study Design

Case study design provides a rich understanding of the empirical world (Flyvbjerg 2006). Because the present research focused on gaining in-depth insights into the organization of the supply management function in MNCs, the case study design was considered suitable (Yin 2009). Moreover, deep knowledge of the supply management function in an MNC (case I) permitted the present research to be extended to a multiple case study design with the addition of two supporting cases (Meredith 1998). Adopting a multiple case study design allowed this research to improve the reliability and validity of the findings of the first case (Eisenhardt and Graebner 2007; Yin 2009).

3.2.1. Selection of cases

Case selection is a critical aspect of multiple case study design and needs to be carefully thought out (Johnston, Leach, and Liu 1999). According to Johnston, Leach, and Liu (1999), every case should serve a unique purpose within the overall scope of inquiry. Therefore, the supporting cases were selected so as to obtain maximum variation from the main case. The logic was that, if it is possible to extract similar patterns from contrasting cases, this will increase the reliability of the results (Yin 2009). Consequently, the two supporting cases differed from the main case as well as from each other in terms of industry (e.g., ICT and utilities), organization of purchasing function, and complexity (i.e., vertical, horizontal, and spatial). Moreover, the third case is a state-owned company, whereas the first and second cases are private organizations. An added advantage was that the three cases represented different parts of the supply chain. The first case is an original equipment manufacturer (OEM). The second case is a network solution provider, meaning that it is

a supplier to many OEMs. The third case is a power and heat producer, distributor, and seller. In some countries, case III owns the entire chain of production, distribution, and sales.

3.2.2. Number of cases

The number of cases is another important factor in multiple case study design and requires careful consideration (Johnston, Leach, and Liu 1999). Eisenhardt (1989b) recommends collecting data from four to ten cases to replicate findings and enhance generalizability of the research. However, the author also stresses on theoretical sampling of cases and contends that the cases should be chosen for theoretical, not statistical reasons. The number of cases used in the present research was three. This is because the chosen cases had enough variations among them to meet the requirements of theoretical sampling. Additionally, theoretical saturation of information is attained quickly while collecting data from case II and case III; the interviews conducted in cases II and III stopped revealing new information after some time. Moreover, studying a small number of cases for this research provided opportunities for gaining rich insights into the supply management function in MNCs (Voss, Tsikriktsis, and Frohlich 2002).

3.2.3. Unit of analysis

Two units of analysis were chosen for this thesis: the supply risk management process and the supply base segmentation process. The rationale for selecting these processes as unit of analyses was that both these processes are affected by the outsourcing (Wagner and Johnson 2004; Lee, Yeung, and Hong 2012) and global sourcing (Gelderman and Semesijn 2006; Lee, Yeung, and Hong 2012) strategies. For instance, outsourcing and global sourcing strategies in one hand expose MNC to various forms of risk from suppliers, and in other hand, make the management of supply base difficult (Zsidisin 2003; Gelderman and Semeijn 2006). Furthermore, supply risk management is an important consideration for categorizing suppliers in several portfolio models of purchasing (e.g. Kraljic 1983, Hallikas, Puumalainen, Vesterinen, and Virolainen 2005). The above is an indication that supply risk management process and supply base segmentation process are tightly coupled with each other and have a significant impact on the effectiveness of each other.

3.2.4. Data collection

The data collected from case I guided the data collected from the supporting cases. The data collection efforts in the three cases are presented in Table 1.

Table 1: Overview of data collection in the cases

Attributes	Main case	Supporting cases	
	Case I	Case II	Case III
Period of attachment	November 2013–June 2013	March 2016–May 2016	February 2016–May 2016
Duration of attachment	8 months	3 months	4 months
Number of respondents	24	18	4
Hours	49.5	22	7
Respondent profiles	Supply management professionals, sustainability manager, group risk manager, acquisition manager, Innovation Manager, Supplier, Insurance Provider	Head of network sourcing, supplier relationship manager, category manager, category lead	Category managers, IT solution provider
Documents	88 (internal and external: presentation, risk reports, sustainability reports, annual reports)	20 (external: annual reports, presentations available on the website, masters' theses)	10 (internal and external: annual reports, financial reports, sustainability reports)

3.2.5. Data analysis

Because of the qualitative nature of the present research, the collected data from the cases were mostly textual and were subjected to content analysis (Dooley 2016). All the recorded materials from cases II and III were transcribed verbatim. Detailed notes were prepared for meetings and discussions from case I that lasted more than two hours. To extract relevant quotations (for papers I, II, and III), the transcriptions were searched for keywords such as risk, segmentation, acquisitions, and innovation. Suitable quotations from respondents for each keyword or theme were put into Excel spreadsheets in order to extract the pertinent information. Following the guidelines of previous qualitative research in the field, the data analysis in paper IV was concerned with finding common patterns in the studied cases (Choi and Hong 2002).

3.2.6. Reliability and validity of the data

The literature presents several sets of guidelines for assessing the quality and reliability of qualitative research. For example, Yin (2009) presents four criteria for ensuring the design quality of case studies: construct validity, internal validity, external validity, and reliability. Similarly, Lincoln and Guba (1985) also present four criteria for measuring the trustworthiness of qualitative research. In the present research, Lincoln and Guba's (1985) guidelines were used. The measures taken to conform to these guidelines are presented in Table 2. As shown in Table 2, the criteria of Lincoln and Guba (1985) are parallel to those of Yin (2009). Lincoln and Guba's (1985) criteria

were applied in this research because these criteria were adopted by several researchers in the broad area of supply chain management (Manuj and Mentzer 2008; Diehl and Spinler 2013; Macdonald and Corsi 2013). The measures taken were adapted from Shenton (2004), who provided explicit descriptions of procedures to follow for meeting each trustworthiness criterion.

Table 2: Assessing the trustworthiness of the study

Trustworthiness criteria	Explanations of trustworthiness criteria	Measures taken in this study to meet the trustworthiness criteria (adapted from Shenton 2004)
Credibility (in preference to internal validity)	Extent to which results appear to be acceptable representations of the case data.	Prolonged engagement with the case organizations. Interviews and meetings from the cases spread across several months; for instance, case I, 8 months; case II, 3 months; case III, 4 months. Participants were asked to review the information gathered. Participants were chosen from different levels of the organization. Triangulation of information archived from multiple sources of data (e.g., interviews, meetings, observations, and archival documents). Thick descriptions were prepared for each case.
Transferability (in preference to transfer validity)	Extent to which results from one context can be transferred to another context.	Multiple cases were studied at different times. The cases were chosen based on maximum variation (e.g., different industries, products, services, and categories) from each other.
Dependability (in preference to reliability)	Extent to which findings are unique to a particular time and context.	Same interview protocol was used in all three cases. Respondents were asked to check the validity of the information generated.
Confirmability (in preference to objectivity)	Extent to which results are researcher's observation versus respondents' reflections on the phenomenon under study	Most of the interviews were recorded and transcribed. Detailed notes were created from the recorded materials lasting longer than two hours. Detailed case descriptions were created when the participants did not consent to recording (one out of 46 respondents) or the researcher was not prepared to record (one out of 46 occasions)

3.3. Collaborative management research

Pasmore and Stymne (2008) defined Collaborative Management Research (CMR) as an effort by at least two parties, one of whom is a member of an organization (i.e., practitioner) under study, and the other is an external researcher. The researcher and practitioner work together in learning how managers' behaviors, management methods, and organizational arrangements affect outcomes in the organization under study. The methods used are scientifically based to reduce the likelihood of drawing false conclusions from the data collected. The intention is to improve the

performance of the system under study as well as adding to the broader body of knowledge in the field of management. Most collaborative management research approaches differ significantly from traditional research approaches (e.g., surveys, case studies, and mathematical modeling) in terms of the type of knowledge created. This is because, in traditional research approaches, the context is set by the researcher, whereas in most CMR approaches, research takes place in the context of the “problem” (Gibbons et al. 1994; MacLean et al. 2002; Bartunek 2011). Moreover, in traditional research approaches, issues are predetermined and defined for research purposes, whereas the main purpose of CMR approaches is to solve organizational problems. Consequently, all CMR approaches, in comparison with traditional approaches, are intended to create practical knowledge (Coghlan 2011) and thereby improve our understanding of the phenomenon under study (e.g., the effect of organizational complexity on the supply management function) by carrying out research that is insightful, influential, and immediately applicable to practice (Radaelli et al. 2012).

The rationale for performing collaborative management research for present research was that the researcher was asked to assist in the development and implementation of a supplier segmentation for case I. The collaboration with case I opened opportunities for collecting data from multiple actors engaged in carrying out supply management function in a large MNC. Moreover, collaborative management research is an unexplored research methodology in the field of purchasing and supply management. Only recently have researchers (Maestrini et al. 2016) in purchasing and supply management concluded that a significant understanding of the buyer–supplier relationship can be obtained using forms of collaborative management research (e.g., action research). Though previous scholars (Näslund 2002; Näslund, Kale, and Paulraj 2010; Halldórsson, Hsuan, and Kotzab 2015; Sweeney, Grant, and Mangan 2015) have called for collaborative management research, such as action research, in the logistics management, operations management, and supply chain fields, its application in the broader area of purchasing and supply chain research has been reported to be still marginal (Wynstra 2010; Chicksand et al. 2012; Spina et al. 2013). Furthermore, type of knowledge produced while performing a collaborative management research differs significantly than the knowledge produced while conducting case studies. Gibbons et al. (1994) highlighted this difference in knowledge production between traditional approaches and collaborative management research approaches and referred the former as “mode 1” knowledge production and the latter as “mode 2” knowledge production. According to the authors in mode 1, knowledge production occurs as a result of an academic agenda, whereas in mode 2 knowledge production is directed to solve practical problems

(Bartunek 2011). By using collaborative management research with case studies, the present research combined two forms (i.e., mode 1 and mode 2) of knowledge production.

3.3.1. The role of the researcher

While most traditional approaches are non-participatory, collaborative management research is necessarily participatory. It tries to achieve balance and interdependence between actors, between academic research and practical application, between knowledge creation and problem solving, and between inquiry from inside and from outside. Consequently, one of the distinguishing factors among various collaborative management research approaches is the role played by the researcher (Shani, David, and Willson 2004). In the present research, the researcher's goal was to facilitate collaborative inquiry and instill methodological rigor (Lüscher and Lewis 2008). The researcher was responsible for research design, data collection, and data analysis. In addition, the researcher also acted as an expert by bringing the theoretical insights required to build a practically applicable supplier segmentation model. While the researcher was designing the questionnaire for collecting data, and choosing interviewees, the practitioner helped the researcher to set up the interviews and distribute the questionnaire to the respondents in the organization. The practitioner also provided constant feedback on the model.

3.3.2. The collaborative research process

The research process followed guidelines for collaborative management research (Shani and Pasmore 1985; Shani, David, and Willson 2004; Shani, Coghlan, and Cirella 2012). Therefore, three measures were taken to ensure methodological rigor. First, data collection was performed in phases (Hatchuel and David 2008; Cirella, Guerci, and Shani 2012; Radaelli et al. 2012). Second, data were collected using multiple methods, i.e., semi-structured interviews, meetings, discussions, focus groups, and a survey engaging actors from all levels of the organization (Jick 1979). Third, all relevant internal and external documents were gathered from the respondents to ensure information source triangulation (Eisenhardt 1989b).

3.4. Summary of the methods used in the appended papers

The different papers adopted different research approaches due to the overall abductive process and because of the collaborative management research method undertaken in the first case. The first two papers adopt a single case study design. The third paper is based on the collaborative management research that was used to build the supplier segmentation model. The fourth paper is anchored in a multiple case study design. The methodological choices were largely dependent on

the nature of the research questions addressed in each paper. Table 3 gives an overview of the research method adopted in each paper.

Table 3: Summary of methods used in the appended papers

Attributes	Paper I	Paper II	Paper III	Paper IV
Topic	Supply risk management in an MNC	Internal visibility of external supplier risks and the dynamics of risk management silos	Enabling purchasing centralization through supply base segmentation	Supply base segmentation process in complex organizations
Method of data collection	Single Case Study	Single Case Study	Collaborative Management Research	Multiple Case Studies
Cases	Case I	Case I	Case I	Case I, II, and III
Source of Data	Interviews, meetings, discussions, archival documents, observational data	Interviews, meetings, discussions, archival documents, observational data	Interviews, meetings, discussions, archival documents, observational data survey	Interviews
Unit of Analysis	Supply Management Process	Supply Management Process	Supply base segmentation	Supply base segmentation
Participants	Personnel related to supply management and risk management process	Personnel related to supply management and risk management process	Personnel related to supply management and acquisitions and sustainability	Personnel related to supply management
Research Questions in thesis	How does complexity influence the relationship between purchasing organization structure and corporate & supply strategy?		How does complexity influence the relationship between corporate & supply strategy and the portfolio of relationships?	How complexity does influence the relationship between purchasing organization structure and the portfolio of relationships?

4. Empirical Settings

The empirical data for this research were collected from three cases. Case I is the main case and cases II and III are the supporting cases. When studying the main case, an in-depth investigation of the supply management process of a large global organization was performed. The supply management function of cases I and II were examined to validate and ensure the reliability of the findings of the first case. A brief description of each case along with the structural complexity of the studied cases, and organization of the purchasing function in each case are described in this section. An overview of the cases is provided in Table 4.

Table 4: An overview of the cases

Attributes	Main case		Supporting cases	
	Case 1	Case 2	Case 3	Case 3
Founded in	1994	1890	1909	
Size (no. of employees)	43,000	110,000	33,000	
Operates in	70 countries (worldwide)	180 countries (worldwide)	Six countries (in Europe)	
Industry	Key and lock manufacturer	Network solutions for the telecom industry	Power generation, distribution and sales	
Sector	Manufacturing (private)	Service (private)	Service (public)	
Typical categories	Lock cases, electronics, aluminum, machining, casting, etc.	Patent, electronic components, real estate, power, etc.	Consulting and engineering, IT equipment, boilers, fuel, etc.	
Studied area	Product Sourcing	Product and Service Sourcing	Product Sourcing	
Sales to sourcing percentage	60%	60%	60%	
No of suppliers	8700 (only direct material suppliers)	28000 (direct and indirect material suppliers)	40000 (direct and indirect material suppliers)	

Table 4 reveals that, although the organizations chosen for the present study differ significantly from each other in terms of industry characteristics, size, and sector, they all have significant levels of outsourcing (60%) and large supply bases.

4.1. Case I

Case I is a world-leading key and lock manufacturer. Founded in 1994, it has grown from a small regional company to a large group of over 200 companies in 20 years. The organization has 43,000 employees and operates in 70 countries. It has grown from a sales volume of SEK 3.5 billion to a sales volume of SEK 57 billion annually (source: annual report 2014). The product range includes mechanical, electromechanical, and electronic products. The group has three regional divisions (i.e., Europe, the Americas, and Asia Pacific) and two global divisions. The regional divisions manufacture and sell mechanical and electro-mechanical products. The two global divisions

manufacture and sell electronic products (e.g., access cards and electronic ID devices) and provide entrance solutions to customers such as hospitals, hotels, and stadiums. The three regional divisions account for 63% of sales, and the two product divisions for 13% and 24% of sales, respectively. The case organization has 8700 direct material suppliers, mainly due to its strategy of growth through acquisitions. On average, the case organization sources 60% of its sales volume from its suppliers.

4.1.1. Structural complexity of the organization

The case organization is structurally complex along three dimensions (see Figure 5). The horizontal complexity is embodied in the five divisions at the same level. The vertical complexity is embodied in the three vertical levels, i.e., the group, divisional, and entity levels (e.g., manufacturing unit and company). The spatial complexity is characterized by the geographical spread of the organization in different regions. Regional divisions A, B, and C operate in the geographical areas of the Americas, Europe, and Asia Pacific, while product divisions E and F operate globally.

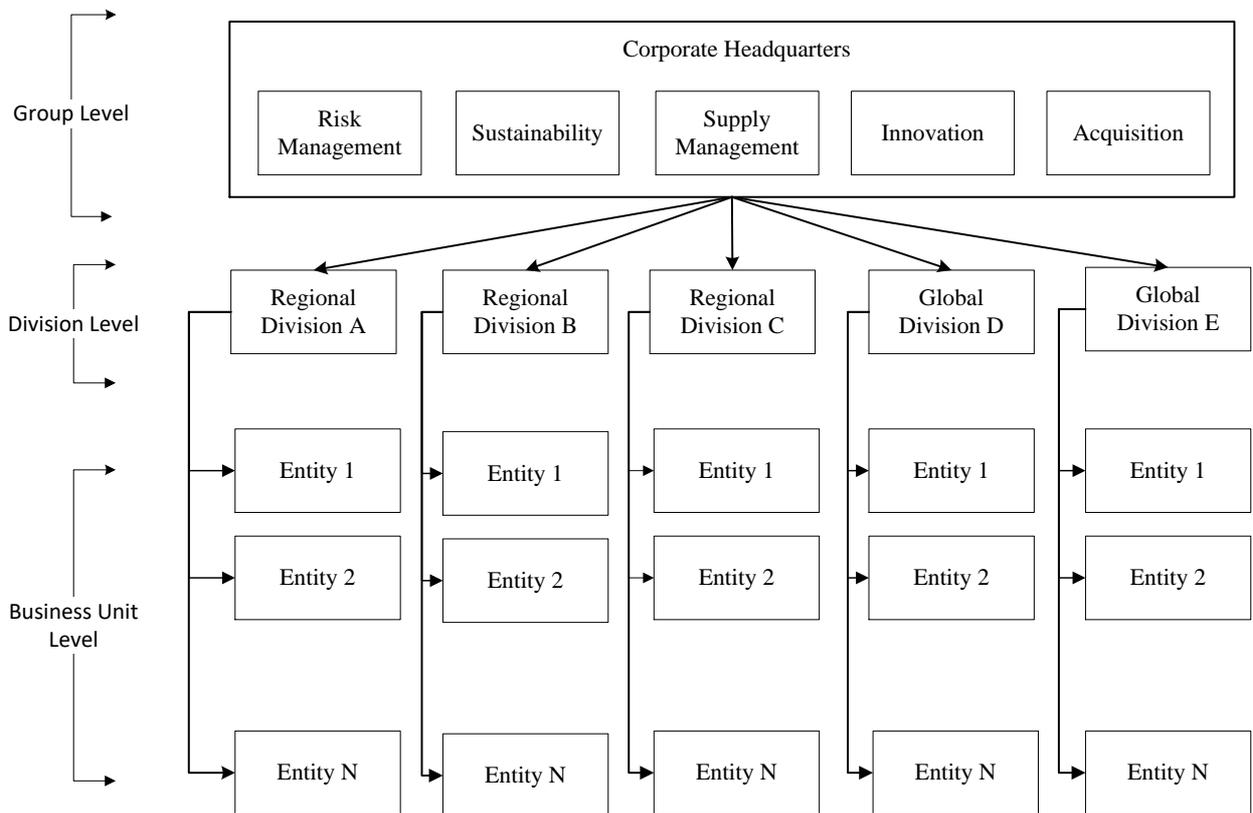


Figure 5: Structural complexity of case I

4.1.2. Organization of purchasing function

The purchasing function is referred to in the organization as supply management. Supply management is a corporate-level function and is steered from the headquarters along with other functions (e.g., risk management, innovation, and acquisitions). The chief technology officer (CTO) is at the top of the supply management organization (see paper IV for an illustration of the supply management function). The group supply chain director (GSCD) is next in the line of command. These two top managers, who are positioned at the corporate headquarters level, are accountable for creating the mission and vision for the supply management function. The next responsible level in the organization is the divisional level. Divisions are decentralized. Sourcing directors are positioned at the divisional level and report to the GSCD. These managers are responsible for ensuring that the autonomous business units in each division are fulfilling the mission and vision of supply management (e.g., reducing number of suppliers 5% per annum) of the group. The next line of command at the divisional level is the category managers, who report to the sourcing directors. Category managers consolidate purchase volumes across business units for their respective categories. The bottom-most responsible level in the supply management organization is the purchasing managers, who are positioned in business units (i.e., entity level) of each division. Purchasing managers are responsible for sending orders to suppliers and for inspecting and accepting ordered and delivered goods from suppliers.

4.2. Case II

Case II is the largest supplier of mobile telecom systems in the world. Founded in 1876, the organization currently employs approximately 110,000 people in more than 180 countries. Over 140 years, the organization has grown from an organization with sales of SEK 50 million in its early years to an organization with annual sales of SEK 228 billion (source: annual report 2014). The key product of the organization is mobile networks representing 55% of sales value. However, it is also a strong player in providing services (40% of sales value) to the telecom industry and in developing support solutions for TV and media. The organization has 33,000 suppliers. Depending on the product category, the value of sourcing ranges from 50% to 90% of the sales value. On average, the organization sources 60% of its sales value from suppliers.

4.2.1. Structural complexity of the organization

The structural complexity of case II is depicted in Figure 6. Unlike case I, the horizontal complexity of case II results from 120 product categories handled by two divisions. However, the organization has recognized the 30 most important product categories in order to reduce the

complexity of handling a large number of categories. The spatial complexity is due to the wide operational footprint of the company, organized into 10 regions and with sites or offices located all over the world. The vertical complexity is embodied in three organizational levels, i.e., corporate, divisional, and regional levels.

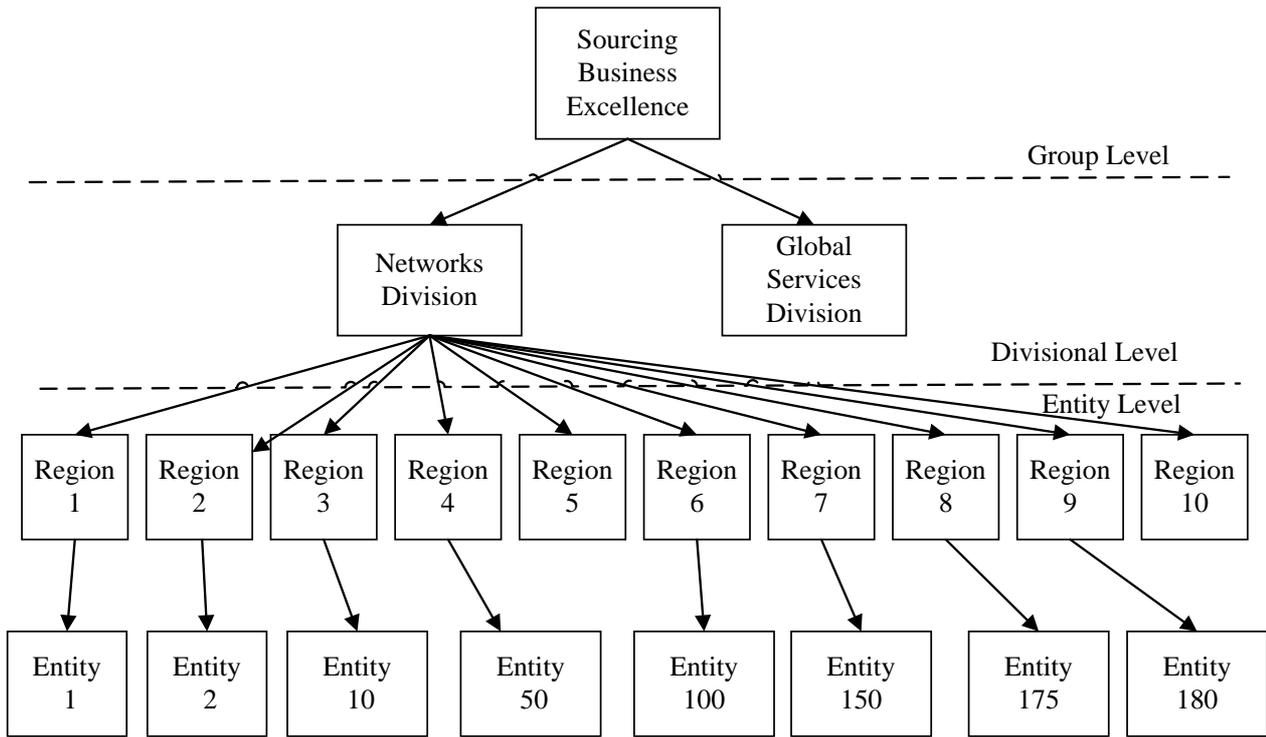


Figure 6: Structural complexity of case II

4.2.1. Organization of purchasing function

Sourcing (equivalent to the supply management function in case I) is a critical function for the organization. Sourcing business excellence is a unit at the top of the sourcing organization (see paper IV for a detailed diagram of the sourcing organization) where top managers responsible for sourcing are positioned. It can be regarded as the corporate headquarters level. This level is responsible for creating standardized processes and agreements that can be used at different levels in the organization.

The next responsible positions in the sourcing organization are the vice presidents of the divisions of network sourcing and global services. This level is regarded as the divisional level. Several managers are positioned at this level, for instance, the head of network sourcing, category leaders, category managers, operational leader for supplier relationships, supplier relationship managers, and strategic sourcing managers. The task of the sourcing professionals at the divisional level is to support the operations that run in distinct regions. To do so, different managers in sourcing

organization perform different responsibilities. Category leaders oversee several categories, while category managers are responsible for one or several categories depending on their size. Supplier relationship managers are responsible for monitoring key suppliers of the organization. The bottom-most responsible level in the sourcing organization is the entity level where supply managers are positioned. Supply managers handle the transactional sourcing for the organization, which means they are responsible for creating orders to purchase products or services, monitoring delivery, and submitting claims to suppliers.

4.3. Case III

Case III is a utility organization and the largest generator of electricity and heat in Europe. Founded in 1909, it is a state-owned company with operations in six countries in Europe and currently employing approximately 33,000 people. The company operates throughout the supply chain, handling production, distribution, and sales. The net sales of the company in 2012 were SEK 167 billion. The five operating segments of the organization account for the following percentages of the profit: power generation, 55%; heat, 8%; wind, 7%; distribution, 24%; and customer solutions, 6%. The organization has 28,000 direct and indirect materials suppliers. On average, this organization sources 60% of its sales value from suppliers.

4.3.1. Structural complexity of the organization

Due to the nature of the industry, the structural complexity of the organization differs from those of cases I and II. The structural complexity of case III is depicted in Figure 7.

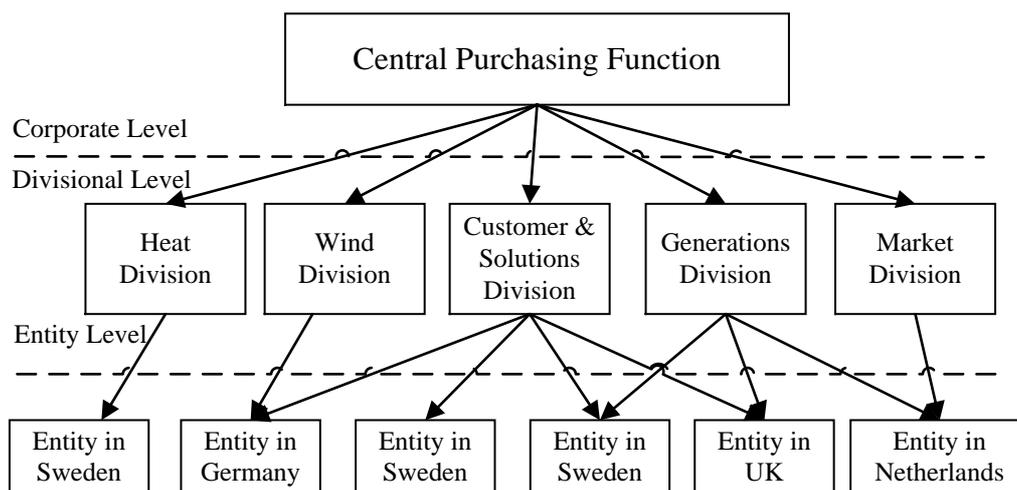


Figure 7: Structural complexity of case III

The horizontal complexity is embodied in five divisions differing in terms of power source (e.g., heat, wind) or in terms of the controlled part in the supply chain (i.e., generation, distribution, or

sales). The vertical complexity is characterized by three levels, i.e., corporate, divisional, and entity levels. The spatial complexity is represented by the organization's presence in four European countries.

4.3.2. Organization of the purchasing function

Unlike cases I and II, in this organization, the purchasing function is referred to as purchasing. Purchasing is a central function, and at the top of the purchasing organization is the chief purchasing officer (CPO), who is positioned at the corporate level. Under the CPO, each division has its own set of category managers. Category managers are positioned at the divisional level and are responsible for negotiating the purchase prices with suppliers, selecting suppliers, and making framework agreements with suppliers. Line managers are positioned at the bottom-most level of the purchasing organization. Unlike in cases I and case II, line managers can engage in maverick buying from suppliers. They are also responsible for ordering and ensuring delivery of the purchased items.

4.4. Summary of the studied cases

The cases studied for the present thesis have several similarities. All these cases are leading organizations in their respective supply chain. The studied case organizations are MNCs and are structurally complex organizations along all three dimensions i.e., horizontally, vertically and spatially. The case organizations are outsourcing significant amount of their sales values (60% of the sales value) from suppliers and the supply bases of all three cases are large.

Despite of the above similarities, the studied cases are different on several aspects. The organization of supply management function in the case organizations is different than each other. For instance, purchasing function in case I is called supply management and in case II is called sourcing. The roles and responsibilities performed by different managers at the various levels of the purchasing organization are also diverse. For example, for case I, CTO is at the top of supply organization, whereas for case III, CPO is at the top of purchasing organization. Moreover, for case II, there are several roles (e.g., supplier relationship managers, category leaders) in the sourcing organization that are entirely absent in cases I and II.

However, in spite of the above differences in the organization of the purchasing function in the studied cases, processes of supply management (case I), sourcing (case II), and purchasing (case III) are strikingly similar to each other. These processes go through exactly similar steps: someone at the top (e.g., CTO, CPO, vice president sourcing) are responsible for setting the vision for the supply management function, few in the middle (e.g., sourcing directors, category managers,

supplier relationship managers) are responsible for executing the vision, and finally some people (e.g., purchasing manager, supply manager, or line manager) at the bottom-most level are responsible for ensuring the supply of the purchased materials to the production and operational units in order to carry out production and operation to meet the needs of customers. Because of this commonality of purchasing, supply management, or sourcing processes, it was possible to examine the effects of organization complexity on the purchasing function.

5. Summary of the appended papers

This section provides a brief summary of the appended papers.

5.1. Paper- I: The paradox of risk management: a supply management practice perspective

The purpose of this paper is to build a deep understanding of how risk is identified, assessed, and mitigated in a large global organization. The paper is guided by two research questions: (1) How are risks managed (i.e., identified, assessed, and mitigated) inside a large global organization? (2) Why does risk management in practice sometimes differ from theory and from widely accepted standards of risk management?

The purpose of the research and the nature of research questions guided the methodology choice (Yin 2009). Accordingly, this paper builds on a single in-depth case study design to gain rich insights into the supply risk management process within an MNC. Unlike previous studies (Norrman and Jansson 2004; Ellegaard 2008) in supply risk management, this paper uses the supply management process as a unit of analysis. The reason is, supply risk management in the studied case is performed within the supply management process.

The paper briefly reviews the literature on risk identification, assessment, and mitigation techniques to understand the state of the art of risk management in the field of purchasing and supply management. The review reveals that most risk identification (e.g., Christopher et al. 2003) and assessment models (e.g., Griffis and Whipple 2012) in the extant literature assume an integrated view of managing supply risks. Having this integrated view of supply risk management implies that the entire range of supply risks that an organization may face will be identified, assessed, and mitigated altogether by a team of people responsible for managing those risks in the organization.

The paper reveals two key findings that are contradictory to the integrated view of supply risk management. The first key finding is that supply risk is not managed within the corporate risk management function, but rather within the supply management function of the organization. The corporate risk management function manages only property (e.g., business unit) risks. The process of identifying, assessing, and mitigating property risk is transferred to the insurance provider of the organization. The insurance provider uses business impact analysis to identify all possible risks of the insured business units of the organization. The implication of the first finding, i.e., that supply risk is managed within the supply management function, is that the tasks of managing various risks are performed by several individuals. The second key finding is related to the implication of the first finding and is that the risks arising at different points in the supply management process (e.g.,

during new supplier selection or during delivery and inspection) are managed using different methods for the identification, assessment, and mitigation of risks. The implication of the second finding is that different risks require different methods of identification and assessment and all risks cannot be identified or assessed using a single identification or assessment tool.

To portray the fragmented, multi-level, and time-dependent view of risk management in practice, this paper used Whetten's (1989) theoretical framework. The framework clearly illustrates who is managing what risks (e.g., financial, sustainability, performance and sourcing risks) where, when, how, and why.

5.2. Paper - II: Internal Visibility of External Supplier Risks and the Dynamics of Risk Management Silos

The purpose of this paper is to understand why the silo structure persists in risk management activities in practice. To achieve the purpose, this paper focuses on the “internal visibility of supplier risks”. Here, internal visibility refers to the visibility of various supplier risks to different actors within an organization. The guiding research questions for this paper are: (1) How are different supplier risks visible among the actors within a purchasing firm? (2) Why is the visibility of supplier risks different for different actors?

A single case is preferred for this study in order to gather deep insights into the studied phenomenon (i.e., risk management silos) (Yin 2009). The overall supply management process of the case organization was chosen as the unit of analysis in this paper to benefit from studying the five different supply management processes of five diverse divisions.

This paper first identifies 13 supplier risks (e.g., innovation capability, switching time, and reputational damage) from the literature. The visibility of these external supplier risks is mapped against the respondents at distinct levels (e.g., the group, divisional, and business unit levels) of the case organization. The mapping reveals that people positioned at different hierarchical levels of the supply organization see different risks.

To understand this difference in visibility, the paper uses the theoretical lenses of contingency theory (Fiedler 1967) and bounded rationality (Simon 1955). Contingency theory explained that the differences in visibility of supplier risks among various respondents were due to the different contexts of the respondents. Bounded rationality, in comparison, explained the differences in visibility of supplier risks among various respondents were due to the different roles and responsibilities of the respondents.

While prior research (e.g., Arena, Arnaboldi, and Azzone 2011) only reports the existence of silo-based risk management practices in organizations, this paper explains why silo-based risk management persists in the complex reality of a global MNC. The paper concludes that silo-based risk management is a natural phenomenon in large organizations and, as a result, is difficult to avoid. Therefore, to provide guidance for practitioners on managing silos effectively, the paper distinguishes between positive and negative dependences of risks. Positive dependence means that mitigating one risk from one silo will mitigate another risk from a different hierarchical silo. Consequently, managing risk in silos may not be that problematic in the case of positive dependence between two risks from two different silos. In contrast, negative dependence means that mitigating one risk from one silo may generate new risks in other silos. Silo-based risk management is therefore problematic in the case of a negative dependence between two risks from two different silos. Hence, it is critical for managers to understand the dependence between different risks in large MNC.

5.3. Paper III: When one size must fit all: enabling purchasing centralization through a supplier segmentation model

The purpose of this paper is to present a successful purchasing centralization initiative orchestrated by a large MNC. The paper answers two research questions: (1) What are the underlying contextual factors that drive the need for centralization in a large MNC? (2) How is purchasing centralization achieved in a large MNC?

This paper is based on an extensive collaborative management research methodology (Pasmore, Woodman, and Simmons 2008) through which a supplier segmentation model was built and implemented. The rationale for conducting collaborative management research was that such methodologies are suitable for orchestrating organizational change (Cirella, Guerci, and Shani 2012), and likewise any other centralization initiative in large MNCs, building and implementing a common supplier segmentation model is a also change initiative (Heijboer 2003).

First, the extant literature on purchasing centralization is reviewed. The review highlights the limitations of prior research in identifying the contextual factors of centralization (Rozemeijer, van Weele, and Weggeman 2003; Bals, Laiho, and Laine 2014). The review also reveals that in answering the question of how to centralize purchasing, previous research has limited itself to solutions such as e-procurement (Kulp et al. 2006), e-business technology (Johnson et al. 2007), and contracts (Celec, Nosari, and Voich 2003).

The paper builds on the work of Rozemeijer et al. (2003), who proposed a conceptual model of purchasing synergy. According to the authors, the business context (e.g., market, technology, and business environment), corporate organization, corporate strategy, and purchasing maturity (i.e., the level of procurement professionalism) impact corporate purchasing synergy. Using this conceptual underpinning, it was possible to extract four factors from the empirical data, each related to one of the above constructs, in order to present a model of purchasing discord. These four factors are as follows: the nature of the supply base; the decentralized corporate organization; the corporate strategy of acquiring companies; and the maturity of purchasing function in the case organization. All these factors created a need for achieving purchasing synergy among the decentralized divisions so that these divisions can effectively manage the autonomous purchasing units (i.e., business units that have a separate purchasing unit) under each division.

This paper explains how purchasing synergy was orchestrated by this large MNC by building and implementing a one-size-fits-all supplier segmentation model. The model helped the organization to establish a common language across its diverse and autonomous divisions. Establishing the common language in this case refers to the standardization of terminologies, buyer–supplier relationships, agreements, and supplier assessments. By enabling such standardization, it was possible to achieve the benefits of centralization through economies of scale, economies of process, and economies of information (Trautmann et al. 2009a; Karjalainen 2011).

The paper makes three contributions. First, it illuminates the purchasing literature on the internal and external factors of MNCs that create purchasing discord and drive the need for centralization. Second, it demonstrates how, by using methodologies such as collaborative management research, a centralization initiative can be implemented successfully. Third, it proposes a novel and practically applicable model of supplier segmentation and demonstrates that such models can be used to enable purchasing centralization.

5.4. Paper IV: Supply versus supplier segmentation: evidence from complex organizations

The purpose of this paper is to gain in-depth knowledge of the supply base segmentation process in large complex organizations. To achieve this purpose, the paper asks three research questions. (1) How is supply base segmentation carried out in large complex organizations? (2) How do these organizations use different types of supply base segmentation models? (3) How does the complexity of an organization affect the supply base segmentation process?

In the paper, a multiple embedded case study design is applied with the supply base segmentation process as the unit of analysis (Yin 2009). The supply base segmentation processes of three large global organizations are studied.

First, a brief literature review is performed to determine how prior research considers multiple factors (e.g., supply market complexity, relationship value, buyer–supplier dependence, and buyer–supplier relationships) as bases for supplier segmentation.

This paper draws on the hierarchical view of the purchasing function proposed by Hespings and Schiele (2015) and on the structural complexity dimensions identified by Daft (2010) to illustrate the organization of the purchasing function in complex organizations. Furthermore, the data are analyzed from a process perspective (Pettigrew 1997; Langley 1999; Hernes 2014) in order to capture the context, time, and outcome dimensions of the segmentation process.

The findings suggest a clear distinction between supply and supplier segmentation processes in these organizations. The former refers to the categorization of purchased materials, products, or service categories – or, as the paper calls them, the supplies of the organization – while the latter refers to the segmentation of suppliers. The results also indicate that the underlying rationales of these two segmentation processes are very different. For instance, for category-level segmentation, an important consideration is the supply market challenge, which is quite similar to models such as that of Kraljic (1983). For supplier-level segmentation, the critical considerations are buyer–supplier relationships, value creation by suppliers, and total expenditure on purchased materials from suppliers. As a result, models such as those of Bensaou (1999), Caniëls and Gelderman (2007), and Rezaei and Ortt (2012) can be useful.

Moreover, findings suggest that models used by these organizations at the category level are mostly portfolio-type models. In comparison, models used by these organizations at the supplier level consider more factors than do category level models and do not restrict themselves to the two dimensions of the prevalent purchasing portfolio models found in the extant literature of purchasing and supply management. The implication of this finding is that it is time for purchasing and supply management researchers to look beyond two-dimensional purchasing models like that of Kraljic (1983) for segmenting suppliers. This is because, Kraljic-type (1983) models are a perfect fit for the category-level segmentation but a misfit for the supplier-level segmentation. The complexity of modern-day organizations demands consideration of a diverse range of factors for segmenting suppliers than those that can be facilitated by the two dimensions of the extant portfolio models.

6. Synthesis

This thesis aimed to address the following research question: How does organizational complexity influence supply management in MNCs? This main research question was broken down into three sub-questions relating the main research question to three elements of the strategic supply wheel (Cousins 2002). Figure 8 reveals how each appended paper contributes to answering three sub-research questions.

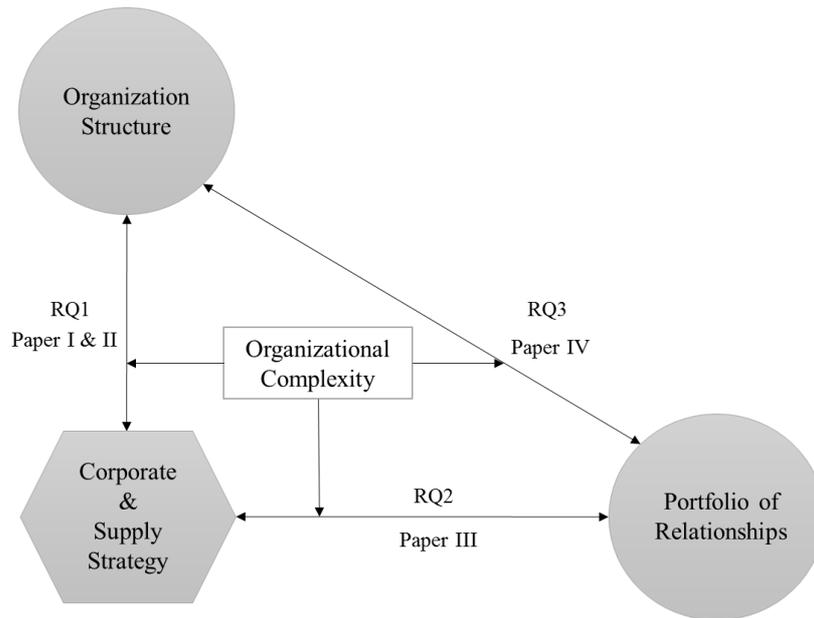


Figure 8: Theoretical framework, research questions, and papers

As depicted in Figure 8, papers I and II in combination answer the first research question concerning how complexity influences the relationship between purchasing organization structure and corporate & supply strategy. The effects of organizational complexity on the corporate strategy–corporate structure relationship is observed to be the creation of organizational silos. This effect is examined by looking into the visibility and management of supply risks (Zsidisin 2003), because such risks directly result from practicing corporate & supply strategy such as outsourcing and global sourcing. By focusing on how risk is managed within the supply management process in MNCs, papers I and II also expose the fragmented nature of the purchasing organization. Furthermore, paper II provides normative guidance for practitioners on how to risk management silos.

Paper III answers the second research question concerning how complexity influences the relationship between corporate & supply strategy and the portfolio of relationships. Corporate &

supply strategy such as outsourcing and global sourcing expose MNCs to various risks and, as a result, make the management of the supply base difficult (Gelderman and Semeijn 2006). Moreover, these strategies also result in decentralization of purchasing units (Faes, Matthyssens, and Vandembemt 2000). Hence, the effect of organizational complexity on the relationship between corporate & supply strategy and the portfolio of relationship is creation of purchasing discord. Paper III also illustrates how to manage such discord or lack of synergy by developing and implementing a common supplier segmentation model. This one-size-fits-all model helped the case organization to manage its portfolio of supplier relationships as well as to establish control over the globally dispersed and autonomous business units.

Paper IV answers the third research question concerning how complexity influences the relationship between the purchasing organization structure and portfolio of relationships. Paper IV illustrates the hierarchical view of the purchasing organization using Hesping and Schiele's (2015) framework. Organizational complexity affects the relationship between the purchasing organization structure and the portfolio of relationships by requiring the application of different purchasing models dedicated to managing relationship portfolios at different hierarchical levels in the purchasing organization. Paper IV also illustrates how the context of category-level segmentation differs from the context of supplier-level segmentation. The paper demonstrates that these contexts can be understood by theoretically distinguishing between the concept of supply and supplier segmentation processes.

The next subsections describe in detail how the appended papers address the sub-research questions and build a comprehensive understanding in order to answer the principal research question.

6.1. Creation of silos: the effect of complexity on the relationship between corporate & supply strategy and organization structure

The current understanding of the relationship between purchasing organization structure (e.g., centralized, decentralized, and hybrid) and corporate & supply strategy suggests that the structure should match the strategy (Chandler 1962). Therefore, organizations that practice strategies such as outsourcing and global sourcing will have to design a purchasing organization that support such strategies. For instance, Arnold (1999) suggests that when there is a high degree of internationalization in both procurement and the company in general, a low degree of centralization (in both procurement and in the general company) will fit the outsourcing model. Current research also suggests that it is difficult to find an optimal strategy–structure fit

(Karjalainen 2011). This research refines the understanding offered by previous research by adding the effects of complexity (whether horizontal, vertical, or spatial) to the discussion of the strategy–structure relationship (Arnold 1999).

Papers I and II note that the structural complexity of an MNC has a significant effect on the strategy–structure relationship, resulting in the creation of organizational silos. The effect of the structural complexity of an MNC is demonstrated in paper I using the supply management process as the unit of analysis. Because of vertical complexity of the MNC, the supply management function is divided into different roles and responsibilities in the hierarchical structure of the purchasing organization. Paper–I reveals that such hierarchical divisions fragment the risk management practices in organizations.

The implication of this finding is that extant risk management models based on holistic assumptions (i.e., identifying, assessing, and mitigating the entire range of risks altogether) may not fit the multi-level and fragmented view of risk management in MNCs. Consequently, current risk identification and assessment models need to be adjusted to this silo-based view of supply risk management practice in MNCs. In other words, as necessary as it is to develop models to identify and assess all risks together, the silo nature of risk management suggests that models that can identify and assess particular types of risk (e.g., financial risk from suppliers) are also useful for managing risks in MNCs. Extant models that can identify and assess all risks together may perfectly fit a small local organization for which the supply management function is not broken down into different roles and responsibilities. This research finds that the same is not true of a large MNC where it is almost intrinsic to the structure and strategies of the organization that the supply management function is divided into many roles and responsibilities. As a result, each actor within the organization will only see one piece of the puzzle because of their position in a hierarchical silo.

Paper II takes the hierarchical differentiation of roles and responsibilities one step further, and claims that the visibilities of the external supplier risks differ across internal actors for two reasons: first, in a large MNC, the supply management function is hierarchical (vertical complexity), putting bounds on the rationality of the actors (Simon 1955), second, due to the contingencies of actors (spatial complexity) at different horizontal levels (i.e., divisions) of the supply management organization. Using contingency theory as a lens, paper II also reveals that contingencies can exist even within single divisions because of category differences. The contingencies of the categories vary due to the local or global nature of the supply base of a particular category. This implies that corporate and supply strategies such as outsourcing and

global sourcing not only expose organizations to various types of supplier risks, but also cause the visibilities of these risks to differ among the actors managing such risks. This is because, these actors are postponed in different hierarchical silos and across diverse horizontally, vertically and spatially complex levels within the MNC. Therefore, organization complexity of large MNCs ultimately contributes to the creation silos and makes the management of these silos difficult.

6.2. Managing Silos: controlling the effect of complexity on the relationship between corporate & supply strategy and organization structure

Paper II provides guidelines to help managers control the effect of complexity on the relationship between corporate & supply strategy and purchasing organization structure. The paper examines the supply risk management process of a large MNC because in that particular MNC, supply risk is managed in different hierarchical silos of the purchasing organization. The paper demonstrates that vertical (i.e., hierarchical), horizontal, and spatial silos can be managed effectively and efficiently in organizations, if the inter-dependencies between them are well understood. Using the causal dependence of risks as an indicator, the paper identifies two forms of interdependences: positive and negative. If the interdependence between risks is positive, which means that mitigating one risk in one silo will eventually mitigate other risks in other silos, managing risk in silos will not be problematic. In comparison, if the dependency is negative, which means that mitigating one risk in one silo will increase risk exposure in other silos, managing risk in silos is problematic.

A holistic and integrated risk management process is definitely a desired state, but observation of the fragmented risk management process in a large MNC suggests that most probably many other organizational processes are also distributed between silos. The associated invisibilities between these silos may hamper the holistic management of these processes. Consequently, the same principle of handling risk management silos can be applied for effectively and efficiently managing silos in other processes.

The findings of paper II imply that the persistence of asynchronous processes and interdependencies goes beyond the debate on the optimal purchasing organizational structure (e.g., centralized, decentralized, or hybrid structures) for strategies such as outsourcing and global sourcing. The results clearly indicate that organizational complexity matters for the risk management process and should receive significant attention when discussing the fit between strategy and structure.

6.3. Purchasing discord: the effect of complexity on the relationship between corporate & supply strategy and the portfolio of relationships

The extant research on the corporate and supply strategies suggests that practices such as global sourcing and outsourcing create two types of relationship problems. The first problem concerns the relationship with external suppliers. This is because, management of a global supply base is challenging due to increasing operational complexity of large MNCs and the need to maintain strong relationships with suppliers from diverse cultures (Gelderman and Semeijn 2006). The second problem concerns the challenges of creating purchasing synergy among autonomous purchasing units dispersed across the world (Faes, Matthyssens, and Vandembemt 2000).

Findings from paper III suggest that large MNCs that operate in various countries and distinct cultural contexts (spatial complexity) face tremendous challenges in managing a global supply base (Gelderman and Semeijn 2006). On one hand, the supply base becomes large and global because of supply strategies such as outsourcing and global sourcing. On other hand, corporate strategy such as acquisitions can make the supply base even more complex. For instance, acquiring new business units on a yearly basis makes the supply base dynamic (i.e., constantly changing) and exposes the MNC to practices such as local sourcing by the newly acquired business units. This exposure calls for the creation of effective relationships between the internal business units of MNCs (Faes, Matthyssens, and Vandembemt 2000).

Paper III complements prior research by illustrating how contextual factors, such as the nature of the supply base, acquisitions, decentralized corporate structure, and maturity of purchasing, create purchasing discord in large MNCs. Paper III explains that if the supply base is large and globally dispersed, it becomes difficult to build meaningful relationships with suppliers. The paper also delineates how a corporate strategy such as acquisitions can result in small local supply bases that are difficult for a global enterprise to integrate. Decentralized corporate structure creates considerable autonomy in the divisions (i.e., product or regional divisions) of the organization, which makes it hard for divisional managers to reach consensus on criteria to segment suppliers. Furthermore, non-uniform purchasing maturity leads to implementation challenges in adopting standard solutions. Consequently, a need for purchasing synergy is created among the decentralized divisions responsible for managing decentralized and dispersed business units.

6.4. Creating purchasing synergy: minimizing the effect of complexity on the relationship between corporate & supply strategy and the portfolio of relationships

Paper III illustrates how a large MNC orchestrated purchasing synergy between its decentralized divisions (horizontally complex) and its decentralized and dispersed business units (spatially complex) using a one-size-fits-all supplier segmentation model. The segmentation model not only assured strategic coherence among divisions but also improved efficiency and flexibility to address the local contingencies of the business units in each division. The segmentation model served two purposes for the MNC. First, it streamlined relationships with suppliers and standardized the process of classifying the suppliers across divisions. Such standardization facilitated the sharing of best practices among decentralized divisions of the organization. This in turn created opportunities to achieve economies of scale by consolidating volumes, economies of process by removing redundant practices, and economies of information by sharing information about suppliers (Trautmann et al. 2009b). Second, the model also helped in managing the challenges of the global supply base of the organization. It assisted the organization in recognizing key suppliers, eliminate non-core suppliers, and ultimately reduce its the supply base (Gelderman and Semeijn 2006).

Paper III illustrates how both horizontal and spatial complexities can be managed. Horizontal complexity refers to the number of elements at the same level. In case I, horizontal complexity was embodied in the five divisions of the company. These divisions were decentralized and could be regarded as autonomous silos running the same supply management function. This implies that when such horizontal differentiation exists, there are opportunities to create and share best practices by achieving integration among silos. Paper III illustrates how such integration can be achieved using a model that fits all the contingencies of dispersed divisions and establishes a common language for communicating about suppliers across divisions. A standard model as the one developed for case I while adopted by the autonomous and dispersed business units can ensure corporate control over purchasing commitments and reduce inefficient maverick buying practices (Karjalainen, Kempainen, and Van Raaij 2009).

6.5. A misfit between theory and practice: the effect of complexity on the relationship between organization structure and the portfolio of relationships

The effect of complexity on the relationship between organization structure and portfolio of relationship is found to be an observed misfit between theory and practice. The misfit here refers to the non-existence of a one-size-fits-all supplier segmentation model in the extant literature of purchasing and supply management. Paper IV explains this gap in literature by illustrating that

purchasing function in large MNCs are hierarchical or vertically complex. Because of this hierarchical nature of the purchasing function, supply base segmentation is performed at two distinct levels: category and supplier levels in large MNCs. The criteria for segmenting suppliers in these two levels are fundamentally different.

The criteria for supply base segmentation processes at the category and supplier levels differ because of three reasons. The first one is that different firm-level and function-level strategies create distinct rationales for supply base segmentation processes performed at the category and supplier levels. For instance, if a cost reduction strategy is adopted at both the firm and function levels, the organization may strive to create savings from categories. The same cost reduction strategy, if adopted at the supplier-level, might be used to keep suppliers from becoming too expensive.

The second one is that different relationship strategies may have to be applied at the category and supplier levels. For instance, in Kraljic's (1983) model, the suggested strategy for handling a leverage supplier is to exploit the supplier to gain the lowest possible price. However, at the supplier level, if a leverage supplier is a partner supplier of the buying firm, the strategy for such supplier may be to build a close relationship with the supplier.

The third one is that categories are diverse and thus require implementation of simplistic portfolio models. Though suppliers can be very diverse as well, the internal organizational practices can be standardized to deal with different segments of suppliers. However, to achieve the desired standardization of internal organizational practices, a multitude of criteria need to be considered at the supplier level. In current literature of purchasing and supply management, the available supplier segmentation models are mostly two dimensional models (e.g., Svensson 2004 and Rezaei and Ortt 2012) and thus cannot fit the range of criteria required to be considered for supply base segmentation at the supplier level.

6.6. Divide and rule: managing the effect of complexity on the relationship between organization structure and the portfolio of relationships

The effect of complexity on the relationship between structure and portfolio of relationships calls for theoretically distinguishing between the concepts of supply segmentation (implemented at the category level) and supplier segmentation (implemented at the supplier level) to make sense of the complex reality of large MNCs. Distinguishing between category-level and supplier-level segmentation is important because only then the current portfolio models can be fitted for performing supply base segmentation in these two levels. Paper IV identifies models from the literature that can perform supply base segmentation at the category and supplier levels.

6.7. Summary

This research was intended to gain insights into how organizational complexity influences supply management in MNCs. The findings of this research suggest that the internal structural complexity of MNCs affects the organization of the supply management function, dividing it vertically, horizontally, and spatially. Such divisions of supply management function have three implications. First, the vertical, horizontal and spatial silos are created. Second, purchasing discord is created due to diverse contextual variables. Third, theories and models from literature do not fit well into the complex realities of large MNCs. To manage silos, dependence between silos needs to be understood. Purchasing discord can be minimized by creating purchasing synergy. It is possible to fit the current portfolio models for supply base segmentation into the complex realities of large MNCs by distinguishing between supply and supplier segmentation processes.

The present research demonstrates that internal organizational complexities of large MNCs do matter and have a significant effect on the supply management function. In contrast to the depiction of focal firms in articles and books (McIvor 2005) as one single organization, the findings of this research reveal that focal firms are not necessarily one single organization, especially when the focal firm is a large MNC. Therefore, researchers in purchasing and supply management must take into consideration of this multi-faceted and multi-organizational (i.e., horizontally, vertically, and spatially complex) view of focal firms and prescribe theories and models accordingly.

7. Implications

The findings of this research provide critical insights for purchasing and supply management theory and practice. This section synthesizes those insights, discusses the limitations of this study, and suggests avenues for future research.

7.1. Theoretical implications

The findings of this research indicate that the internal structural complexity of the organization does matter when it comes to managing supply in MNCs. This structural complexity is measured along three dimensions: horizontal, vertical, and spatial (Hall 1982; Mckinley 1987; Price 1997). Horizontal complexity matters because it determines how many elements are in a single level. For instance, in case I, horizontal complexity was due to the number of product and regional divisions. Such a divisional structure of the organization implies that the various divisions will replicate same processes (e.g., risk management, category management, and supplier management). It further suggests that these divisions can leverage on potential synergy benefits such as shared knowhow, pooled resources, increased negotiation power, and strategies coordinated across horizontal divisions (Faes, Matthyssens, and Vandembemt 2000). The present research illustrates how a large MNC achieved standardization through a one-size-fits-all supplier segmentation model and created purchasing synergy among its geographically dispersed and autonomous divisions (Stanley 1993). This implies that synergy among the internal business units of a focal firm, which is desperately sought by MNCs (Smart and Dudas 2007) to facilitate global sourcing (Arnold 1989, 1999), cost efficiency, and effectiveness (Karjalainen 2011), is indeed achievable through a simple means such as a supplier segmentation model.

Vertical complexity matters because it divides the supply management function into diverse roles and responsibilities at various hierarchical levels of large MNCs (Hesping and Schiele 2015). The present research demonstrates that this division of roles and responsibilities in large organizations results in different bounds for actors performing those roles and responsibilities. These bounds can cause visibility issues among the internal actors of a large MNC and these actors may see different risks depending on their roles and responsibilities in the organization. Previous research has applied the bounded rationality concept to understand the trade-offs of make versus buy decisions (Dabhilkar 2011) or the agency problems arising between buyers and suppliers (Halldorsson et al. 2007). This research complements prior research by demonstrating that bounded rationality is not only a valuable perspective when seeking to understand the internal visibility of risks among the internal actors of MNCs, but also can be used as a standalone lens examining complex supply

management phenomena (paper II). Vertical complexity also matters because it determines who manages what risks, using what methods, and as part of what processes (paper I). It also determines who (e.g., the group supply chain director) is responsible for creating strategies (e.g., having a world-class supply base) and who (e.g., the category manager or purchasing manager) implements strategies (paper IV).

Spatial complexity is critical because of two reasons. First, it substantiates the importance of contingency theory (Fiedler 1967) in understanding complex phenomena (e.g., risk management silos) in purchasing and supply management research. The present research explains how the spatial dispersion of divisions in different contexts may translate into multiple contingency variables (e.g., technology and strategic sourcing environment). Due to these contingency variables, the internal visibility of risks may differ among the actors responsible for managing supply in large MNCs (paper II). Second, the varied contexts of different divisions may act as barriers to achieving corporate purchasing synergy (Rozemeijer, van Weele, and Weggeman 2003) in large MNCs (paper III).

By applying the complexity perspective when considering the nature of the purchasing function in MNCs, this research builds a multifaceted view of the focal firm, versus a homogeneous and monolithic view of organizations in purchasing and supply management research. Previous purchasing and supply management research has drawn attention to disintegration and dispersion of focal firms (Ghoshal and Bartlett 1988; Ghoshal and Nohria 1989; Ghoshal and Nohria 1993), providing prescriptions for how to organize the purchasing function for global sourcing (Arnold 1999; Trautmann et al. 2009b) or to create purchasing synergy (Faes, Matthyssens, and Vandembemt 2000; Rozemeijer, van Weele, and Weggeman 2003; Gelderman and Semeijn 2006). The present research adds to that body of knowledge by claiming that the internal structure of the organization also significantly affects the organization of the purchasing or supply management function. This is especially valid for large MNCs because they are exposed to various cultures, risks, and practices. The internal structural complexities of MNCs make the risk management process fragmented, hierarchical, and time dependent (paper I); affect how and by whom these risks will be managed in such organizations (paper II), create a need for a mechanism for coping with this complexity (paper III) and call for distinguishing between the conceptualization of “supply” and “supplier” (paper IV).

This research also highlights the importance of “internal visibility” (Sarker et al. 2016) versus the external visibility that has received significant attention in prior research (Christopher and Peck 2004; Barratt and Oke 2007; Francis 2008). Previous research has stressed understanding the

identity (“what it is”), location (“where it is”), and status (“in what condition”) of supply chain entities (Francis 2008) in order to reduce uncertainty (Christopher and Peck 2004). In contrast, the present research emphasizes internal visibility in explaining why supplier risk management is silo based. Furthermore, by using bounded rationality and contingency theory in explaining risk management silos, it complements prior purchasing and supply management research, which has been criticized for its sparing use of theory (Spina et al. 2016).

The present study has significant methodological implications for understanding the effects of “mode 2” forms of knowledge creation on “mode 1” forms of knowledge creation (Gibbons et al. 1994; MacLean et al. 2002; Bartunek 2011). This research combines case study research design (Yin 2009) with collaborative management research (Shani, David, and Willson 2004; Pasmore, Woodman, and Simmons 2008). An in-depth understanding of supply management in a large MNC was possible due to the collaborative management research conducted by the researcher for case I. This unique collaboration was intended to create practical knowledge and solve a practical problem (Pasmore et al. 2008). However, the collaboration also provided rich insights into the risk management process (papers I and II) as well as the supply base segmentation process in large MNCs (Papers III and IV).

The teaching case (Sarker 2016) published from this research can be used in graduate-level courses. It can help students appreciate the purpose of supplier segmentation models and learn the difficulties of implementing such models in practice.

7.2. Managerial implications

The growing importance of the purchasing function in modern organizations is undeniable (Schneider and Wallenburg 2013). Consequently, this research provides useful knowledge for managers positioned at various hierarchical levels within purchasing organizations. For managers positioned at a high organizational level, such as the chief technology officer and vice president of sourcing, this thesis fosters critical understanding of risk management in MNCs. It demonstrates that even if risk is managed at the corporate headquarters level as a separate function (e.g., as in case I), supply risk management can be fragmented in practice (paper I). Top management should therefore be mindful of these fragmented risk management practices carried out at multiple hierarchical levels of large MNCs and take suitable measures to integrate information about risks generated in different hierarchical and divisional silos. Paper II provides top managers with insights into how risk management silos can form due to the division of labor and divisional differentiation in an MNC. The paper clearly demonstrates that silos are a natural phenomenon in

large MNCs. As a result, managers need to understand the possible interdependence among different silos and act accordingly.

Paper III is also directed toward high-ranking managers in purchasing organizations. It illustrates how a large corporation can use a one-size-fits-all supplier segmentation model to establish organizational control and purchasing synergy among decentralized divisions (Faes, Matthyssens, and Vandembemt 2000; Foss and Pedersen 2004). The model will also allow managers to streamline their portfolios of relationships with suppliers. Paper IV, in comparison with papers I, II and IV, provides insights for tactical-level managers such as category managers and supplier relationship managers. It describes empirical models from three leading global organizations that can be used for category-level and supplier-level supply base segmentation processes. Moreover, it highlights the importance of using different models for category-level and supplier-level supply base segmentation processes.

To summarize, there are five key takeaways from this thesis for managers. First, purchasing organization structure should be understood beyond centralization, decentralization, and hybrid structures and managers should be mindful of the structural complexities of MNCs while striving to achieve an optimal strategy–structure fit. Second, silos are ubiquitous in modern organizations (paper I). Third, in order to deal with silos, managers need to understand the dependence between different silos (paper II). Fourth, various silos can be integrated by establishing a common language among silos (paper III). Last, because of contextual differences between silos, managers may need to pick different models from literature that fit their respective context (paper IV). Overall, this thesis sheds light on the intricacies of supply management in large MNCs. By doing so, it endeavors to help the actors who constitute small, though crucial, parts of these large organizations to better comprehend the big picture, so that they do not have to say the following:

“There is no structure in our processes, in fact, in our supply chain. We just make lots and lots of money. I have no idea how”

Strategic Sourcing Director, Case I

Large organizations certainly have numerous structures and processes; the key problem here is that, not all of these structures and processes are visible to any one of the thousand actors that constitute a large organization.

7.3. Limitations

From a methodological standpoint, this research suffers from the limitations of any exploratory study with a small number of cases. Although this research provides rich insights into supply management in MNCs, due to the in-depth nature of this research it was impossible to design and

implement a survey or use any other quantitative research method in order to generalize the present findings. Hence, the findings of papers I and II have limited generalizability. Though paper III benefits from a more rigorous and relevant collaborative research methodology, and paper IV uses a multiple case study design, the data still are gathered from a limited number of cases.

This study applies a complexity perspective in analyzing the organization of the purchasing function in MNCs. However, it limits itself to conceptualizing complexity only in terms of the number of elements (Vachon and Klassen 2002). In the present research, complexity therefore refers only to the number of elements at a particular level (i.e., horizontal complexity), at different hierarchical levels (i.e., vertical complexity), and to the geographical dispersion of elements at each level (i.e., spatial complexity). Complexity also significantly increases with the level of coupling among differentiated elements. Though paper II examines the interdependence between hierarchical silos (i.e., vertical levels) and paper III examines the integration between horizontal silos (i.e., divisions), it was impossible to establish a direct link between level of coupling among different elements and its effect on the organization of the supply management function.

7.4. Avenues for future research

The limitations identified in the previous sub-section along with the critical observations of this research about the supply management function in MNCs open up opportunities for future research. For instance, this research considers only the supply (i.e., purchasing) part of the supply chain. It would also be intriguing to observe how operations, logistics, or distribution are affected by internal organizational complexity. This is because, likewise purchasing units, operations units of large MNCs can also be globally dispersed. Consequently, future investigation could productively explore how organizational complexity influences the operations function in MNCs.

Moreover, this thesis used two units of analysis: (1) the supply risk management process; (2) the supply base segmentation process. In the case of supply base segmentation, it is observed that there is a need to distinguish between “supply” and “supplier” segmentation processes to make sense of how different purchasing portfolio models can be applied in practice. Does the same also apply to “supply” and “supplier” risks? The definition of supply risk is “the probability of an incident associated with inbound supply from *individual supplier failures* or *the supply market occurring*, in which its outcomes result in the inability of the purchasing firm to meet customer demand or cause threats to customer life and safety” (Zsidisin 2003). This definition treats both supplier and supply failures as constituents of supply risk. Therefore, future research can investigate whether distinguishing between supply risk and supplier risk is also required to make sense of how different risk management models can be applied in practice.

This study applied contingency theory and bounded rationality in order to understand risk management silos. However, other silos are found in organizations, such as product development teams, project management teams, and various departments. Can all organizational silos be explained by contingency theory and bounded rationality? Or contingency theory and bounded rationality explanations of silos are solely limited to supply risk management.

Lastly, this study is a qualitative study. The effects of structural complexity observed here through the in-depth investigation of cases can be further explored by designing quantitative studies around the theoretical framework.

7.5. End note

“Organizations must be seen as tools.... A tool is something you can get something done with. It is a resource if you control it. It gives you power others do not have. Organizations are multipurpose tools for shaping the world as one wishes it to be shaped. They provide the means for imposing one's definition of the proper affairs of men upon other men.”

- Perrow (1986)

Modern-day organizations are of immense significance for society. The better we understand the intricacies of powerful organizations, the better we will be able to control this “tool” that shapes the world. This thesis represents a modest effort to disentangle the labyrinth of supply management in large MNCs in order to reach a better understanding of these types of organizations.

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