



Master's degree thesis

LOG950 Logistics

Supply Chain Risk Management beyond tier-one suppliers

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Preface and acknowledgements

In its essence, education is a journey from ignorance to knowledge. The road traveled, winds through unfamiliar territory, through twists and turns, stretching towards an undefined destination. It is on this road that we all travel, in vessels fueled by dedication, expectation and perhaps most of all, by curiosity. At this moment we find ourselves at a rest stop somewhere along that road, contemplating the last step of a journey completed, with ignorance in the rear-view mirror, and knowledge still obscure somewhere in the distance.

In taking on the challenge that this thesis presented, we walked off a cliff with our eyes open, taking on an area of research previously unexplored and pairing the personal gratification of filling in the blank edges of the map with the hope of making a humble contribution to our collective knowledge. In the words of American poet Ralph Waldo Emerson, “Do not go where the path may lead, go instead where there is no path and leave a trail”. It is our sincere hope that the small trail we leave behind may entice other travelers on the journey to knowledge, for it is one worth taking.

Although we are ultimately responsible for the writing of this master thesis, there are several others whose input have been critical in assuring the quality of our work. Their efforts may be invisible to the reader, however remain very clear to us. We therefore wish to use this opportunity to express our gratitude to those who have guided, advised and helped us throughout the research – and writing process.

We wish to extend our deepest and most heartfelt gratitude to our ever helpful, available and knowledgeable academic advisor Deodat Edward Mwesiumo. The idea of researching Supply Chain Risk Management (SCRM) beyond traditional buyer-supplier dyads is your “brainchild”, and without you, the completion of this thesis would have been impossible.

A special thanks to Bella Belerivana Nujen for your constructive criticism, attention to detail and advice on structuring our thesis.

Lastly, we wish to thank all the companies, organizations and individuals who have contributed to our data collection. We know your time is valuable and are incredibly grateful for that you chose to spend some of it on us.

Vetle Helland & Jens Gunnar Aspelund

Abstract

Due to outsourcing and specialization, supply chains have become more extensive and complex, leaving them more susceptible to risk. Consequently, researchers and business practitioners alike have realized the need to manage risk outside the context of the firm, thus giving rise to Supply Chain Risk Management.

Despite the realization that risk can originate at any level of the supply chain and have repercussions throughout the chain; the mode of research within Supply Chain Risk Management has been centered on dyadic buyer-supplier relationships. Due to this, there is a considerable research gap within the field of Supply Chain Risk Management regarding risk originating beyond first-tier suppliers.

This research aims to generate new knowledge about Supply Chain Risk Management beyond first-tier suppliers, and contribute to closing the research gap by asking, “How can focal organizations manage supply chain risk beyond first-tier suppliers?” The research is focused on non-financial risk related to the upstream supplier of the focal organization.

The research was organized as an exploratory multiple-case study, and the cases were selected based on a theoretical replication logic. The data collection consisted of semi-structured interviews with key personnel in each case company.

Analysis of the interview transcripts revealed that although all case-companies recognized that their supply chain risk partly consisted of risk related to sub-suppliers; few had a framework for managing it.

The main findings of this research include that the dependency of buying organizations on its first tier supplier can determine whether it is possible to conduct supply chain risk management efforts, and that visibility is the foundation for effective risk management in the supply chain. Based on our findings and extant theory within power dependence we identify four scenarios that firms may find themselves in regarding their relationship with tier-one supplier, and its implications for supply chain risk Management beyond first-tier suppliers. The four scenarios are control, cooperation, dependency and trusting. Overall, the study provides both theoretical contributions and actionable managerial implications. In addition, six avenues for future research are identified.

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List of abbreviations

BIV	Business Interruption Value
CoC	Codes of Conduct
CRS	Compound Risk Score
CSR	Corporate Social Responsibility
ERP	Enterprise Resource Planning
GVA	Governance Value Analysis
MRP	Material Resource Planning
RDT	Resource Dependency Theory
RET	Relational Exchange Theory
RQ	Research Question
RSM	Risk Sharing Mechanism
SCM	Supply Chain Management
SCR	Supply Chain Risk
SCRM	Supply Chain Risk Management
SCV	Supply Chain Visibility
SET	Social Exchange Theory
SLA	Service Level Agreement
TCE	Transaction Cost Economics
TCT	Transaction Cost Theory

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Chapter 1

Introduction

1.1 Chapter introduction

This chapter contextualizes the thesis subject, shows the existence of a research gap regarding SCRM beyond tier-one suppliers and provides insight as to why closing said research gap is necessary. Our research objectives are clarified, and the research questions utilized to examine the subject are presented, along with an explanation as to why they are fruitful for elucidating SCRM.

1.2 Background for the thesis

Due to specialization, outsourcing and global sourcing, supply chains have become more fragmented and complex (Christopher and Peck 2004). As the length and complexity of supply chains are recognized to have an impact on performance, cost, quality, responsiveness and resilience (Skilton and Robinson 2009) academics and professionals have realized the need for a new management discipline aimed at targeting the challenges and opportunities presented by this novel organizational reality. To manage this shift, Supply Chain Management (SCM) emerged as a discipline within the management sciences.

Within the confines of the focal organization, companies can largely manage strategy and internal risk issues with traditional risk- and operation management tools. When introducing a second upstream supply chain echelon however, the tools and tactics at the company's disposal change, as the complexity increases and the focal company has a harder time influencing their supplier's managerial decisions. Still, Supply Chain Risk (SCR) can be managed through the company's sourcing strategy, Service Level Agreements (SLA) and various mutually beneficial cooperative efforts.

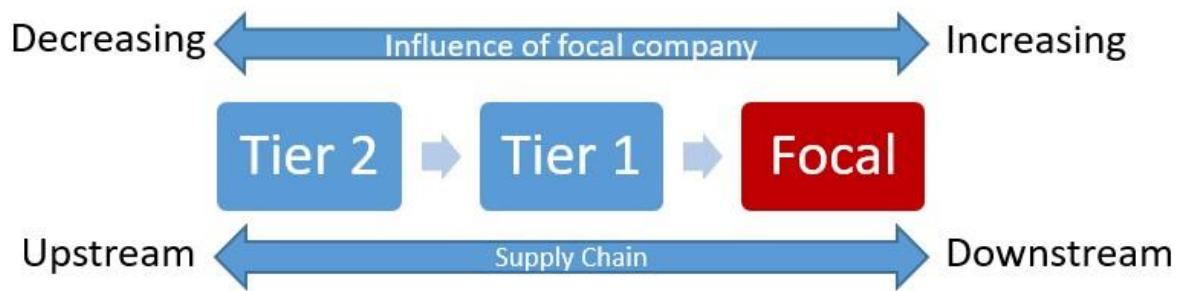


Figure 1: The sphere of influence by Supply-Chain separation. (Own Production).

In the same way that companies use different tactics and tools to manage risk in a dyadic setting as opposed to when fully integrated upstream, it stands to reason that there may be a different approach to managing SCR relating to subsequent lower-tier suppliers. This area has not received adequate attention in research, as most literature that includes the possibility for disruption in supply focuses on single facilities or pairs of echelons in a supply chain (Schmitt and Singh 2012; Yu and Goh 2014).

The existence of this research gap is peculiar because risk originating from beyond the first-tier supplier is not inconsequential or less detrimental than those occurring further downstream in the supply chain. In fact, the failure of any node in the supply chain could imply a failure of the entire supply network (Bakshi and Kleindorfer 2009).

As the field of SCRM matures and research gaps are filled, more comprehensive and integrated models are likely to provide managers with better framework for SCRM, thus allowing increased understanding of the risk elements in their supply chains and more precise tools for managing them. Hence, analyzing SCR can provide organizations with a more nuanced and proper decision basis, as it can elicit complexities and potential obstacles along the chain the focal company is embedded in.

1.3 Research objectives- and questions

1.3.1 Objectives

The main objective of this thesis is to explore how a focal firm in the supply chain can manage SCR related to suppliers beyond the first-tier.

This study contributes to this field of research by exploring the extant literature combined with a qualitative research design conducted through a multiple case study, supplemented by a document analysis of buyer-supplier contracts and Codes of Conduct (CoC). In doing so, our research contribute with a more holistic understanding of SCRM by uncovering the strategies, tools and tactics used to manage SCR beyond first-tier suppliers, as well as their determinants.

1.3.2 Questions

To elucidate the main research problem a set of relevant and fruitful research questions are developed. Each of the research questions contribute towards gaining a broad and holistic understanding of the main issue.

Do managers know the identity of their company’s sub-suppliers? If so, do they have intricate knowledge about their operations?

This question is relevant because if managers are not able to appropriately identify and evaluate the risk-elements in their supply chain, then they will not be able to manage them. One key element this research question seek to clarify is the concept of “visibility”, described by Jüttner (2005) in his study about SCRM requirements from a business practitioners perspective as being “*widely acknowledged by focus groups*” and “*less for organizations beyond the first tier*”- (Jüttner 2005.p 135).

How do buying organizations assess risks beyond tier-one suppliers?

The second research question aims to provide information on whether the organization systematically maps and assess SCR and of how this process is undertaken. Through this line of inquiry, we investigate whether there exists in-use methods and strategies for risk assessment that are previously undescribed/under-researched in SCRM literature. Furthermore, when and if applicable, these are incorporated into the proposed framework.

How do buying organizations monitor the performance of suppliers beyond tier-one (subcontractors)?

When a risk element in the supply chain has been identified, assessed and measures have been implemented, monitoring is the next step in the risk management process (Blackhurst, Scheibe, and Johnson 2008). Without monitoring the performance of suppliers, the buying organization has limited information about whether the subcontractors fulfill their obligations, or whether implemented efforts are producing the desired results. Hence, this research question aims to discover whether monitoring procedures exist, and whether such procedures are undertaken by the buying organization, third-party monitoring services, or by the subcontractor themselves in the form of self-reporting.

What are the challenges of managing risks beyond tier-one suppliers?

Through literature studies, we find what researchers and academics deem to be the most important challenges within SCRM, however without giving practitioners enough space to voice their opinion, we can only understand one of many realities. Investigating professionals/practitioners' perceptions of the challenges of managing risk beyond tier-one suppliers should not be neglected. After all, they make decisions and manage the involved processes.

How do buying organizations address these challenges?

To gain a holistic understanding of how buying organizations manage SCR it is not sufficient to look at how they manage specific risk-elements. We also need to understand how they counteract or mitigate the barriers and challenges to manage risk. Examples of such barriers could include lacking visibility, supply chain misalignment, cultural differences or geographical distance.

1.3.3 Chapter summary and structure of the thesis

This chapter has provided the context of the thesis subject and has presented the research gap regarding SCRM beyond tier-one suppliers. Furthermore, the chapter has justified why closing the said research gap is necessary.

The rest of this thesis is organized as follows: Chapter 2: Containing literature reviews of SCRM, risk management and SCM as well as the theoretical framework. Chapter 3: Research Methodology, including justification of all methodological decisions as well as validity- and reliability evaluations. Chapter 4: Findings from the case-companies and an aggregated analysis of the findings. Chapter 5: A discussions about our findings, and how they fit into extant theory. Chapter 6: Research summary, theoretical- and managerial implications and limitations of the study.

Chapter 2

Literature review

2.1 Chapter Introduction

This chapter is separated into two main sections. “Background of the field” which present the background of SCRM as a field, and examine relevant literature from both SCRM, SCM and risk management. Secondly, “Theoretical framework” which focus on specific elements within SCRM, and theoretical lenses through which to examine them. Relevant critique of the theories used are also included in order for the reader to make their own assessment of their applicability. Furthermore, we explore how different literature and researchers define risk, and determine the scope of our own definition.

2.2 Background of the field

This research draws on peer- reviewed journal articles originating from several different academic fields. The main ones being SCM, Risk Management, and SCRM. The latter is most closely related to our research, however, many of the concepts within SCRM derives from the former two and utilizing certain frameworks from these fields may therefore be fruitful. In this chapter, we provide an overview of relevant literature within all three fields and explain its pertinence to our research.



Figure 2: Theoretical background of Supply Chain Risk Management (Own production)

2.2.1 Supply Chain Management

The last couple of decades, the SCM field has become increasingly popular. There has been a significant increase in academic research, conferences and university courses related to SCM

(Burgess, Singh, and Koroglu 2006). However, SCM as a research field has not succeeded in creating an own theoretical base, but has instead borrowed from other disciplines such as economics, management, sociology and psychology (Carter 2011). Due to its multidisciplinary origin, there have been many attempts to define SCM, but none has become universal (Mehmeti 2016). Mentzer et al. (2001) argue that it is possible to develop a universal and encompassing definition of SCM.

Mentzer et al. (2001a) defined SCM as *“the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole”*- (Mentzer et al. 2001 p. 141).

Christopher and Peck (2004) defined it as *“The network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer”*- (Christopher and Peck 2004 p. 2).

Based on the aforementioned definitions there seems to be a consensus that the modern business is no longer competing as a single entity, but rather as a part of an inter-organizational network. The success of a company therefore depends on the ability to integrate the company in a network of business relationships (Lambert, Cooper, and Pagh 1998). A possible pitfall for SCM is that the scope becomes so broad it encompasses too many functional areas thus losing its identity and focus (Ballou 2007).

According to Lambert, Cooper, and Pagh (1998) *“SCM deals with total business process excellence and represents a new way of managing the business and relationship with other members of the supply chain”*- (Lambert, Cooper, and Pagh 1998 p.1).

Although SCM promotes collaboration and strategic coordination across businesses in the supply chain, to improve long-term performance and relationship between the individual company and the supply chain, the actual practicing of SCM takes place to a very limited degree. It is more likely that the management of the supply chain is practiced between the focal company and first-tier suppliers, while tasks concerning other tiers beyond that first-tier does

not fulfill the envisioned theoretical scope for SCM (Ballou 2007). According to Ballou (2007) the majority of firms today practice SCM as logistics, but argues that when the techniques and tools to achieve the proposed benefits of SCM are better documented and measured, managers will begin to practice SCM.

Applying literature from the SCM discipline allows us to gain knowledge in how businesses behave in a supply chain network. Since management of businesses and relationships in a supply chain is within our research questions scope, we deem it useful to broaden our understanding of the topic.

2.2.2 Risk Management

Similar to the development within the SCM field, risk management issues have also gained academic attention from different literature streams, such as economics, strategic management, international management and finance. In recent years, there has also emerged a growing literature in risk management within the logistics field. Risk management has become an important topic in SCM (Narasimhan and Talluri 2009), but SCRM from an academic viewpoint is still in its infancy (Jüttner 2005).

This view has been substantiated by later research, with petitions for more case studies regarding how companies assess and perceive SCR (Lavastre, Gunasekaran, and Spalanzani 2012). Claims of lacking empirical academic research has been heightened (Sodhi, Son, and Tang 2012; Vilko, Ritala, and Hallikas 2016). The need for broader perspectives and understanding (Hughes et al. 2015), and the need for more systemic and holistic approaches to the subject is therefore needed (Bonsall et al. 2019). All of this support Jüttner (2005)'s argument that there still exists a research gap for risk management within the SCM discipline.

The increased focus on risk management derives from several different trends in the global business market. This includes collaboration across borders, strategic outsourcing, new technology, shorter product life cycle, offshoring and shorter lead times. While some of these new strategies pave the way to new possibilities, they also increase the probability of external events interfering with the daily business operations (Narasimhan and Talluri 2009). There have been multiple incidents where disruptions further upstream, has severely affected companies downstream. When US shut down 29 of their ports because of a labour dispute in 2002, not only did Toyota and Nissan have to stop their production, there was real concern that it could

send the whole East-Asian region into a recession (Simpson 2002). Thus, the new global trend offers organizations new strategic choices and opportunities, but organizations must also take into consideration the increased risk and vulnerability they open themselves up to, and the potential economic losses that comes with it (Narasimhan and Talluri 2009). Most business are aware of these risks, and many seek to manage them through e.g. formal risk audits, however the definition of risk is fairly limited (Jüttner 2005). When dealing with risk management in a supply chain, not only must the company assess their own vulnerabilities in a supply chain, they must also map out which direct risk can disrupt their own operations, and identify the risk that emerge as a result of linkages between different businesses in the supply chain as a whole (Jüttner 2005).

Assessing and identifying risks and their consequences can be a daunting task for a single organization. It might be feasible to identify tier-one supplier risks, but it becomes more complex and expensive to analyse tier-two's supplier risk and exposure (Jüttner 2005).

Since our research questions concern aspects related to risk beyond tier-one suppliers, we incorporate literature regarding risk management, to see whether existing risk management strategies can be deployed and adapted to usage beyond the first-tier.

2.2.3 Supply Chain Risk Management

SCRM is a relatively new field of academic study, which nevertheless has garnered extensive attention in later years (Rao and Goldsby 2009). Colicchia and Strozzi's (2012) study of citation networks within SCRM recognize Kogut and Kulatilaka's (1994) publication on operational flexibility as the field's inception. This view is contested by Tang and Nurmaya Musa (2011), who considers the first SCRM publications to emerge in 1997. Early studies within the field of SCRM (e.g. Kogut and Kulatilaka 1994; Huchzermeier and Cohen 1996), tends to follow the conceptual understanding that "risk" is equivalent to variations in the external factors affecting the supply chain.

While this view is still present within the field of SCRM, the works of Chapman et al. 2002; Christopher and Peck 2004; C. S. Tang 2006, have contributed towards extending the concept of SCR to include disruption-risk and supply-risk. Companies no longer compete as a single entity, but are part of an inter-organizational supply network, therefore, the focus on SCRM should also be managed from an inter-organizational perspective (Pujawan and Geraldin 2009).

Jansson and Norrman (2004) argues that understanding the devastating effects, and knowing how to avoid disasters or even minor supply chain disruptions is the main focus of SCRM. While Pujawan and Geraldin (2009) claims that increasing resilience, reducing the probability of risk events occurring, and the organizations ability to recover from a disruption is the aim of SCRM. Within proactive SCRM, collaboration, integration and cooperation are key concepts for reducing SCR (Colicchia and Strozzi 2012; Jüttner 2005 and Kleindorfer and Saad 2005). Within these fields, our research makes use of Li et al. (2015) and Wiengarten et al's (2016) findings on the effects of “information-sharing” and “risk-sharing” to evaluate SCRM efforts.

This thesis derives from and apply to the frameworks and definitions described in these articles for the development of theory and interpretation of our results. Jansson and Norrman's (2004) case study of Ericsson's SCRM approach serves as an inspiration in terms of reactive-and risk mitigating efforts. This case study is particularly relevant to our study of risk management beyond tier-one suppliers because Ericsson's SCRM approach was designed as a direct result of a supply disruption caused by an incident at the sub-supplier level (Jansson and Norrman 2004).

Some of the recent, relevant and influential publications on SCRM are summarized in Table 1.

Table 1: Relevant SCRM literature

Author	Title	Objective	Main findings
(Revilla and Saenz 2017)	The Impact of risk management on the frequency of supply chain disruptions. A configurational approach	Developing a configurational model of SCRM beyond reactive internal responses.	Interorganizational cooperation reduces the frequency of supply chain disruptions.
(C. S. Tang 2006)	Perspectives in supply chain risk management	Reviewing quantitative models for SCRM, and comparing strategies from literature with actual practice.	Current SCRM models are designed for managing operational risk. Not disruptions.
(Li et al. 2015)	Joint supply chain risk management: An agency and collaboration perspective	Determining the effect of risk information sharing and risk sharing mechanism in improving financial performance.	Both risk information sharing and risk-sharing mechanism positively influences financial performance. The effectiveness of risk sharing increases with relationship length and supplier trust, while the effectiveness of risk sharing mechanism is increased by shared SCRM understanding.
(O. Tang and Nurmaya Musa 2011)	Identifying risk issues and research advancements in supply chain risk management	Investigating recent research developments in SCRM and identifying research gaps.	There is a lack of research on information flow risk and proactive SCRM strategies.
(Tse et al. 2011)	Quality risk in global supply network	Exploring the issue of quality and safety in global sourcing and developing SCRM framework for reducing quality risk.	Supply chain visibility and strategic sourcing can reduce the impact of quality risk in multi-tier supply chains.
(Wiengarten et al. 2016)	Risk, risk management practices and the success of supply chain integration	Exploring the role of risk and risk management in the success of supply chain integration.	Integration is effective in both high- and low-risk scenarios.
(Nguyen et al. 2017)	Developing visibility to mitigate supplier risk: the role of power dependence structure	Developing a model to build supply chain visibility.	Visibility can be an important tool for mitigating supplier risk. The importance of visibility increases with the degree of the dependence the buyer has in its supplier.
(Sodhi, Son, and Tang 2012)	Researchers perspective on supply chain risk management	Gaining a better understanding from the research community on the scope and methods of SCRM.	There is no clear consensus on the definition of SCRM, a lack of commensurate research on the response to supply chain incidents and a shortage of research on SCRM in general.

Although there are many publications that aim to provide a collaborative approach, speak of integration and supply chain approaches, from Table 1 we see that researchers do not separate between different tiers in the supply chain when it comes to SCRM. Hence, the idea that different tiers of the supply chain may require differentiated risk mitigation- and prevention strategies is absent from academic discourse, indicating a research gap on SCRM beyond first-tier suppliers.

2.3 Theoretical framework

This section describes the theoretical frameworks and concepts relevant to SCRM beyond first-tier suppliers in more detail.

2.3.1 Defining risk

Risk management in supply chains has become an important topic in the SCM field due to multiple industry trends such as outsourcing, globalization, new innovative technology and reliance on specialized suppliers (Narasimhan and Talluri 2009). Because of these trends, there has been an increase in the magnitude and potential of SCR. The term “risk” does not have a widely accepted definition (Freise and Seuring 2015).

Pfohl, Köhler, and Thomas (2010) defines SCR as “*Risks that can be attributed to disturbance of flow within the goods, information, and financial network, as well as the social and institutional networks. They might have negative effect on the goal achievement of single companies and the whole supply chain, respectively, with regard to end customer value, costs, time or quality*”- (Pfohl, Köhler, and Thomas 2010 p.35).

Another definition is provided by Nguyen et al. (2017), who refer to SCR as “*buyer’s expectation of probable disruption on the supplier’s side that causes loss to the buyer due to unavailability of a sourced item*”- (Nguyen et al. 2017 p.70).

Traditionally, risk is viewed as potential economic loss or chances, but in recent years, a broader perspective has emerged. With the newer perspective, risk is understood as an effect that hinders corporations to accomplish their goals and objectives (Freise and Seuring 2015).

Having established that there are many different forms of “risk”, we find it pertinent to specify which types are in focus, and which are excluded. Therefore, when we write about risk in our master thesis, we do not refer to the inherent risk of for example uncertain customer demand or price/currency fluctuations, but rather upstream disruption risk, quality risk and social risk within the supply chain.

For the concept of disruption risk, we follow Tang's (2006) definition; “*Disruption risks are referred to as the major disruptions caused by natural and man-made disasters such as earthquakes, floods, hurricanes, terrorist attacks, etc., or economic crises such as currency evaluation or strikes*” (C. S. Tang 2006b. p.453).

The increased length and complexity of a supply chain adds extra quality risks and considerations for organizations, and makes it increasingly difficult to assure the quality of products (Romano and Vinelli 2001). The final quality level the customer receives depends on the quality management practices of each node in a supply chain; hence, each member of the supply chain is contributing to the quality level (Romano and Vinelli 2001). Any failure in noticing quality breaches may affect the companies in terms of customer complaints, a tarnished reputation or product recalls, therefore, knowing how to handle and prevent quality risks from reaching the customers are crucial (Tse et al. 2018).

Social issues/risks in the supply chain are defined as “*product- or process-related aspects of operations that affect human safety, welfare and community development*” (Klassen and Vereecke 2012. p.103.). Adding to this definition, we find it pertinent to include the potential negative PR-and reputational effects related to a breach in these product- or process aspects in our definition of social risk.

2.3.2 Visibility

The pertinence of “visibility” to managing SCR beyond the first-tier is that one cannot manage the risk of an entity whose existence is unknown, and neither choose an effective approach of doing so without knowledge of its operations.

Supply Chain Visibility (SCV) can be defined as the degree to which supply chain partners have access to information related to supply chain operations and management, and how this is considered to benefit each other (Mohr and Spekman 1994; Barratt and Oke 2007). When discussing visibility in supply chains beyond the first-tier, we find it pertinent to include another aspect to this definition, namely whether a focal firm has rudimentary knowledge about its sub-suppliers. The notion that one supply chain entity should not know the name and function of one of its supply chain members might appear strange to the reader, however due to sub-contracting and the general complexity of modern supply chains many companies can only guess the number (and names) of their indirect suppliers (Webb 2018).

There is no unique and uniformly accepted definition of visibility (Caridi et al. 2010). Some publications focus on the quality and accuracy of the data made available e.g. Closs, Goldsby, and Clinton (1997) and Gustin, Daugherty, and Stank (1995). This view is also relevant for our thesis; however, we consider it to belong under “information sharing” rather than visibility. Figure 3: The visibility frontier and its potential effect on risk detection” represents a hypothetical supply chain for a product, with the visibility frontier signaling the buying firm’s knowledge about its supply chain partners.

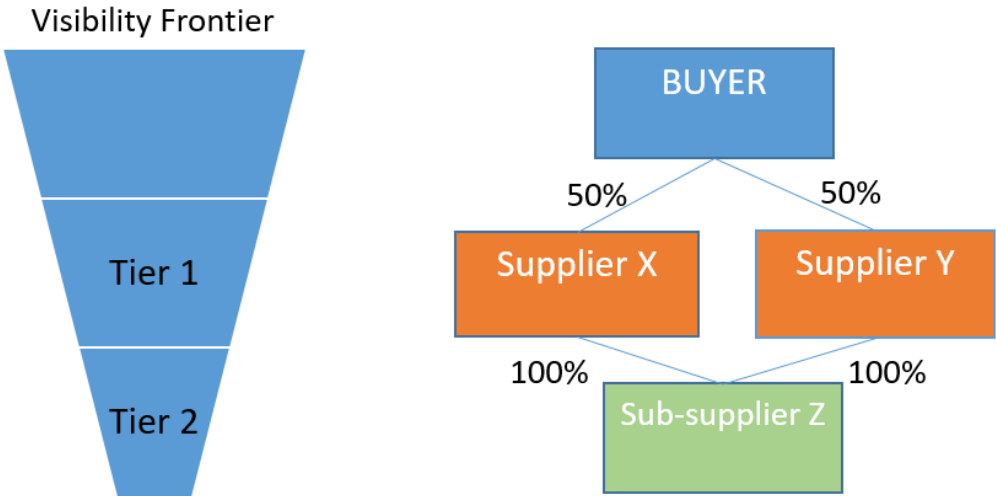


Figure 3: The visibility frontier and its potential effect on risk detection

As shown by Figure 3: The visibility frontier and its potential effect on risk detection”, with a visibility frontier of “Tier 1”, the buyer only knows of its immediate suppliers, while “Tier 2” entails that it knows its sub-suppliers. By means of the hypothetical scenario presented below, the effects of this is explained further.

Scenario:

“In order to reduce the risk of a disruption stopping the flow of goods, the buyer chooses to adopt a dual sourcing strategy, sourcing 50% of its supply for their product from “Supplier X” and 50% from “Supplier Y”. Believing they have reduced risk to an acceptable level, the buyer continues its day-to-day operations.

One day, the deliveries of products from both Supplier X- and Y subsides. Upon request, both suppliers blame the missed deliveries on their own supplier of raw materials. In response to this, the buyer realizes the need for more extensive knowledge of their supply chain, maps it out, and extends the visibility frontier to “Tier 2”. After doing so they realize that both their suppliers purchase 100% of their material from the same supplier, namely “Sub-supplier Z”.

“Figure 3: The visibility frontier and its potential effect on risk detection” teaches us two things. Firstly, that extending the visibility frontier can help us discover potential risk elements previously undisclosed. Secondly, none of the two suppliers (X- and Y) experiences increased risk from sharing the same sub-supplier, as they are independent and figure in different channels within the supply chain. For the buyer on the other hand, the fact that the two suppliers share the same sub-supplier means that a single disruption negates the risk-reducing effects of their dual sourcing strategy. Since none of the suppliers have incentives to manage risk any differently, the hypothetical situation described here highlights the need for SCRM beyond first-tier suppliers by the focal company”.

Bartlett, Julien, and Baines (2007) investigated the effects of visibility on supply chain performance and joint initiatives by using Lamming and Caldwell (2001)’s transparency framework. Their findings indicate that there were significant improvements in vis-à-vis schedule adherence and overall performance of the supply chain (Bartlett, Julien, and Baines 2007).

Wei and Wang (2010) takes a dynamic capability view on SCV and examined how visibility can be utilized as a firm specific competence in order to increase a company's ability to reconfigure. In their paper, four distinct forms of visibility were developed, each with its specific approach to drive supply chain re-configurability. "Visibility for sensing", "visibility for learning", "visibility for coordinating" and "visibility for integrating" (Wei and Wang 2010).

Regarding the first "Visibility for sensing" is explained as the ability of the company to access real-time information thereby recognizing changes in the environment. This especially entails changes in customer needs and market-information needs, and is proven to have a direct impact on strategic supply chain performance (Wei and Wang 2010).

The second, "Visibility for learning" represents the ability of a company to learn, and attain information from other members of the supply chain, including its suppliers and buyers. External knowledge is fundamental for building capabilities, and expanding the knowledge base by using the supply network can increase supply chain performance (Johnson, Sohi, and Grewal 2004).

Third, "Visibility for coordinating" entails coordinating dependencies such as incoming goods and outgoing information-flows. This is achieved through the usage of e.g., modern Material Resource Planning (MRP)/Enterprise Resource Planning (ERP) systems, building buffer inventories or sharing relevant shipping information. Hence, visibility for coordination offers important decision support in supply chains (Sahin and Robinson 2002).

Lastly, "Visibility for integration" entails creating consensus and common understanding of the supply chains goals, and is thought to increase in conjunction with the amount of information shared. It provides the understanding of each firm's capabilities, strengths, goals, and skills and help achieving goal congruence in a supply chain (Jap 1999).

In contradiction to the findings of Wei and Wang (2010), Brusset (2016)'s research on the relationship between visibility and agility suggests that visibility alone cannot enhance agility (we find it feasible to compare the two studies as responsiveness and re-configurability are key concepts of agility). It is however worth mentioning that Brusset (2016) only uses survey data, and only data from a single source within each business studied, and that the quality and depth of information may therefore be insufficient to provide strong evidence.

Moreover, the concept of visibility has also been studied in the context of power-dependence theory. Nguyen et al. (2017) finds that under high dependence of buyer on supplier, visibility is more required to mitigate risk. Vice versa, *“the importance of visibility is reduced if buyer is not dependent on its supplier”*- (Nguyen et al. 2017 p.69). The basic message and fundamental conclusion of their paper is that visibility is an important proactive approach in mitigating supplier risk for the buying firm, and that the firm must invest in integrating the suppliers IT-resources in order for the benefit to be realized.

2.3.3 Collaborative- and contractual SCRM

Collaborative approach

One of the key underlying assumptions of SCM is that the participants in a supply chain are co-dependent and that the overall performance of the chain therefore affects the individual members. Another is that optimizing “silos” or the individual results of each company creates a sub-optimal chain.

If we view “opportunism” through the lens of SCM, it is possible to argue that opportunistic behavior is idiosyncratic because the self-interest of each company is aligned with the long-term performance of the chain. Long-term could be a key word here as the expectation of a brief relationship might tempt supply chain participants to realize short-term profits from opportunistic behavior. Rokkan, Heide, and Wathne (2003) studied the effect of extendedness on opportunism resulting from specific assets in buyer-supplier dyads. Their findings suggest that for buyers who had sunk costs associated with a supplier, *“a relationship's extendedness or future time horizon can also serve to mitigate the expropriation risk that specific investments produce”*- (Rokkan, Heide, and Wathne 2003)

Developing a shared SCRM understanding is considered critical for the successful creation of a SCRM strategy (Chopra and Sodhi 2004). This can be achieved by “stress-testing”, which entails an approach of “what if” scenarios (contingency planning) and is helpful in creating shared ownership of the SCRM process (Chopra and Sodhi 2004). The term “shared SCRM understanding” might seem somewhat vague, but according to Hinds and Weisband (2003), shared SCRM understanding refers to the extents of cognitive overlap and commonality in beliefs, expectations, and perceptions about SCRM. Coleman (1990) finds that shared understanding tends to be more prominent in companies with repeated interactions.

Contractual SCRM

By contractual SCRM, we refer to any contractual elements aimed towards/or resulting in managing or reducing risk. Supply chain contracts could offer robust strategies to increase supply chain resilience through mitigating uncertainties or risks in addition to making a supply chain more efficient (Tang 2006). Such risk sharing contracts or “Risk Sharing Mechanisms” (RSM) have found extensive academic attention with publications such as Cachon and Lariviere (2005) and Jeong (2012) exploring their potential in mitigating risk associated with uncertain demand and price fluctuations (Ghadge et al. 2017). Under these circumstances (uncertain demand, fluctuating price,) Ghadge et al. (2017) finds that buyers and sellers can reduce SCR by calculating and agreeing to an optimal order quantity and price. Fixing the price reduces risk for the buyer, while a set quantity reduces the risk of the seller.

RSM are not always “result-oriented” but can also refer to efforts aimed at aligning incentives and assigning responsibility among supply chain members (Jüttner 2005). Shared SCRM amongst participating supply chain members enhances the effectiveness of risk sharing mechanisms (Li et al. 2015). One such risk sharing mechanism is the use of target cost contracts where the buyer and supplier contractually agree on the expected cost of a project. Consequently, the two entities share the variance between budgeted costs and real costs whether it is higher or lower than budgeted. This aligns incentives to keep costs as low as possible. In terms of risk, such an arrangement also reduces the budget risk, potentially facilitating better financial asset utilization (Li et al. 2015).

There are other contractual elements beside contract-type that can influence SCR beyond tier-one suppliers. One of these involves the buying organization requiring adherence to their CoC from their immediate supplier, and of any sub-supplier involved in the supply chain (Vytopil 2015). Such a CoC can include a number of different demands, from environmental standards, requirement regarding working conditions, safety- and security measures as well as guidelines for documentation of adherence (Vytopil 2015). Industry standards (such as ISO) can be used with similar effect.

Even without a CoC or industry standard, contract clauses can influence risk and risk management practices. Examples of this can be:

Restrictions on sub-supplier location

Preventing the supplier from using sub-suppliers from a country with high environmental uncertainty connected to regulation or an area where the risk of disruption from e.g. natural disasters is considered to be high.

Maximum lead-time

Establish a maximum lead-time limit between supplier and sub-supplier in order to reduce the time of replenishment in case of quality deficiencies or a lost shipment of goods.

Minimum stock level

Setting a minimum stock level requirement so that production stops or belated deliveries does not transfer throughout the chain.

Financial solidity and liquidity

Requiring a minimum level of financial solidity and liquidity for sub-suppliers to prevent business discontinuity from affecting supply chain operations.

The abovementioned examples does not represent an exhaustive list, but it indicates that including such clauses in contracts with the immediate supplier allows the buyer to influence sourcing strategies beyond the first-tier, thereby shaping the supply chain in a favorable manner, and affecting the probability and consequences of various risk elements (Vytopil 2015).

2.3.4 Information sharing

Risk information sharing refers to situations where companies in a supply chain share critical SCR information to the other members in the chain. Successful information sharing can improve the coordination of different processes in a supply chain, and thus improve the overall integration, delivery accuracy, reduce the time to market, as well as increasing the customer satisfaction and the quality of the supply chain collaboration (Li et al. 2015).

The concepts of information sharing and visibility are logically interrelated because increased information sharing by definition increases visibility between the entities in question. Following this logic, information sharing can be considered a means to an end (visibility).

On the other hand, a basic level of visibility is required for information exchange to take place, as entities in the supply chain cannot share information with each other without knowledge of party's existence. This may be an unlikely occurrence in traditional buyer-supplier dyads, however becomes a possibility when we examine relationships extending several echelons of the supply chain.

There are interesting insights to be found in the intersection between information sharing and power dependence theory. For example, Xiao, Xie and Hu (2013) found that the dominant party in terms of relative power dictates information sharing in buyer-supplier dyads. Therefore, we can say that the supply-chains influence on the information exchange is determined by whether or not there exist a dominant force. If this statement is true, then different echelons of the supply network that are relatively equal in relative power, will find that collaboration might be the only option for achieving information exchange. These two scenarios (dominated or equal dyads) results in different information flows within the network, with information flowing both ways with the collaborative approach, and towards the dominating party in the other. This scenario is depicted in Figure 4, below.

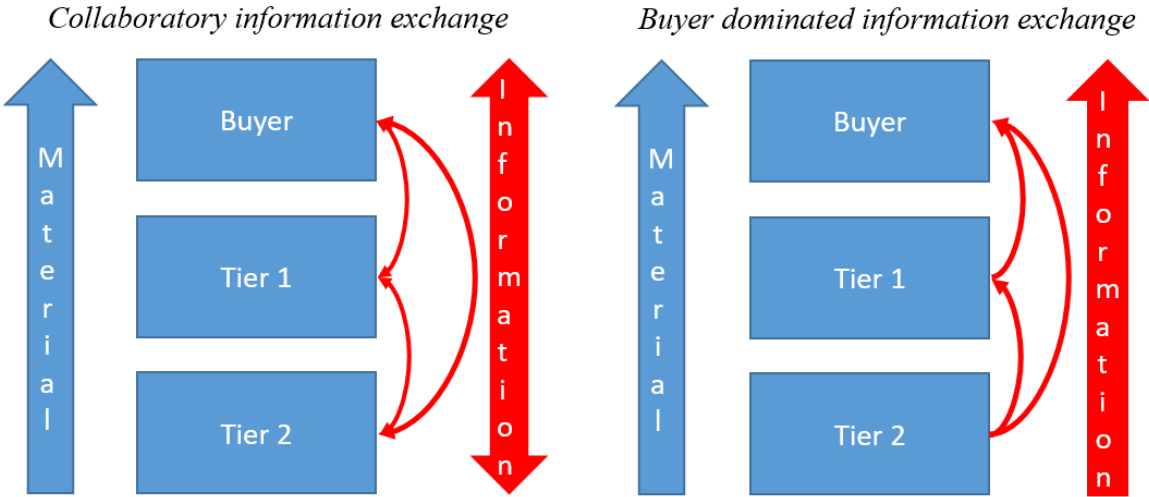


Figure 4: Information exchange under two different supply chain Power structures. (Own production)

It stands to reason that not all supply chains will be organized like the two examples visualized in Figure 3. For example, supply-chain-wide visibility of vulnerabilities requires information sharing across supply chain participants (Kleindorfer and Saad 2005). Thus, despite significant power difference between participating parties, the information-flow may still be bilateral/multilateral.

We should also be careful to assume that a bilateral collaborative approach to information sharing is necessarily superior to a dominant one-sided one, since “*Unilateral inter-firm IT governance form can be stable and long lasting regardless of the power distribution between the two parties, as long as stable inter-firm governance exists*”- (Xiao, Xie, and Hu 2013b, page 526)

Within SCRM, information sharing has two distinct roles. Proactivity through elucidating risk elements in the supply chain, enhancing visibility and thereby allowing supply chain participants to take an active approach to managing risk. Reactively, information sharing acts as an early-warning mechanism in the case of emergent risk elements, facilitating detection and the spreading of vital information to all relevant parties in the supply chain. When companies are informed about a contingency before the event occurs, or in the early stages of development, contingency-plans may be put into effect.

Parajuli, Kuzgunkaya, and Vidyarathi (2017) find that “*combining proactive and reactive strategies improve supply chain responsiveness to disaster events, and are effective in minimizing both short term impacts and long term losses of market shares from major disruptions*”- (Parajuli, Kuzgunkaya, and Vidyarathi 2017. p13-14).

In addition to acting as an early warning mechanism, reactive information sharing can also increase the speed and effectiveness of the supply chains responsiveness, agility and other risk mitigating efforts (Chopra and Sodhi 2004; Tse and Tan 2012; Moberg et al. 2002).

2.3.5 Transaction cost theory

Transaction Cost Theory (TCT), also known as Transaction Cost Economics (TCE) is a discipline coined by Williamson (1971). According to TCT, transaction costs exist due to two underlying assumptions, opportunism, and bounded rationality. Opportunism, defined as “*self-interest seeking with guile*”- (Williamson 1985) refers to that “*homo economicus*” will act in a way that benefits itself, even if these actions negatively impact its supply chain partners. Bounded rationality within this context refers to the limited ability of contracts to foresee and predict every possible outcome of a scenario. This is an adaptation of Simon's (1961) original definition which states that “*human behavior is intendedly rational, but limitedly so*”- (Simon 1961 p.24).

The mode of analysis within TCT is Transaction Cost Analysis (Buvik 2002a), which uses the transaction between sellers- and buyers as the unit of analysis (Riordan and Williamson 1985; O. E. Williamson 1981; O. E. Williamson 1991).

There are two categories of transaction costs (Buvik 2002b). Ex-ante transaction costs, which constitute opportunity costs (Masten, Meehan, and Snyder 1991), and results from incorrect use of specific assets (Rindfleisch, Heide, and Walker 1997).

The second category, ex-post transaction costs relate to problems of hidden actions in ongoing relationships (Bergen, Dutta, and Walker 1992).

Buvik (2002a) presents four types of ex-post transaction costs:

“1. Performance control (e.g. the verification of production costs). 2. Performance verification costs (e.g. product quality assessment). 3. Adjustment costs (e.g. change orders difficulties). 4. Bargaining costs (e.g. price negotiations).”- (Buvik 2002a. p.568).

Although Williamson recognizes both ex-ante and ex-post transaction costs, little of the empirical and analytical TCT literature focus on how ex-ante supplier screening can reduce ex-post opportunism (Stephen and Gillanders 1993), and thereby the need for monitoring and control. The one-sided “ex-post” focus is problematic if we consider the possibility of a substitutive relationship between supplier screening- and monitoring.

In the early stages of the discipline’s development, TCT was criticized for not considering the role of differential capabilities in structuring economic organizations (Richardson 1972); neglecting power relations (Perrow 1986), and trust and social embeddedness (Granoveter 1985). In this regard, it is relevant to point out that Williamson (2010) only consider TCT to be one of the lenses through which to study complex economical organizations, meaning that it is not intended to be all-encompassing, but rather complementary to other modes of research. The complementarity of TCT and “the capabilities view” becomes evident when reviewing the work of El Meladi, Glavee-Geo, and Buvik (2018). Their article on “Understanding how opportunism and resource capability affect performance in exporter-LSP outsourcing relationships”, finds amongst other things, that while opportunism has a negative effect on outsourcing performance, an increase in perceived opportunism increases the effect of flexibility on performance (El Meladi, Glavee-Geo, and Buvik 2018).

Over the years, the external critique of TCT has largely subsided, probably due to its fruitful usage in academia and further cemented through the Nobel Prizes awarded Ronald H. Coase (1991) and Oliver E. Williamson (2009) for their work within the field.

Of the remaining critics in the post-80s era, Moran and Ghoshal's (1996) work is one of the harshest and most cited (Ketokivi and Mahoney 2017). Their critique includes objections to the notion that hierarchical control reduces opportunistic behavior, because monitoring and control in itself is detrimental to the relationship between the monitor and the monitored party, and thereby perpetuates opportunism. Williamson (1996) and Ketokivi and Mahoney (2017) responds to this criticism by highlighting that Moran and Ghoshal (1996) have a different conceptual understanding of opportunism than that found in the general TCT literature and that carefully executed control measures are unlikely to warrant a negative reception from the monitored party.

Since its inception, TCT has developed to include issues other than those originally stated by Williamson. For instance, the examination of a wider range of hybrid governance mechanisms has led to more attention being paid to characteristics of specific agents and to incentives that help build trust and commitment (Heide and John 1992). This again have led to a new wave of criticism, as some academics believe TCT is only valid for the examination of individual business transactions, and that results garnered from utilizing the framework to study “relationship costs”, sustained governance partnerships and the complexities of supply chain cooperation are therefore flawed (Hammervoll 2009). Hammervoll’s critique is specifically targeting the Governance Value Analysis (GVA) model in terms of value creation; however, GVA is an extension of TCA.

As previously stated, the unit of analysis in TCT is the transaction between a buyer and a seller. Since there are no direct transactions between a buyer and its sub-suppliers, the use of TCT to analyze SCRM beyond first-tier suppliers may not be entirely conventional. However, there are aspects of TCT in buyer-supplier relationships, which can potentially act as determinants of how SCR can be managed in the lower-tiers of the supply chain. Examples of this includes environmental uncertainty, where an increased level propagates more visibility and control measures. And specific assets, which influences opportunism, and thereby the possibility of suppliers acting in a way which negatively influences the buyer.

Where there is more room for opportunism in the relationship, the buyer has increased incentives for active participation and the exertion of control in the risk management work.

2.3.6 Dependency

Power-dependence is a social exchange theory originally developed by Richard M. Emerson between 1962 and 1972. It revolves around the relative power in exchange relationships, and the dependencies that arise from this, with the power A has over B equaling the dependency of B on A (Molm 2007).

Power is defined by Emerson (1962) as *“The power of actor A over actor B is the amount of resistance on the part of B which can be potentially overcome by A”*- (Emerson 1962 p.32).
 Dependence is defined as: *“The dependence of actor A upon actor B is (1) directly proportional to A's motivational investment in goals mediated by B, and (2) inversely proportional to the availability of those goals to A outside of the A-B relation.”* (Emerson 1962 p. 32).

Power dependence theory devise four different power-dependence scenarios

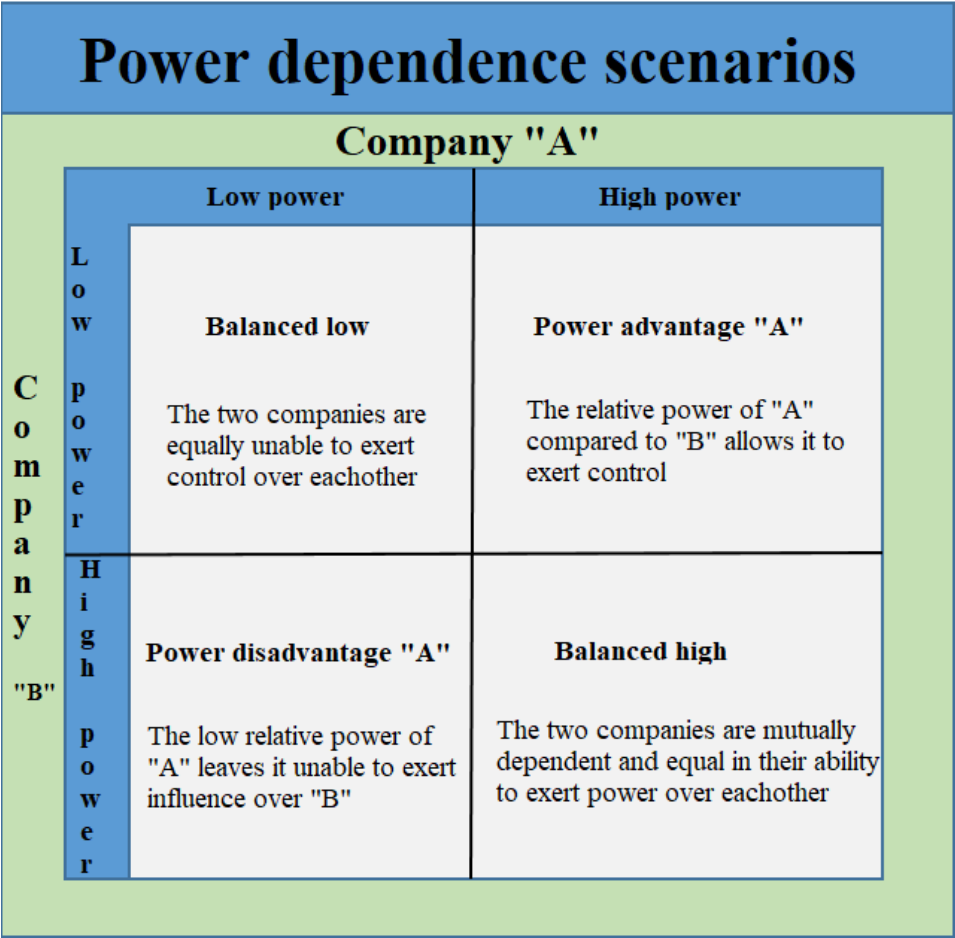


Figure 5: Power Dependence Matrix (own production)

The different scenarios are further differentiated into two groups “**Balanced**”, consisting of “Balanced Low” and “Balanced High” and “**Unbalanced**” made up by Power Advantage A” and ”Power Disadvantage A”.

Unbalanced power relations are considered to be unstable because it encourages the use of power by “A”, which set in motion one of two responses from “B”, adaptation (cost reduction) or balancing operations (Emerson 1962). Adaptation entails that the disadvantaged actor adapts to the demands of the advantaged actor. This adaptation comes with a “cost” which can be either economical, emotional or entail a shift in values. It does not however, change the nature of the relationship, and the actor with less relative power would still be susceptible to future demands. The second option of “balancing operations” on the other hand involves attempts to restore power-balance to the relationship by either reducing B’s dependence on A, or increasing A’s dependence on B. Emerson (1962) define four such balancing operation strategies:

Motivational withdrawal

Redirection of resources and motivation towards other activities.

Extension of power network

Establishing new partnerships that allow the disadvantaged actor the opportunity to circumvent the advantaged actor. In a business setting, this strategy could equate to a buyer establishing a relationship with a second supplier of his product.

Coalition formation

Cooperation amongst two or more disadvantaged actors with the intention of increasing their relative power in comparison with an advantaged actor. An example of this could be that several independent farmers form a collective in order to consolidate their production-volumes and negotiate higher prices with industrial buyers.

Emergence of status

The disadvantaged actor seeks to increase the advantaged actor’s motivational investment in the relationship and thereby increasing its dependence by affording it some special acclaim or prestige. This is quite vague, and finding practical examples is a challenge, however it could include favorable mentions of the advantaged actor in the media. Generally, “Emergence of status” as a balancing operation tends to involve providing something that is highly valued by the receiver, while of low cost to the sender (Emerson 1962).

In relation to SCRM beyond first-tier suppliers, the relevance of power-dependency theory is that relative power and dependencies between a buyer and its immediate supplier may affect the buyers' ability to influence the supply chain. Pedersen and Andersen (2006) finds that holding a weak bargaining position will make it difficult for buyers to assert influence over suppliers. Along the same lines, power-asymmetry is a requirement for compliance (Locke, Amengual, and Mangla 2015). Viewing the problem of SCRM beyond first-tier suppliers from a buyer-perspective, this suggests that the "Power Advantage A" scenario in Figure 5: Power Dependence Matrix (own production) is the only one where the buyer can influence the supplier. Even if this is the case, we are still talking about a dyadic buyer supplier relationship. But, what about the buyers' influence on subsequent tiers? Preuss (2001) argues that if a buyer requires the use of a "standard", not only the immediate supplier will have to follow it, but also the lower-tiers of suppliers involved in the production of the buyers product. Hoejmose et al. (2013) calls this effect a "multiplier-effect" and suggest that it may be strongest in power-asymmetries favoring the buyer.

A natural extension to the theory and background of dependence relations in organizational research is the inherent role of resources as determinants of dependency, which also is the domain of Resource Dependence Theory (RDT).

A fundamental thesis in RDT is that there is a connection between the organizational actions and its environment. This is due to the suggestion that organizations are not able to acquire all resources or functions internally to sustain themselves, and organizations are dependent on other organizations in the environment, thus relationships and transactions occur between organizations (Aldrich and Pfeffer 1976). RDT stresses the importance of power, and from an RDT perspective the power organization "A" has over organization "B" stems from the degree of dependence organization "B" has towards organization "A" (Davis and Cobb 2010). It is worth to mention that since power between two organizations is not a zero-sum game, both organization "A" and "B" can be dependent on each other, making them interdependent. As such, to determine the level of dependence an organization must define what resources are critical for its operations. RDT emphasize the cost or the total amount of resources acquired is not the first priority, instead, if the organization are unable to continue functioning without a specific resource it is critical (Nienhüser 2008).

RDT further argues that uncertainty, in itself, is not problematic, however when dependency is present for the critical resources, the organization has to implement measures to reduce uncertainty. This is similar to what is stated in TCT, where Williamson (1985) argued that high uncertainty and dependency cause problems related to specific resources i.e., transaction costs. RDT presents some alternatives to reduce dependency, since it is assumed that all organizations seek to reduce their dependence on others and increase their own power. However, when measuring dependency, one must consider the perception of the individuals. The individuals are responsible for evaluating pricing the resources, and the nature of bounded rationality makes this difficult (Nienhüser 2008). Consequently, if an organization overestimates the resources they acquire, or underestimates their own resources, then there is a perceived dependence towards others, which ultimately can create a skewed view towards the power of other organizations (Nienhüser 2008).

Pfeffer and Salancik (1978) proposed different strategies organizations could use to reduce the external dependencies on others. Examples are; Mergers/Vertical integration, Joint ventures and other inter-organizational relationships. However, Pfeffer (1976) states that each of these strategies has limitations when it comes to their effect(s), due to the fact that organizations are constructed as open systems. For example, after a merger is completed, the company has successfully managed a dependence, but most likely they have created dependency towards another organization at the same time (Pfeffer 1976).

According to Pfeffer (1976) there are three reasons to why organizations might merge: “*First, to reduce competition by absorbing an important competitor (sic) organizations; second to manage interdependencies with either sources of input or purchasers of output by absorbing them; and third, to diversify operations and thereby lessen dependence on present organizations with which it exchanges*”- (J. Pfeffer 1976 p.39).

Other inter-organizational relationships like Joint ventures (JV), Research and development (R&D) deals, strategic alliances etc. have been subject to research from an RDT perspective, and along with TCT it is one of the most common ways to explain resource dependency (Hillman, Withers, and Collins 2009). The RDT research on inter-organizational relationships focuses on how organizations manage dependencies and uncertainties, but unlike mergers, they do not absorb all of the dependency. Empirical evidence shows that JVs are most likely to occur between interdependent organizations.

Further, it shows that inter-organizational relationships reduce both domestic and international environmental complexity and uncertainty, while allowing organizations to acquire resources (Hillman, Withers, and Collins 2009). The claims RDT makes on inter-organizational are largely supported by empirical evidence, however, scholars continue to rely on other theoretical perspectives to give a more holistic perspective on JVs and other inter-organizational relationships (Hillman, Withers, and Collins 2009).

2.3.7 Relational Exchange Theory

Relational Exchange Theory (RET), also known as Relational Exchange, relational marketing or B2B Relational Exchange, is a subtype within Social Exchange Theory (SET), which specifically examines dyadic business-to-business relationships. As a modern discipline, SET was developed in the 1950s and 60s with substantial contributions being made by Homans (1958), Blau (1964;1960;1955), Emerson (1962) and Thibault and Kelley (1959). However, its roots can be traced all the way back to Aristotle's "*Nicomachean Ethics*" (Lambe, Wittmann, and Spekman 2008). The fundamental assumption of SET is that entities choose to enter into relationships because they expect positive returns in excess of what they could expect without the relationship (Homans 1958). Although the actors in RET are organizations instead of individuals (as in SET), Homans' (1958) assumption about relationships still apply; Organization enter into relationships because they expect the returns to be higher than what they will be if they do not (Homans 1958).

In the context of a business, however, this statement does not tell us much, as any business is entirely dependent on having a relationship for any exchange to take place. Without the exchange of goods or services, there will be no transactions, and by consequence, in time no businesses. Because of this, RET examines more fruitful questions, namely the determinants of why companies chose to enter into one relationship instead of another, and the appropriate level of integration in the eventual relationship.

In order to answer such questions, Lambe, Wittmann, and Spekman (2008) defines six relevant variables from the SET literature, which are used when examining B2B exchanges, dependence, trust, commitment, cooperation, relational norms and satisfaction (Lambe, Wittmann, and Spekman 2008).

Although all these aspects are useful, and to an extensive degree overlapping and mutually influential, Smith and Barclay (1997) find “trust” to be most influential in determining effective business relationships.

Trust can be defined as “*The belief in an exchange partner’s reliability and integrity*”-(Morgan and Hunt 1994 p.23). Or “*the willingness of a party to be vulnerable to the actions of another party based on an expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control the other party*”- (Mayer, Davis, and Schoorman 1995 p.712). We consider these definitions interchangeable, and similar enough that the use of one over the other will not significantly influence the data or analysis in the various works.

Although there appears to be accord in the literature on the definition of trust in all but semantics, the concept can be operationalized and used in several different ways. Araujo and Franco (2017) used a qualitative case study approach to find the determinants of trust in a cooperation relationship. Their findings include the discovery of five distinct “trust building mechanisms”, namely: Mutual dependence, previous experience and reputation, awareness of the risk of opportunistic behavior, contractual agreements and dynamic processes (Araujo and Franco 2017). Worth mentioning however, is that their study does not examine a buyer-supplier relationship, but rather a cooperation-relationship between two competing suppliers. That said, the results can still be viable for dyadic buyer-supplier relationships as the optimal state of such a relationship is cooperation, balancing competition and cooperation (Eriksson 2016).

Ha, Park, and Cho (2011) discern two distinct types of trust. “Affective trust”, which results from openness, positive mutual understanding, honesty and respect, and “Trust in competency”, which comes from business capabilities, satisfaction with know-how, willingness to accept partners specialty and unique knowledge/skills (Ha, Park, and Cho 2011). Their findings suggest that both affective trust and trust in competency have positive effects on benefit/risk-sharing efforts, while only affective trust has a positive influence on information sharing (Ha, Park, and Cho 2011).

In the context of SCRM beyond first-tier suppliers, trust is an important aspect, as the degree of trust a buyer has in its first-tier supplier could potentially determine whether it sees it as necessary to manage lower-tier supplier themselves, or if the job of doing so can be left to the supplier. In such situations, affective trust would refer to the belief that the supplier would act directly or indirectly in the interest of the buying party and conduct their SCRM effort with good intentions. Trust in competency would refer to whether the buyer believes that the supplier has adequate knowledge, know-how and financial resources to conduct such efforts effectively.

Based on the available literature there is mixed or inconclusive findings when it comes to the relationship between trust and control (Teng and Das 2013). Lambe, Wittmann, and Spekman (2008) finds that there is lack of empirical findings to support the notion that relational norms, trust and other forms of informal governance can replace formal governance. Informal governance is required because bounded rationality hinders contracts from being able to encompass all eventualities in a relational exchange (Bernheim and Whinston 1998). Teng and Das (2013), who researched the effects of trust and control in creating confidence in partner cooperation finds that the two can be both substitutive and complementary.

Substitutive in that a high level of trust negates the need for complex contracts, and a well-defined contract reduces the need to rely on trust. Complementary, in that the both contribute towards creating confidence. They also dispute the idea that confidence is constant, and that an increase in either trust or control must necessarily result in a decrease in the other factor. In contrast, companies should pursue both trust building –and control initiatives to achieve increased confidence in buyer-supplier partnerships (Teng and Das 2013).

Over time, successful exchange leads to a buildup of trust (Gottfridsson, Rundh, and Camen 2011). We can therefore say that the level of trust in an exchange relationship is not constant. Because of this, measures of control should also differ over time. In the early stages of trust development, transactional contracts provide added control due to their comprehensiveness. When trust is developed, relational contracts that sacrifice control for flexibility may be more applicable (McNeil 1978; Gottfridsson, Rundh, and Camen 2011).

Chapter 3

Research Methodology

3.1 Chapter Introduction

This chapter provides a walkthrough of the methodological choices made at all stages of the research. A methodology is the overarching, systematic analysis of methods and principles within a field, thus acting as an umbrella under which all other questions regarding methods and structure of the research are positioned (Schensul 2008). The methodology differs from what we refer to as “methods” in that it is not a tool meant for developing data or information, but rather an overview of the methods and techniques used (Schensul 2008)

To acquire the best results in research it is therefore crucial to have an explicit, systematic and planned approach (Mohajan 2018).

The chapter begins by presenting the philosophical position of the study, followed by a presentation of research approach, design, strategy, case selection, case descriptions, research setting, data collection, data analysis and validity and reliability.

Figure 6 below summarizes all the key methodological choices made for the study.

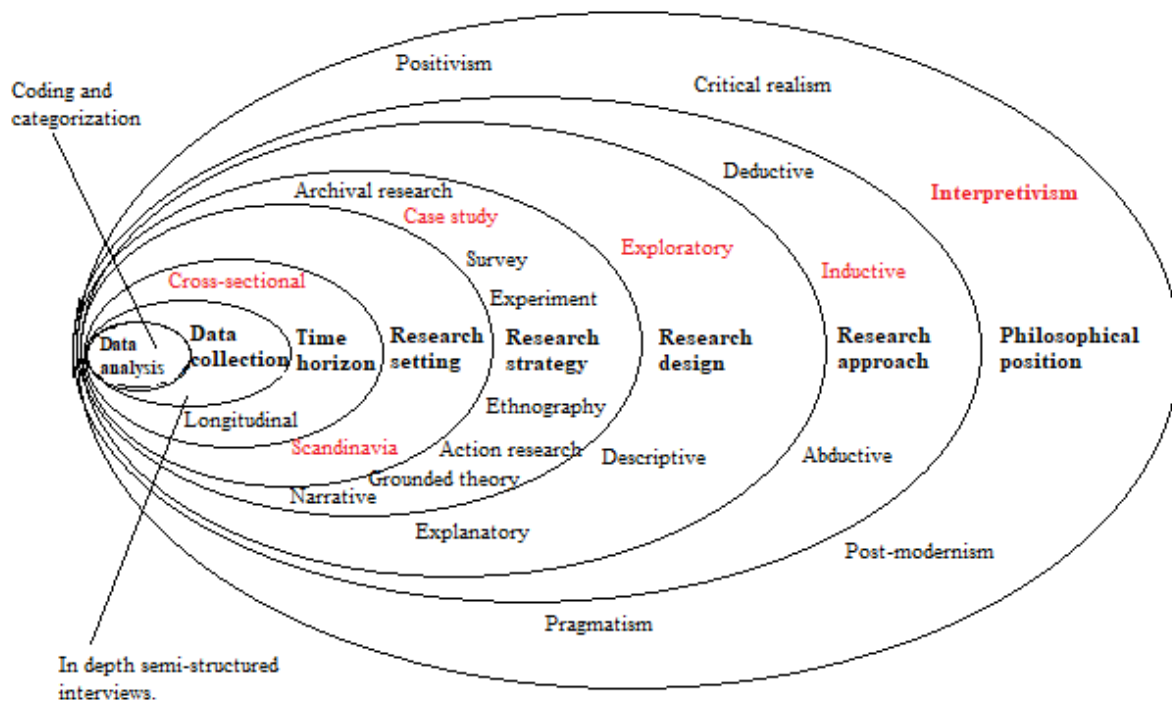


Figure 6: The research onion. Adapted from (Saunders, Lewis, and Thornhill 2009)

3.2 Philosophical position

There are different epistemological and ontological stances researchers can take during research. The different epistemological and ontological stances are closely tied to the research design and methods used in the study and affects how researchers uncovers knowledge in social science (Saunders, Lewis, and Thornhill 2009). Ontology concerns the nature of the social phenomena being investigated, and whether social entities are considered objective entities or social constructs (Bryman 2012). Ontology also questions the social reality and individual consciousness; is reality objective? Is it perhaps a result of the individual cognition? The two ontological positions, objectivism and constructionism, are divided by the questions of *“whether social entities can and should be considered objective entities that have a reality external to social actors, or whether they can and should be considered social constructions built up from the perceptions and actions of social actors”* (Bryman 2012 p.32).

In our research, we have taken a constructionist position. Hence, we support the latter statement that social entities should be considered social constructs built from the perceptions and actions of social actors.

With a constructivism positioning the *“social phenomena and their meaning are continually being accomplished by social actors. It implies that social phenomena and categories are not only produced through social interaction but that they are in a constant state of revision”* (Bryman 2012 p.33). This also means that the reality we present are not regarded as definitive, but a specific version of social reality.

According to Cohen, Manion, and Morrison (2007) epistemology is the assumptions researchers make about *“ the very bases of knowledge- its nature and form, how it can be acquired, and how (sic.) communicated to other human beings”* (Cohen, Manion, and Morrison 2007 p.7). An epistemological issue we must consider is whether *“the social world can and should be studied according to the same principles, procedures and ethos as the natural sciences”* (Bryman 2012 p.27). When it comes to epistemology, we have taken an interpretive stance, meaning that we *“understand, explain and demystify social reality through the eyes of different participants; the participants themselves define the social reality”* (Cohen, Manion, and Morrison 2007 p.19). In the context of this research, we see “knowledge” as being subjective and personal and thereby rejecting the approach of natural scientists.

3.3 Research approach

There are different ways to look at the relationship between theory and empirical research. The most common view is the deductive approach, where theory guides the collection and analysis of data, and the research questions are influenced by theoretical considerations (Bryman 2012). Another approach is the inductive reasoning, with this view the theory emerges after the collection and analysis of the gathered data. The chosen research approach is linked to our philosophical position as described in Chapter 3.2. Applying an inductive reasoning in our research fits well with the philosophical position of interpretivism. With an inductive approach, you are able to produce new theory as the outcome of your research (Bryman 2012). The inductive stance allows us to draw generalizable inferences based on the conducted interviews and the document analysis. The premise for inductive reasoning is that with a certain amount of data, the researchers may discover relationships and findings (Cohen, Manion, and Morrison 2007)

In the beginning of the 20th century, social scientists argued that to be able to make a cause-effect link between variables, you have to understand how your research objects interpret the social world (Saunders, Lewis, and Thornhill 2009). One of the strengths for inductive approach is that it allows for such an understanding. In addition to this, the inductive approach usually places interested in the context of the research objectives, therefore we can allow ourselves to study a smaller sample (Saunders, Lewis, and Thornhill 2009).

3.4 Research design

There are several different definitions of research design. Given (2008) defines it as *“the logic that links the data to be collected to the initial questions that were asked”*- (Given 2008 p.931). Creswell (2014) on the other hand refers to research designs as *“types of inquiry within qualitative, quantitative, and mixed methods approaches that provide specific direction for procedures in a research design”*-(Creswell 2014 p.41). What Creswell labels as research

design mirrors what we refer to as “research strategy” and we therefore prefer Given’s (2008) definition.

Yin (2003) outlines three different research designs for case studies. Exploratory, as a prerequisite to other research, hypotheses and questions. Descriptive, to account narratives, and explanatory, which is aimed at testing hypotheses.

We have conducted exploratory research, and as the name implies, the intentions are mainly to further explore the research questions chosen. An exploratory approach does not provide conclusions to the problem studied; rather it provides guidance to future research on the topic, thereby coinciding with our research objective. The three main ways of conducting exploratory research is by interviewing “experts” in the subject, searching through the literature or performing focus group interviews (Saunders, Lewis, and Thornhill 2009). For this research, we have interviewed “experts” in the subject, and searched through literature.

3.5 Research Strategy

There are several different research strategies researchers can utilize during research, examples include survey, grounded theory, case study, ethnography and experiment (Saunders, Lewis, and Thornhill 2009). None of the strategies are inferior or superior to one another. While, some are more suited for the inductive approach, others have a better fit for the deductive approach (Saunders, Lewis, and Thornhill 2009).

When choosing the strategy most suited for our research, the most important aspect was whether it enables us to answer the research questions and meet our objectives. Due to the characteristics of our study, our ontological and epistemological stance, and the developed research questions, the most suited approach to complete this thesis was by utilizing a case study as our research method. Our case study is a collective case study that builds on the instrumental case study. Meaning that to give insight into an issue or refine a theory, a particular case is studied, but in our thesis, multiple companies are involved. A collective case study can rely on different sources of data and multiple different collection methods, such as observations, interviews, narrative reports, questionnaires and numerical data (Punch 2005). According to Punch (2005) *“The case study aims to understand the case in depth, and in its natural setting, recognizing its*

complexity and its context. It also has a holistic focus, aiming to preserve and understand the wholeness and unity of the case”- (Punch 2005 p.144).

Using case studies as a research design is suitable when the aim of the research is to find answers to “why” and “how” questions, when behavioral events are beyond the researchers control, and when studying contemporary events (Teegavarapu and Summers 2008). As all three elements are true for this research, we find that a case study approach is applicable. Further substantiating the choice of case study as research design for studying SCRM beyond first-tier suppliers is that little, or no theory exist, which adequately describes the phenomenon, and as stated by Eisenhardt (1989), “*one strength of building theory from cases is the likelihood of generating novel theory*”- (Eisenhardt 1989 p.546). Furthermore, the theory generated closely mirrors reality due to the researchers’ intimate interaction with evidence (Eisenhardt 1989). Choosing a multiple case approach also negates a common weakness of single case studies that the researcher becomes unable to distinguish between important relationships and idiosyncrasies of the specific case by gathering evidence across cases (Eisenhardt 1989).

3.6 Case selection

We define case selection as the methods used to choose which and how many cases/businesses to select as research objects.

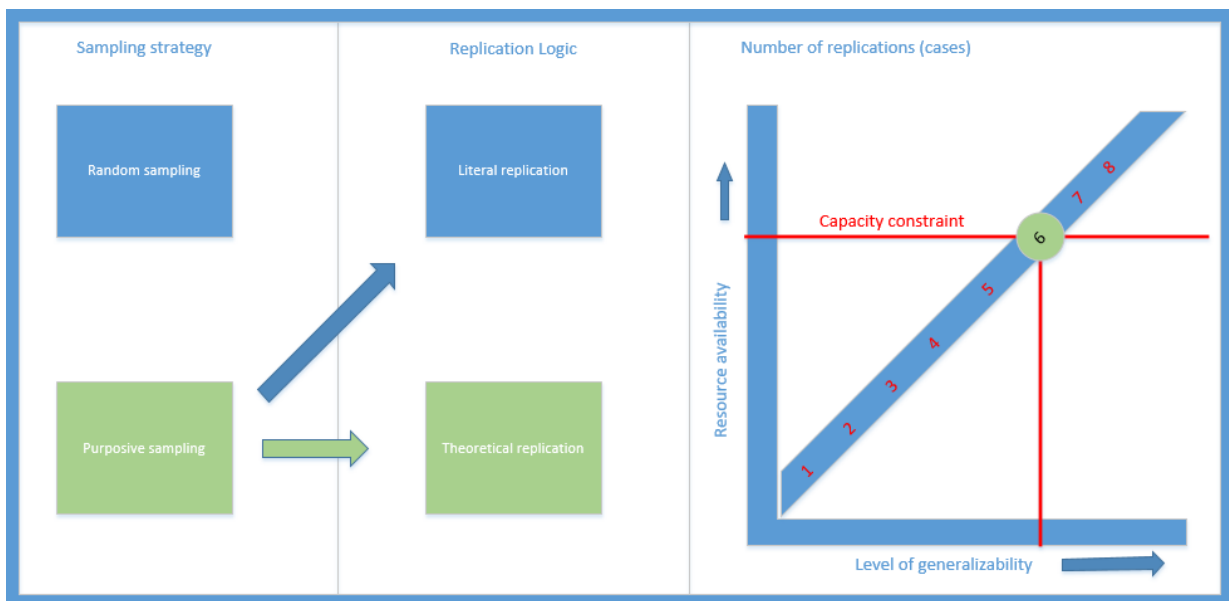


Figure 7: Methodological choices in case selection. (Own production)

A depiction of methodological decisions regarding the selection of cases in case studies. The decisions made in this research are colored green.

There are two main “families” of sampling logic, “random sampling” and “purposive sampling”. Random sampling entails choosing cases randomly selection within the population, and is based on the idea that randomness hinder bias in the selection process. In case study research, random sampling is a viable strategy when examining a few variables in a large number of cases. With purposive sampling, the researcher actively chooses which cases which cases should be selected from the population. There are several strategies for doing so which is further explained later in this chapter.

Seawright and Gerring (2008) finds that comparable case studies composed of a relatively low number of cases, randomized sampling produces results that are unrepresentative of the population.

Since our exploratory approach necessitates in depth analysis of each case, the number of cases are logically low. This makes the case for our choice of using purposive sampling in our case selection.

One important question to address is how many cases are needed to achieve the desired level of generalizability (Ellram 1996). For each case utilized in the research, there is a correlating increase in replications, which influences the generalizability of the results. Furthermore, a larger number of cases can also increase the proportion of companies within the total population that share relevant similarities to the selected cases. We can therefore claim that that it is favorable to have as many cases as possible, as long as it does not affect the “depth” of each case. In reality however, researcher rarely have unlimited time and resources. These capacity constraints thereby dictate the maximum number of cases that are available for selection. Due to the complexity of the thesis subject, a larger number of replications is required for external validity. When balancing this view with the practical restrictions on time and resources we find that six cases will be sufficient to present a holistic view of SCRM beyond first-tier suppliers. This is generally considered enough to generate compelling evidence for either rejecting or confirming initial propositions (Ellram 1996).

There are two main replication logics within purposive sampling; Theoretical replication, which relates the same issue being investigated in several cases the researcher expect will provide contrasting results, for predictable reasons (Yin 2003), and “literal replication”, where one issue is investigated in several cases which are expected to produce similar results. Both replication logics can generate generalizability, but in contrasting manners. Theoretical replications

generate results that are generalizable to cases with similar characteristics as those used in the research, while literal replication creates results that are generalizable to the category of the population the selected cases belong to.

Because we aimed to provide a broad conceptual understanding of SCRM beyond first-tier suppliers and generate theoretical generalization, we chose to select cases that differed from each other when evaluated in accordance with one or more of our theoretical perspectives (SET, TCT and Dependence). This constitutes a theoretical replication logic.

3.7 Case Descriptions

In this section, we describe the six cases selected for this research. The names of all companies have been changed in order for the companies and informants to remain anonymous. *Table 2: Case overview* provides an overview of the cases, while descriptions that are more detailed follow below.

Table 2: Case overview

Case	Industry	Product type	Risk focus	Key informant
Shipbuilder	Shipbuilding	Physical	Delivery-time and capacity	Managing Director
Scandi-TV	TV-distribution	Electrical components	CSR	Purchaser
Foodpro	Retail	Agricultural Produce	CSR and disruption	Purchaser
HeavyMetal	Offshore Petroleum	Processed metal	Delivery-time	Managing Director
Propmaker	Shipbuilding	Metals and miscellaneous	Delivery-time and quality	Director of purchasing
Call AS	Telecommunications	Software and electrical hardware	Business continuity and supplier consolidation	Department Manager

Shipbuilder

Shipbuilder is the local branch of a global enterprise operating in the shipbuilding industry. The product supplied by Shipbuilder to its customers are physical parts with relatively low criticality that are sourced from suppliers in both Europe and Asia. In addition to the products purchased from other companies, Shipbuilder also has some internal production, amounting to approximately 10% of total sales.

When procuring products, the company collects quotations from at least three suppliers. Generally, the same suppliers are involved in most auction processes and Shipbuilder knows these companies well.

Due to the relationship between Shipbuilder and these suppliers, there is a high degree of trust towards the suppliers, and the company has therefore decided not to conduct any monitoring or SCRM activity in the lower levels of the supply chain.

The main risk Shipbuilder experiences in its operations is capacity problems, meaning that suppliers do not have the necessary production capacity to fulfill the company's orders within an acceptable time frame. In order to mitigate this risk, Shipbuilder believes that it requires longer-and closer supplier relationships. To accomplish this, the company is moving away from running bidding processes for each project and look to establish long-term framework agreements with key suppliers.

Scandi-TV

Scandi-TV is a large Scandinavian TV-distribution company who procure a large variety of electrical components. Due to the nature of the products purchased, their supply network is extensive and lower tier suppliers' number in the thousands. Not only are there many sub-suppliers, but these are also very spread out geographically.

The job of Scandi-TV's first-tier suppliers is primarily to assemble the electrical components in to a final product for consumer and business markets. Scandi-TV has a close working relationship with its first-tier suppliers and often visit the supplier to observe the assembly.

The company has the opportunity to run audits on lower-tier suppliers and focuses on doing so. However, since the number of sub-suppliers is so high, they cannot monitor or audit all of them.

When on audits, the company's risk-focus is on Corporate Social Responsibility (CSR) and social risk.

Foodpro

Foodpro is a food producer and brand-owner who supplies both HoReCa (Hotels Restaurants and Catering) and grocery stores with produce. The company's first-tier suppliers are large wholesalers located in Europe, while the bottom-tier suppliers (mainly farms) are spread out geographically according to the growth areas for their products. Foodpro place high value on SCV, and have mapped their entire supply chain. The first-tier supplier, who also actively conducts SCR- efforts, provides information about lower-tier suppliers to Foodpro.

This information is believed to be trustworthy, as the two company agree on the importance of SCR and have common goals.

Like Scandi-TV, Foodpro also have a large supplier network with a high number of sub-suppliers, and cannot actively monitor and audit them all. Based on the information on sub-suppliers gathered by tier-one as well as knowledge about the external environment they operate in, the company is able to create a compound risk-score (CRS) for each sub-supplier which helps determine whether additional measures are necessary to lower risk.

For Foodpro, the two main forms of SCR is CSR in the form of child labor, forced labor and unacceptable working conditions, and the risk of disruptions due to natural catastrophes or unfavorable climactic conditions. For the former, Foodpro relies on audits by either the first-tier supplier or third parties to uncover the problems for then to offer assistance in rectifying them. In order to mitigate the impact of disruptions, the company tries to incorporate a dual- or multiple sourcing strategy with suppliers operating in different external environments. This is however not always possible as the production of some forms of produce is restricted to a specific geographic area.

HeavyMetal

HeavyMetal is a fabrication and machining company supplying the oil-industry with highly specialized custom products. The company's primary product has a short supply chain with only two-tiers of suppliers. Due to high quality requirements, few companies qualify as suppliers, and HeavyMetal therefore operates in an environment where there is a supply-side

duopoly. Out of the two possible tier-one suppliers, the company distinctly prefer one to the other, as they deliver considerably better reliability and customer service. Reliability (the ability to deliver on time) is very important for HeavyMetal, as the cost of late deliveries to its customers is high. If the first-tier supplier does not deliver on time however, HeavyMetal does not receive any monetary compensation from them. Due to the market situation, the first-tier suppliers have a dominating position in the relationship with HeavyMetal. Because of this, the company cannot “require” the supplier to take actions to increase their reliability in any aspect, nor to disclose information about the lower levels of the supply chain. To mitigate the risk of late-deliveries they therefore include extensive time-buffers in their project planning.

In addition to the primary product, HeavyMetal also purchases custom electric components. The end customer decides the specifications- and suppliers of these components, and HeavyMetal is therefore not responsible for any of the risk related to these products.

The power-dependence situation makes it impossible for HeavyMetal to actively manage SCR, conduct monitoring of sub-suppliers and create visibility in the supply chain. Even in a reversed power-dependence scenario, HeavyMetal would not conduct monitoring activity because it believes that monitoring deteriorates trust in the relationships, hindering the exchange of tacit-knowledge and increase bureaucracy.

Propmaker

Propmaker is a company who make- and sell propulsion systems to national and international shipyards. On a general basis, the company has considerable power in its supplier relationships due to having large market share in a limited buyer-market.

In previous years, Propmaker’s supply chain of has been very stable, and the company has focused on a strategy of single sourcing and close relations with the first-tier suppliers. In order to stay competitive in terms of price in the international market, the company are in the process of introducing multiple new suppliers in a multiple sourcing strategy to avoid opportunistic pricing behavior from incumbent suppliers.

Propmaker recognize that introducing new and previously “unknown” entities into the supply network may increase quality- and delivery-time risk. However, since the margins in the industry are low, they consider SCRM beyond first-tier suppliers to be wasteful as the resources

spent on conducting it could be spent on other value creating activities. Furthermore, the company considers that first-tier suppliers can be trusted to manage risk related to its subsequent tier if Propmaker succeeds in thorough ex-ante screening and selection of new suppliers.

Call AS

Call AS is a largely autonomous department within a large telecommunications company. The department procures a large variation of products and services including both software, hardware and consultancy.

The departments SCRM efforts changes over time. For new suppliers the primary focus is that the chain is not at risk from discontinuity due to liquidity-or solidity issues. If the relationship endures and the product-volume reaches a commercial level, the risk-focus changes towards CSR and ethical business practices.

In addition to the risk of business discontinuity, Call AS considers supply-side consolidation to be a major risk in their supply-chain. If the first-tier suppliers consolidate, they increase their relative power in the business relationship, potentially making it challenging for Call AS to demand access and create visibility. This is a two-sided coin however, as consolidation improves the suppliers ability to satisfy quality- and documentation demands, thereby reducing the accompanying risk.

3.8 Research setting

A research setting can be explained as the cultural, social and physical context in which the study takes place (Given 2008). We generally distinguish between four main types of research settings. The “natural”, where the researcher does not attempt to alter or control the conditions of the study, and the post-positivist, experimental and quantitative research settings, where every aspect of the environment are optimally controlled by the researcher (Given 2008).

Our research was conducted in a natural setting. The reason for this is that capturing meaning in the intersection of information and context was considered valuable- and necessary for reaching our research objectives. The geographical setting for our research was Scandinavia.

Although some companies were subsidiaries of international companies headquartered elsewhere, all cases used in our research were located in Scandinavia.

3.9 Data collection

Research data collection can be divided into two categories, primary or secondary data (Hox and Boeije 2005). In our master thesis, we have collected both primary and secondary data. Collecting primary data can be both costly and time-consuming, however, it brings some advantageous as well, for example, we can tailor the research method and theoretical construct to suit our research questions (Hox and Boeije 2005).

This enabled us to gather original data directly from a primary source through interviews, tailored specifically to our research questions. Secondary data on the other hand are easily accessible and are not to the same extent that time consuming to collect. Other researchers originally create secondary data for a different purpose, but if relevant and applicable, it can be used for our purpose (Hox and Boeije 2005). Our secondary data consists of buyer-supplier contracts, ethical guidelines and CoC's from the case companies.

3.9.1 Interviews

The technique we used to collect primary data was by conducting interviews with companies in different industries, to understand how they assess risk beyond tier-one suppliers. Kvale (1996) defines an interview as: *“a conversation, whose purpose is to gather descriptions of the [life-world] of the interviewee” with respect to interpretation of the meanings of the ‘described phenomena’*- (Kvale 1996 p.174). In qualitative studies, the human part of the story plays an important role, and the results of interviews are co-created work emerging from the interaction between researcher and participants (Donalek 2005).

In the majority of the cases we conducted the interviews in a natural setting (their workplace) to create an atmosphere where the interviewee is comfortable and at ease, thus enabling the interviewee to talk freely (Furgerson and Jacob 2012). However, two of the six interviews were conducted via “Voice over Internet Protocol” technologies, which in our case was Skype. This eliminated the geographical barrier and enabled us to interview participants that was geographically far away from us, while adapting to their time-schedule and eliminating traveling costs. A concern we had when doing Skype interviews was the loss of non-verbal cues as well as not gaining the participants trust as quickly, as this can enhance the richness of the

data (Iacono, Symonds, and Brown 2016). Fortunately, the participants agreed to use video while doing the interview, enabling us to see the face and upper body, thus allowing us to notice any non-verbal cues. The four interviews we conducted face-to-face were located in close proximity to us.

All the interviews were done in the period between February 8th and March 20th 2019. The interviews lasted between 25 minutes up to 60 minutes, and all participants were guaranteed anonymity. We conducted semi-structured interview with open-ended questions.

This enabled both parties (interviewers and interviewees) to be flexible and more open, allowing us as interviewers to follow up on responses we found particularly interesting, and getting interviewees to elaborate (Alshenqeti 2014). The same interview guide was used for all cases, with only minor adjustments. This template interview guide can be found in Appendix A: interview-guide.

For those participants we had obtained contact details we sent information regarding our research and the set of questions we were going to discuss during the interview. Sending information prior to the interview enabled them to prepare and reflect on the questions, so when the interview commenced they had a better understanding of the research.

Table 3: Interview schedule provides a summary of the schedule and duration of the interviews.

Table 3: Interview schedule

Case	Date	Interview object	Duration of interview
Shipbuilder	February 8 th	Managing Director	30 Minutes
Skandi-TV	February 13 th	Purchaser	25 Minutes
Foodpro	February 13 th	Purchaser	25 Minutes
HeavyMetal	February 19 th	Managing Director	60 Minutes
Propmaker	March 6 th	Director of Purchasing	55 Minutes
Call AS	March 20 th	Department Manager	30 Minutes

The interviews were all audio-recorded and later transcribed. This was convenient during the interview, because it enabled us to focus on the interviewee without taking notes. At a later stage, we used the transcriptions to analyze the content, which contributed to our findings in chapter 4.2.

3.9.2 Documents

Document analysis is often complementary to other forms of qualitative research methods in order to ensure triangulation. Triangulation is important to ensure thesis validity and corroboration and therefore we supplemented the interviews with document analysis (Ellram 1996). Document analysis serve a variety of purposes in our research. Firstly, it is possible the documents can unravel some information leading to questions to be included in the interview (Bowen 2009). Secondly, it can supplement valuable information to the already existing knowledge base, and allows us to go in-depth on the material. Furthermore, document analysis can verify potential finding from the interviews (Bowen 2009). The proposed advantages mentioned above was something we benefitted from in our case studies, as findings in the CoC resulted in ideas for questions to use in the interviews. Documents also functioned as verification, and it reduced the interviewee bias regarding CoC and contracted related issues since we could objectively verify the statements through the documents we possessed.

Table 4: Documents analyzed and sorted by case summarizes the documents analyzed for each case and the resulting findings.

Table 4: Documents analyzed and sorted by case

Case	Document	Findings
Shipbuilder	Code of Conduct	Reaffirmation of interview findings.
Scandi-TV	Standardized buyer-supplier contract	<p>Reaffirmation of interview findings.</p> <p>Additional findings:</p> <ol style="list-style-type: none"> 1. The buyer can require the tier-1 supplier to change sub-supplier in the case of terms of breaches of the contract. 2. Any legal disputes regarding contractual agreements are settled in the buying organizations home country.
Foodpro	Code of Conduct	Reaffirmation of interview findings.
HeavyMetal	Code of Conduct	Reaffirmation of interview findings.
Propmaker	Code of Conduct	Reaffirmation of interview findings.
Call AS	Code of Conduct	Reaffirmation of interview findings.

Contracts and CoC contributed to expanded knowledge, and we got an insight in how contracts may influence behavior and serve as a risk-mitigator, which we will elaborate on in

Chapter 5. The CoC were publically available on the respective company's website, while the buyer-supplier contracts were requested specifically for each case. When examining CoC and buyer-supplier contracts respectively, it is worth mentioning that these documents are intended for different audiences. While CoC are aimed at the general public, access to the contracts are strictly reserved for the buying organization and its supplier.

We also gathered some general information about the company prior to the interview, both through their website, but also in news articles. This gave us a holistic understanding of the industry they operated in, and gave us an insight in their historical performance and provided us with background information. Such background information is valuable during research as it helped understand the roots of the phenomenon we were investigating (Bowen 2009).

3.10 Data Analysis

For the collected data to be useful, it needed to be analyzed and understood. As we have collected primary data through semi-structured interviews, our data is qualitative. Qualitative data refers to all data that are non-numeric, or data that have not been quantified (Saunders, Lewis, and Thornhill 2009). However, there does not exist one standardized procedure for analyzing qualitative data (Saunders, Lewis, and Thornhill 2009). Before we began analyzing the data, we transcribed our audio-recorded interviews, checked the spellings for error, and had it reviewed by our interview objects.

After the interview objects had reviewed the transcripts, we organized in such a way that both researched conducted an individual read-through of the transcripts to better comprehend the content. Then we discussed different answers, agreed upon different meanings of the data, and highlighted what we found interesting. Thereafter, we integrated different data and notes we had on the cases and coded each case together in relation to the stated research questions. Thereafter, we created a table for each research question, summarizing each respondents answer. After we had coded all the cases, we aggregated the analysis into themes, which we have presented in Chapter 4.

3.11 Validity and reliability

Validity and reliability are traditionally favored measures of research quality in logistics research (Halldorsson and Aastrup 2003). As these measures are generally related to the positivistic paradigm of quantitative research however, many researchers operating within the qualitative realm discard them in favor of terms such as credibility, trustworthiness, applicability and confirmability (Strauss and Glaser 1967). Halldorsson and Aastrup (2003) claim that this use of alternative measures of judging research quality in logistics is becoming more prevalent due to the shift towards a higher prevalence of qualitative approaches in logistics management. And that “*The criteria through which research quality is evaluated must reflect (or at least take into account) such changes in the discipline*”- (Halldorsson and Aastrup 2003 p.321).

As a method of dichotomizing, the meaning of “quality” in qualitative research from that found in the quantitative approaches, we recognize the viability of alternative quality measures. However, the qualitative design tests of transferability, dependability, confirmability and credibility closely mirror their positivity counterparts external validity, reliability, construct validity and internal validity (Riege 2003; Yin 1994). It therefore appears that the difference between the two sets of quality measures are largely semantic.

Table 5: Measures of research quality in the qualitative and quantitative research (Own production). shows the corresponding measures of research quality in the Positivistic and Realist/Interpretive paradigms.

Table 5: Measures of research quality in the qualitative and quantitative research (Own production).

Matching measures of research quality	
Positivist	Realist/Interpretive
External validity	Transferability
Reliability	Dependability
Construct validity	Confirmability
Internal validity	Credibility

Riege (2003) collected a set of techniques intended for use by researchers engaged in both qualitative and quantitative disciplines to ensure or increase the quality of their research. (An adaptation of which can be found in Table 6.

We used this as framework for presenting the methods and techniques used to ensure the quality of our research as well as providing other researchers, business practitioners and readers the opportunity to make their own assessments.

Table 6: Validity and reliability measures. Adapted from Riege (2003).

Measures to:	Undertaken	
	Yes	No
Increase construct validity		
Use multiple sources of evidence	X	
Establish a chain of evidence	X	
Reviewing of drafts by informants		X
Reviewing of drafts by researchers	X	
Internal validity		
Use of cross-case analysis	X	
Use of graphs and diagrams in the analysis phase	X	
Cross-checking results	X	
External validity		
Literal replication		X
Theoretical replication	X	
Definition of scope and boundaries	X	
Comparison with existing literature	X	
Reliability		
Full account of theories and ideas	X	
Accurate observations and actions	X	
Using pilot-studies		X
Use of semi-structured study protocol	X	
Use multiple researchers	X	
Mechanical data recording	X	
Development of case-study database		X
Parallel findings across data sources	X	

3.11.1 Construct Validity

Construct validity relates to establishing suitable operational measures for the concepts being studied (Ellram 1996). There are three main methods for establishing construct validity in a case study, namely using multiple sources of evidence, establishing a chain of evidence, and review by informants (Ellram 1996). In addition to these three methods, Riege (2003) also considers reviewing of drafts by researchers to be a viable technique.

By triangulating data obtained from interviews, buyer-supplier contracts as well as ethical guidelines and CoC, our research satisfies the requirements for using multiple sources of evidence. All informants agreed to being available for follow-up during the research-period in order to clear up misunderstandings, provide additional information and present their view in case any discrepancies between data-sources arose. The informants retained the possibility of reviewing all information provided by them throughout the research period; however, they were not given the opportunity of reviewing drafts of the antecedent findings and analysis.

The rationale behind this is that the anonymization of the research happened right before the date of publication, and that allowing the informants to review non-anonymized material could compromise sensitive data about other informants. To mitigate this threat to construct validity, the responsible researchers and our academic advisor systemically reviewed drafts throughout the research period.

Establishing a chain of evidence refers to the process of ensuring that the research follows a logical path, allowing the reader insight into how the study is conducted (Ellram 1996). This entails everything from the development of research questions and interview protocol to the conclusions. In this case study, two external experts- and published academics within the field of SCM reviewed the document for continuity, coherence, readability and subject matter. By cooperatively making adjustments according to the feedback, we ensured that all these concepts reached a satisfactorily level.

3.11.2 Internal validity

Internal validity can be referred to as: “*the isomorphic relationship between the data in an inquiry, and the phenomena those data represent*”- (Erlandson et al. 1993 p.29-30). Ellram (1996) claims that internal validity, as a measure of research quality is only valid for explanatory studies, while Riege (2003) finds that there are several ways of increasing/ensuring internal validity in case studies. The latter however, does not distinguish between explanatory and exploratory research.

According to Riege's (2003) framework, this research uses all available case study design-tests for internal validity. In the analysis-phase, we used cross-case analysis as well as within-case analysis to extract meaningful information from our data, and utilize graphs and diagrams to portray the information in an understandable manner. To further propagate internal validity in the data-analysis, cross-checking between different data-sources was undertaken.

Credibility is the corresponding qualitative measure to internal validity (Halldorsson and Aastrup 2003; Riege 2003; Erlandson et al. 1993). However, Erlandson et al. (1993) differs from the other by defining credibility as “*the compatibility of the constructed realities that exist in the inquiry's respondents minds with those that are attributed to them*”- (Erlandson et al. 1993 p.30). Hence, credibility does not exist between the researcher and the audience, but rather between the researcher and the inquiry's informants. To achieve this, they suggest six techniques; prolonged engagement, persistent observation, triangulation, referential adequacy materials, peer debriefing and member checks. From these techniques, our research make use of Triangulation (see “Construct Validity”) and member checks by having informants reviewing the transcription of their interviews.

3.11.3 External Validity

External Validity or alternatively “transferability” refer to whether the findings of the conducted research are generalizable to other businesses and situations than those studied. Ellram (1996) considers the lack of generalizability to have been the major critique of using case studies as a research methodology. The three main issues being; the representability – and uniqueness of the case and whether it is suitable to generalize into one specific case (Denscombe 2010).

Considering our research follows an inductive logic, trying to generate general theories from specific cases, ensuring external validity is of the highest importance. Thankfully, the idea that case studies cannot generate generalizable findings is a misconception (Ellram 1996; Denscombe 2010). However, researchers have to be careful when generalizing from case studies, clearly demonstrating how the selected cases are similar to those of its type (Denscombe 2010).

Denscombe (2010) describes three arguments that adequately rebukes eventual claims of lacking generalizability;

Firstly, *“although each case is in some aspects unique, it is also a single example of a broader class of things”*- (Denscombe 2010 p.60).

This means that a unique case will be representable for all cases that share similar characteristics.

Secondly, *“the extent to which findings from the case study can be generalized to other examples in the class depends on how far the case study example is similar to others of its type”*- (Denscombe 2010 p.60).

The more characteristics shared, the more likely it is that generalization will provide intended results.

Thirdly, *“reports based on the case study include sufficient details about how the case compares to others in the class for the reader to make an informed judgement about how far the findings have relevance for other instances”*- (Denscombe 2010 p.61). Hence, our research must convey enough detail about the circumstances of our cases for the reader to determine whether his/her business share enough characteristics for generalization to be feasible.

Ellram (1996) argues that if a broad range of conditions are included in explaining the findings, the case study is most likely more generalizable. The number of cases examined is also important, with more cases leading to higher generalization.

This research makes use of theoretical replication, by selecting cases with different characteristics that are likely to produce contrasting results for predictable reasons (Yin 1994). Thereby creating a much wider pool of entities which generalizations can be made to.

Tsang (2014) distinguishes between theoretical– and empirical generalization. Empirical generalization refers to “*whether certain characteristics of a case or sample are typical of the population from which the case or sample was drawn or of another population.*”- (Tsang 2014 p.371).

Theoretical generalization on the other hand entails developing explanations for the variables observed in the research (Sharp 1998). Because of the chosen research methodology, we find that the case for theoretical generalization in our study is stronger than for empirical generalization. This is true for case-studies in general (Tsang 2014), and is further propagated by the exploratory methodology.

Riege (2003) propose that defining the scope and boundaries of the research in the research design phase increases generalizability. For exploratory research such as ours, this presents a challenge, as exploratory research axiomatically relies on the organic development of research and for the researchers to go where the findings take them. Because of this, it can be claimed that rigidly designed boundaries and scope is diametrically opposed to the concept of exploratory research. In the research-design phase leading up to this paper, we determined which types of “risk” to incorporate- and exclude, thereby defining the scope for the research subject, while the theories and tools used to analyze our findings were defined after reviewing the collected data. By doing so we satisfy the requirements for both the definition of scope- and boundaries and an exploratory approach.

When analyzing the data, trying to extract key findings, we carried out continuous crosschecks against extant literature and theory to ensure that there were viable explanations to support our analysis. These forms of comparison between established and general theory and new findings contribute to substantiate our research and increase the generalizability of the findings.

3.11.4 Reliability

In relation to research design quality, reliability can be defined as “*whether it can be demonstrated that the procedures and operations in the research design can be repeated by other researchers and produce similar results*”- (Riege 2003). Alternatively, Guba and Lincoln (1989) defines it as “*the consistency, predictability, dependability, stability and accuracy of a study in terms of the phenomena assessed and the instruments used*”- (Guba and Lincoln 1989 p.235). By any of these definitions, an exploratory case study is not “reliable” in the positivistic sense.

The qualitative quality test corresponding to reliability is dependability (Denscombe 2010). Where reliability concerns invariance of results, dependability seeks to ensure the variances traceability. The rationale for dependability is that variance in the outcome of a replicated study does not necessarily arise from errors in the research design, but might also be due to changes in reality or increased insights (Guba and Lincoln 1989).

Several different techniques were used to increase the dependability and reliability of our research. In order for other researchers to pass judgement on whether our decisions regarding the research design and data analysis are reasonable, we explained the theories and ideas used in all phases of the research. To ensure that the data captured through our case-interviews are accurate, we utilized mechanical data recording, capturing the live data by voice-recorder and stored it throughout the research period.

Furthermore, a semi-structured interview-guide with only minor adjustments was used for all interviews in order to create congruence. Through communication and debate between the two researchers, all choices and methodological decisions were examined thoroughly, reducing the effects of individual biases- and convictions.

Chapter 4

Findings and analysis

4.1 Chapter Introduction

This chapter presents answers to our research questions on a case-by-case basis, and derives from our interview-transcripts. The findings are then analyzed and aggregated into categories. The tables below summarize the responses of all cases to each research question (RQ).

Table 7: RQ1 responses

RQ1: Does the focal company know the identity of their company's sub-suppliers, and have knowledge about their operations?			
CASE	NO	YES	SOMEWHAT
Shipbuilder	X		
Scandi-TV		X	
Foodpro		X	
HeavyMetal			X
PropMaker	X		
Call AS			X

Table 8: RQ2 responses

RQ2: How does the buying organization assess risk beyond first-tier suppliers?	
CASE	
Shipbuilder	Does not assess risk beyond tier-one suppliers.
Scandi-TV	Assigning criticality, examining the external environment and sourcing optionality.
Foodpro	By multiplying a criticality score with the probability of the risk happening for each type of risk.
HeavyMetal	Does not assess risk beyond tier-one suppliers.
PropMaker	Does not assess risk beyond tier-one suppliers.
Call AS	By examining liquidity and solidity.

Table 9: RQ3 responses

RQ3: How do buying organizations monitor the performance of suppliers beyond tier-one?

CASE

Shipbuilder	Does not monitor sub-supplier performance.
Scandi-TV	Buyer audits.
Foodpro	Self-evaluation, third party audits, reports from tier-one.
HeavyMetal	Does not monitor sub-supplier performance.
PropMaker	By keeping record on deliveries of products that does not satisfy quality-standards.
Call AS	Buyer audits, self-evaluation and third-party audits.

Table 10: RQ4 responses

RQ4: What are the challenges of managing risks beyond tier-one suppliers?

CASE

Shipbuilder	Does not manage risks beyond tier-one.
Scandi-TV	Selecting the correct sub-suppliers to focus on. Traceability of products.
Foodpro	Labor and capital intensive to monitor all sub-suppliers.
HeavyMetal	Lacking technical knowledge. Risk of provoking the tier-one supplier. Gaining access to information about sub-suppliers.
PropMaker	Does not manage risk beyond tier-one.
Call AS	Low transparency and overlapping procedures- and regulations.

Table 11: RQ5 responses

RQ5: How do buying organizations address these challenges?

CASE

Shipbuilder	They do not address any challenges.
Scandi-TV	By identifying and evaluating the most critical risks.
Foodpro	By utilizing risk evaluation tools.
HeavyMetal	Open channels of communication.
PropMaker	They do not address any relevant challenges.
Call AS	Not specifically addressed.

4.2 Findings

4.2.1 Shipbuilder

Shipbuilder outsources about 90% of production, however, they do not know the identity of their company's sub-suppliers nor do they have intricate knowledge about their operations. Consequently, the other research questions cannot be properly answered by Shipbuilding, as they do not assess risk, monitor the performance, and are unaware of the challenges of managing risk beyond tier-one suppliers.

Shipbuilder explained that a combination of their industry operating with a lot of trust, lack of resources, and the good relationships with their tier-one suppliers had been a reason to not get involved with their sub-suppliers. However, they acknowledge that being involved with their sub-suppliers could be beneficial when dealing with capacity problems, overall project planning, and delivery time. As stated by the interview object in response to questions on the potential advantages of having more information about their sub-suppliers:

“It would provide big advantages regarding project planning, and reduce ad-hoc adjustments. In addition, it would help us in ensuring that the sub-supplier have the necessary capacity, that the product arrive in time and that the quality is as promised.”

4.2.2 Scandi-TV

Scandi-TV knows the identity of their company’s sub-suppliers, and have knowledge about their operations. However, the products they source are very complex, and a product containing 3-5 main components may be a result of 1000 of other small components put together. Understandably, Scandi-TV do not have intricate knowledge about all of the 1000 sub-suppliers operations involved in their products, as the interview object explained:

“It’s mainly about being selective in what you want to look into based on the risk criteria. I think that is the most difficult part in a way, to sit and define what is the most critical thing in the whole 1000 components box you get. Which to focus on and dive into.”

Since they cannot have intricate knowledge about 1000 sub-suppliers, they assign the components with different criticality scores, and actively pursue those with the highest score. In addition to this, they are actively mapping alternative sourcing options to the products they procure, and examine the external environment. Scandi-TV has a high focus on sub-supplier monitoring and performance, and dedicate time and resources to perform frequent audits beyond tier-one suppliers themselves.

According to Scandi-TV, the biggest challenge to managing risk beyond tier-one suppliers is selecting the correct sub-supplier to focus on, and the traceability on certain components. Scandi-TV’s strategy for better traceability is to cooperate with tier-one suppliers (which they

have a good relationship with) to get knowledge about the tier-two supplier, who can connect them to the tier-three and so on. They do this to ensure visibility and reducing risk as far down the supply chain as possible, which in most cases work perfectly fine.

Unfortunately, some of the products in their components, for example minerals, are difficult to trace all the way to the source. To select the correct sub-suppliers Scandi-TV identifies and evaluates self-defined risks, for example poor working conditions, child labor, product criticality, and procurement cost. Based on the criticality evaluation, they actively seek to eradicate these risks.

4.2.3 Foodpro

Foodpro knows the identity of their supplier and have knowledge about their operations, but similarly to Scandi-TV, they have so many sub-suppliers that it is virtually impossible to have intricate knowledge about each sub-suppliers operations. Since Foodpro have such a vast supplier network, they have developed their own risk assessment matrix to better understand which sub-suppliers and product have a higher risk profile. The assessment matrix is a combination of factors like criticality for their business, CSR-related risks, how difficult it is to source the product etc., and they give each of these factors an individual score.

When Foodpro put those scores together they get a CRS on each product, and then they can make a rational decision about which product they should focus on. For example, if a company has an extremely high CSR-score and they decide to focus on this specific supplier, the goal is to improve this sub-supplier by auditing and giving feedback to what needs to improve in order to conduct business with Foodpro. The interview object elaborated:

“So, it’s mainly helping them improve, and not just like cutting them out. Because the risk will risk not disappear, because somebody, somewhere, will still do business with them and the problem will still exist. Therefore, it is mostly helping them improve rather than cutting them out completely”

Foodpro uses a variety of methods to monitor the performance of their sub-suppliers, including self-evaluation forms, third party audits and reports from their tier-one supplier.

When it comes to the latter, they receive aggregated knowledge about different regions where the product is sourced. This information comes from their tier-one supplier. Furthermore, they

use third-party audits and have the opportunity to join the tier-one suppliers audit team when they conduct audits of the lower-tiers.

Foodpro's view on self-evaluation is that it needs to be adjusted specifically to each region so that there are no misunderstandings, because if you send the same self-evaluation form to a company based in Asia and Europe, their experience is that the form would be misinterpreted. In addition, the self-evaluation form should be adjusted to the specific risks the sub-suppliers are more likely to experience. The biggest challenge Foodpro face when it comes to managing risks beyond tier-one is that it is too labor and capital intensive to monitor all the sub-suppliers.

This particular challenge is difficult to eradicate, because if you want to do thorough monitoring and assessments of a sub-supplier, it is labor and cost consuming. To address the challenge, Foodpro utilize the CRS to make sure that the time and money they do spend on monitoring and assessments are at least spent on the right sub-suppliers.

4.2.4 HeavyMetal

The level of HeavyMetal's SCV varies based on the purchasing cost of the product category. For custom processed metal-products, which is a big expenditure, the company has knowledge about sub-suppliers at tier-two level, while for standardized items; visibility only extends to tier-one. As stated in the "Case Descriptions" chapter, HeavyMetal also procures customized electronic products. For this category, the visibility-frontier is also at tier-one, and the company expects that the tier-one suppliers would be reluctant to disclose their subsequent tiers if petitioned to do so.

HeavyMetal acknowledges that the lower tiers of the supply chain can influence SCR, but do not assess risk beyond first-tier suppliers, nor monitor their performance. Although HeavyMetal does not monitor the performance of sub-suppliers, nor conduct any other SCRM initiatives aimed specifically at suppliers beyond tier-one, they specify some of the challenges that would accompany such efforts.

One challenge is the lack of technical, product-specific knowledge. This is especially relevant for components and parts that are not considered part of the company's core product, and may affect the ability to effectively manage quality and delivery-time risk. Other challenges include getting the tier-one supplier to disclose its suppliers, and conducting monitoring of these without provoking the tier-one supplier. As the managing director of HeavyMetal stated:

“By maintaining an open dialogue, we find out much more than if we use the contracts, in which case the supplier will simply «shut down» and we will only get the information they are legally obligated to give us.”

Since HeavyMetal does not manage SCR beyond tier-one, it does not have any strategies in place to overcome these challenges. However, they include a large time-buffer in their project plan to mitigate the effects of risk on delivery time, thereby increasing the company’s risk tolerance.

4.2.5 Propmaker

Propmaker’s visibility frontier extends to tier-one suppliers, thus they do not know whom their lower-tier suppliers are- or have intricate knowledge about their operations. The company does not assess risk, nor monitor performance of sub-suppliers on a general basis. The reason for this, in the words of the director of purchasing is that

“It should not necessary to do monitoring regularly; it should be reserved for special cases where there is a specific need.”

Propmaker does record sub-standard deliveries, and audits the companies who do not deliver according to contract; however, this only applies to tier-one.

Because the company does not proactively manage risk beyond tier-one, they have not experienced any challenges related to SCRM, nor adopted any strategies for solving those challenges.

Although Propmaker does not consider this to be a strategy related to SCRM, they use long time-horizons and buffers in their projects in order to mitigate the negative consequences of quality risk (the need to order replacement products) and delayed deliveries.

4.2.6 Call AS

On a general basis, Call AS has a strong degree of control over the lower-tiers of suppliers in their supply chain. The procurement department within the company is obligated to map the supply chain down to the lowest level for compliance purposes. This is true for all products that reach the commercial stage, thus having a high purchase volume. For small batches of products

that are in for testing or internal use however, the degree of visibility required is much lower, and efforts to ensure compliance are therefore equally reduced.

The products procured by Call AS are often highly technical, requiring up-to-date technical insight. It can be challenging for the procurement department to keep up with the rapidly changing development in the field, and R&D specialists are therefore integrated in the procurement teams to make sure the department gain the necessary insight and understanding of the operations of companies in Call AS's supply chain.

As stated in the case description, business continuity risk is a great concern for Call AS as they are often doing business with firms that are small and/or newly formed. To assess this risk, the company evaluates data regarding solidity and liquidity found in the companies' balance sheets.

In terms of monitoring, Call AS relies on audits conducted by special audit-teams within the purchasing department. These audits on the suppliers beyond tier-one, are run irrespective of who the tier-one suppliers are and what monitoring procedures they have in place. On one hand Call AS recognizes that the need for monitoring may be greater when new suppliers are introduced into the supply chain, however all companies are subject to the same procedures.

“If they are selling something completely new, large amount of simple work, and then they go into a different line of business, then we probably audit that. But maybe not when we extend the existing contract for the same product.”

In addition to audits conducted by Call AS, the company uses supplier self-evaluation and third party auditors.

One challenge Call AS faces in their effort to monitor sub-supplier performance and compliance is a lack of transparency in the process due to the high number of people and organizational levels involved. This problem is most acute when the tier-one supplier is also a large company with its own extensive monitoring regime. Another problem is that Call AS experience a high degree of supply-side consolidation, which creates lower sourcing optionality and increases the company's dependence on the supplier. Thirdly, the pace of business dealings and rapidity of technological change makes the window for conducting audits and the time-period for validity

of gathered information shorter. Of the problems mentioned, the latter two are largely outside Call AS control, and there is little the company can do to address them aside for trying to find sourcing alternatives for high volume products and use open source-codes for software development. As for the challenges regarding transparency, the data acquired does not suggest that any measures are taken to resolve the problem.

4.3 Analysis

4.3.1 Do managers know the identity of their company's sub-suppliers? Moreover, if so, do they have intricate knowledge about their operations?

The gathered data suggest that there are large variations between companies when it comes to whether they know the identity and operations of their sub-suppliers. A large proportion of companies knows neither the identity nor the operations of their lower-tier suppliers. One common denominator amongst the companies with low visibility is that they operate in industries with low profit margins. This may signalize that the importance placed on creating SCV compared to other business-areas is relatively low.

On a general basis, companies are more likely to know the identity of their sub-suppliers than to have intricate knowledge about their operations. Based on the necessary effort to create these two “layers” of visibility, this finding is logical. In case of companies who actively focus on SCRM beyond first-tier suppliers, they all appear to have visibility regarding the identity of their sub-suppliers down to the lowest tier. One exception to this “rule” is the case of certain metals that are very difficult to trace.

As for having intricate knowledge about the operations of sub-suppliers, one important determinant appears to be the extent of the supply network (number of actors). Where the extent of the supply network is relatively low, the focal organization has intricate knowledge about all sub-suppliers operations, while more extensive supply networks necessitates the selection of a sub-set of suppliers due to restrictions of cost, time and manpower.

4.3.2 How do buying organizations assess risks beyond tier-one suppliers?

How buying organization assess risk beyond first-tier suppliers depend on what form of risk is being assessed. For example, quality, and delivery-time risk can be assessed by examining and recording historical performance. This however relies on tracing the root cause of the errors back to the responsible sub-suppliers if the problem does not stem from tier-one.

Business continuity risk is generally easy to assess by reviewing sub-suppliers balance sheets and other financial documents. The accessibility of documents either openly or by request is a prerequisite for the feasibility of these assessments.

For the assessment of risk related to disruptions due to regulatory changes or natural catastrophes, focal firms rely on aggregate analysis of the external environment the sub-suppliers operates within. This relates to both regulatory/political regimes, regional susceptibility to weather-related incidents and the optionality in the supply-market for the products in question.

The aforementioned assessment types and techniques all relate to the probability of a specific risk-type to occur or its consequences. Most companies do not place equal important on all forms of risk, thus it becomes advantageous to have an assessment tool that allows the focal-company to incorporate their own perceived criticality. One such tool is a CRS, an example of which is presented in *Table 12: Compound Risk Score example. (Own production)*.

Table 12: Compound Risk Score example. (Own production)

Compound Risk Score			
<u>Risk-type</u>	<u>Criticality(1-10)</u>	<u>Likelihood(1-10)</u>	<u>Computed</u>
CSR	10	3	30
Delivery-time	5	6	30
Quality	2	4	8
Disruption	7	8	56
Compound Risk Score Company X			124

Criticality is a key concept when it comes to risk assessment beyond first-tier suppliers, and should be one of the main decision-variables when it comes to deciding what and who to monitor. Note that criticality can refer to both the impact of a risk-element, but also to the role of a purchased product or component to the focal firm's main product. Since a small

inexpensive component can sometimes be vital to a larger high value product or service, it could be advisable to curtail “value” as a determinant of assessment.

While the CRS presents a holistic approach to risk assessment, there is an alternative way to assess risk related to suppliers beyond the first-tier. This second view places even higher value on criticality and involves finding the few most critical areas/risk/products for the focal firm and conduct SCRM efforts towards lower-tier suppliers with these as a solitary focus.

4.3.3 How do buying organizations monitor the performance of suppliers beyond tier-one (subcontractors)?

Buying organizations monitor sub-supplier performance in five different ways. By sub-supplier self-reporting, reports from tier-one suppliers, audits by the focal organization, third party audits, and witness points. There are slight variations in how focal organizations use self-evaluation forms as a monitoring practice. The data suggests self-evaluations take the form of either a checklist or a questionnaire. The common denominator is that it is adapted to the risk areas the focal firm might encounter with that specific sub-supplier, and that the self-evaluation form can be a decider to increase monitoring for the sub-suppliers. Another way to monitor sub-suppliers is by receiving aggregated information from the tier-one suppliers.

A prerequisite for this type of monitoring is that both the focal firm and the tier-one suppliers have a common interest in monitoring the sub-suppliers. If the focal firm have a power-dependence disadvantage it would be virtually impossible to dictate the tier-one supplier to first monitor the sub-suppliers, and then provide the information to the focal firm.

The data also shows that some companies prefer to conduct the auditing of their sub-supplier themselves, by utilizing their own audit team/quality team. It might be fruitful for the focal firm to perform the audit themselves, since the team is competent and possess great knowledge about their own customers and the final use of the product, making it easier to know the quality requirements to run the audit on sight. Third party monitoring is another way to organize monitoring, and ensure that sub-suppliers operate ethically, and deliver high quality products. The third-party auditing reports may have

higher credibility when the intended audience is outside of the focal company as the auditors have little or no vested interest in the audit results.

In some cases, the tier-one supplier can audit their own suppliers and send their auditing reports to the focal company for review. In these cases, the relationship between the focal firm and their supplier was good, and they got invitations to join those on sight audits on a regular basis. As both parties had an interest in monitoring and improving their sub-suppliers, organizing the auditing in this manner was beneficial for both parties.

The last form of monitoring we encountered was the witness points. This contractual agreement ensures that the focal company are notified when certain parts of production commences, and the focal firm then send a team to oversee the production. This type of monitoring allows the focal company to assess the process and receive direct information on quality issues or setbacks in production.

To summarize, there are numerous ways to monitor sub-suppliers, and it seems to be situational how companies approach monitoring. Factors such as the industry firms operate in, power-dependency relationship between focal firm and its suppliers, as well as available resources are factors that decide to what extent firms monitor sub-suppliers, and what techniques they use.

4.3.4 What are the challenges of managing risk beyond tier-one suppliers?

The challenges concerning SCRM beyond first-tier suppliers can be separated into two categories; challenges that hinder companies from conducting SCRM, and challenges they experience when conducting SCRM-related work.

In the first category, a major challenge is that the first-tier suppliers are unwilling to disclose information about the subsequent tiers. A second challenge is that the focal company needs to allocate enough available resources in terms of personnel and money to conduct SCRM work. For companies who are already managing risk beyond first-tier suppliers, challenges still include resource-limitations on personnel, time and money that place restrictions on the extent

of SCRM efforts. This forces companies to be selective regarding which sub-suppliers and functional areas to include in SCRM-work.

A second challenge is the issue of transparency in the SCRM process. Where there are many people and several organizational levels involved in the risk management process it becomes increasingly challenging to keep track of- and coordinate activities. This challenge is particularly prevalent in situations where several organizations in the supply-chain conducts SCRM, and includes potential outcomes such as overlapping procedures which creates unnecessary expenditure, and unrecognized monitoring gaps.

4.3.5 How do buying organizations address the challenges of managing risk beyond tier-one suppliers?

To address the challenge of getting resources allocated to conduct SCRM, our data suggest that it might be fruitful to focus on the role of CSR in hindering- or negating the negative PR-effects of a CSR incident at sub-supplier level. CSR however, is only one element within SCRM, and there is no evidence in our data to suggest that highlighting the risk-mitigating effects of CSR would encourage top-management to allocate more resources to other SCRM-issues.

Where the problem of having enough resources to conduct SCRM stems from low margins, low capital reserves rather than low support from top-management, counteracting it has no “easy-fix”.

It is worth noting that a focal company, which cannot afford the expense of conducting SCRM, can neither afford the consequences of large-scale disruptions to its supply chain or continuous sub-standard performance.

In situations where the first-tier supplier acts as a barrier to SCRM by restricting the focal company’s access to information about the lower tiers of the supply chain, the options for the buying firm are meagre. The optimal solution is to find a first-tier supplier that either has more beneficial stance on supply-chain transparency, or in regards to which the buying organization has enough power in the relationship to demand access. If such an option does not exist, the data suggest that the best option for the buying firm is to avoid conflict and maintain open channels of communication to facilitate the exchange of tacit-knowledge.

The challenge of selecting which suppliers to focus on in SCRM when the supply-network is expansive is addressable, but not without effort. It does require that the focal company have done a complete supply-chain mapping so that it at least knows the identity of all actors in the supply chain as well as which products and services they contribute with to the supply chain. Furthermore, the focal company must collect data on the external environment of all actors. This includes the regulatory- and political environment, regional predisposition to weather/climate related incidents and alternative sources of supply. Lastly, the focal company must evaluate the criticality of each risk-type to their business, *ceteris paribus*.

When all of this information is compiled, the focal company has the necessary data to conduct a risk analysis, using a tool such as the CRS described in *Table 12: Compound Risk Score example. (Own production)*. After doing so for all sub-suppliers and creating a database for compound risk scorecards, the focal firm can easily sort the sub-suppliers by score and select the ones with highest aggregate scores as targets for SCRM. How many sub-suppliers to select depends on the budget-restrictions.

4.3.6 Chapter summary and additional findings

This chapter presented the findings and analysis of the study. Overall, we find that there are large variations in SCV, and that buying firms are more likely to know the identity of their sub-supplier than to have intricate knowledge about their operations.

Those companies that actively assess risk beyond tier-one focus generally focus on either product-criticality or the availability of alternative suppliers. Not all companies monitor sub-supplier performance, but amongst those that do, behavioral monitoring such as supplier self-evaluation, buyer audits and third-party audits are feasible methods. Sub-supplier performance can also be monitored by output monitoring if complemented with additional efforts.

The challenges concerning SCRM beyond first-tier suppliers can be separated into two categories; challenges that hinder companies from conducting SCRM, and challenges they experience when conducting SCRM-related work. For the former, unfavorable power-dependency towards the tier-one supplier is the main issue, while selection-problems are the main challenge for the latter.

In addition to this, the study has produced several interesting findings that are relevant for SCRM beyond first-tier suppliers, but are not addressed directly by our research questions. Those findings are presented in the following paragraphs.

Information-flow between tiers in the supply-chain is hierarchical, with little or no direct information flow between tiers that are not subsequent, leaving it slow and susceptible to distortions. One potential reason for this is that each tier acts as sorting device, distributing information based on the requirements and needs of the next tier in the supply chain. Because there is no direct contact between the focal organizations and the sub-suppliers, investigating SCRM beyond first-tier suppliers, requires researchers to analyze the relationship between focal-firm and tier-one suppliers.

Focal companies who use contingency planning for sourcing optionality as a mitigation strategy does not evaluate whether the alternative suppliers have sufficient free capacity to accommodate their required purchasing quantity.

SCRM beyond first-tier suppliers is a multi-theoretical discipline that is not adequately addressable by using a single theory. Whether it is possible for a focal company to conduct SCRM can be explained by power-dependence theory. Whether it is beneficial is explained by TCT and SET, while RDT explains which suppliers and products to focus on.

Chapter 5

Discussion

5.1 Chapter Introduction

The objective of this research has been to uncover new knowledge about SCRM beyond first-tier suppliers, thereby contributing to closing a major research gap within the field. We have done so by utilizing a multiple case study with theoretical replication-logic to examine existing practice, and through reviewing extant literature within adjacent academic fields, adapting existing theory to use beyond tier-one suppliers. In this chapter, we will elaborate on our analysis, challenge our findings and evaluate their fit with existing knowledge.

5.2 Knowledge about the identity and operations of sub-suppliers

In our sample, we found that there are different degrees of visibility in the supply chain. While some firms do not know the identity nor the operations of their sub-suppliers, others have more visibility in their supply chain and intricate knowledge of sub-supplier operations. Logically, the focal firm cannot choose an approach to manage risk beyond first-tier suppliers when those entities are unknown. When firms do not manage risk beyond tier-one suppliers, they become unable to influence existing risks, thus they are more vulnerable to risks that may affect their daily operations. Interestingly, some of the negative effects firms stated they encounter when they were unaware of the sub-suppliers identity could be mitigated by increasing the visibility in the supply chain. Bartlett, Julien, and Baines (2007) findings on visibility indicate that there are significant improvements in both schedule adherence and overall supply chain performance.

However, even if the focal firms actively try to pursue these benefits by increasing the visibility, their first-tier supplier might be lacking the same interest.

The power-dependence in a buyer-supplier dyad may therefore affect the visibility, and Nguyen et al. (2017) study show that those who have dependency on their supplier are more reliant on visibility to mitigate risks, and vice versa. Thus, if the supplier with high relative power does

not want to commit to SCRM strategies, it is difficult to implement. With the increased complexity of supply chains in recent decades, there has been an emphasis in academia on collaboration and strategic coordination across businesses to improve the overall supply chain performance. However, the actual practicing of SCM (and SCRM) in the majority of our sample takes place to a limited degree and does not fulfill the envisioned theoretical scope for neither SCM nor SCRM. Our data suggests that it is more likely the management of supply chains take place between the focal firm and the first-tier suppliers, which Ballou's (2007) paper corroborates.

On the contrary, those firms that conduct SCRM beyond tier-one do their best to manage risk all the way to the raw material. This seems reasonable because, in theory, if they only have knowledge up to their tier-two supplier for example, they would still be vulnerable to unknown risk from tier-three and beyond. Furthermore, those who conduct SCRM all the way to the raw material have the financial capacity to do so, unlike industries with low margins where SCRM and visibility are often not a priority. Our findings also indicate the complexity of the supply network affects the SCRM initiatives; more suppliers mean more complexity and increased difficulty to implement full visibility. We argue that this is interconnected with available resources and finances, since implementing SCRM initiatives are both cost and time consuming.

Even the firms who had intricate knowledge of their sub-suppliers operations, did not operate on shared IT-platforms, and thus the information was not something they could monitor constantly in real-time. This is unfortunate since shared systems is important to realize the benefits of visibility. Our conclusion on visibility is similar to other papers e.g. (Li et al. 2015; Nguyen et al. 2017; C. S. Tang 2006) that visibility is an important proactive approach to mitigating supplier risk for the buying firm.

5.3 Risk assessment beyond first-tier suppliers

Organizations use different tools and strategies to assess risk beyond first-tier suppliers. This is due to the variations of industries, the relationships with their first-tier suppliers and the characteristics of their sub-suppliers products. When it came to assessing quality and delivery

related risk, firms looked at the historical performance. That approach gives an overview of the amount of deviations related to quality or delivery time. If there are frequent deviations, the firm pursue the sub-supplier responsible and implement strategies to eradicate the problems. Surely, this approach has its advantages and help firms tackle issues in their supply chain. However, other risk assessment tools should supplement this approach, because firms are acting on issues that have already affected them, meaning it will not prevent the issues to occur in the first place.

Firms are also vary of the financial aspects of their sub-suppliers, where some of the firms in our sample highlighted the importance of business continuity and the related risks. Especially in the screening phase of a new supplier, it is important to examine their financial reports, to ensure their sub-supplier are not in risk of going bankrupt.

Business continuity risk is relatively easy to assess, and the focal firm can review the sub-suppliers balance sheets and other financial documents. The consequences of not assessing business continuity risks might be higher than the cost of performing one. Depending on the product they deliver, it might be complicated and time consuming to replace the bankrupt sub-supplier, thus we argue that the focal firm should conduct this assessment not only for new suppliers, but also for already established relationships. Some firms also assess the risk related to disruptions in their supply chain and having a proactive approach towards it.

Knowing when a disruption might affect the company is virtually impossible, but assessing the risk and doing the due diligence is a proactive approach, which enables firms to prepare for regulatory and political shifts in the area the sub-suppliers operate. The actual assessments are done by receiving aggregate analysis of the external environment sub-supplier operate in. Certain areas are more susceptible to weather related incidents, and by being proactive, the focal firm can have other sourcing opportunities readily available if disruption strikes.

It is possible all of the aforementioned risks are something the focal firm would encounter with multiple sub-suppliers in their supply chain. If so, it would be convenient to prioritize which sub-suppliers are critical to the company, and the probability of certain risks affecting the company.

The CRS allows the company to incorporate the risk they perceive to be most critical to their operations and based on the total risk score, they can pursue those sub-suppliers with the highest score first. In existing literature, we find that other practitioners have similar methods like the aforementioned CRS, where they combine probability and impact in a risk map/matrix. However, Ericsson found that the assigning “risk value” (impact multiplied with probability) is not always easy to use nor understand for business people (Norrman and Jansson 2004). Therefore, they focus on the financial impact when assessing which product or sub-supplier to focus on. Ericsson calculate the financial value of impact by multiplying gross margin with “business recovery time”, plus extra cost such as inventory carrying, idle capacity, labor and equipment. While there are different alterations to the risk matrix, the objective remains the same: to uncover which sub-suppliers to look into, and use this information to decide which approach the focal firm should implement for mitigating the risks.

When it comes to risk assessments in supply chains, we agree with existing theory, which argues that identifying, and assessing possible risks and their impact in a supply chain is a complex task. This is due to the multiple nodes and links in a supply chain, where companies must identify risks directly linked to their products, but also uncover all the risks involved with the different linkages between other suppliers. Gilbert and Gips (2000) found that while assessing sub-supplier risks are feasible, costs increase and it gets less practical to analyze the exposure of a supplier’s sub-supplier. Thus, the further upstream you assess risk the more difficult it becomes, amplifying the need to utilize, for example, CRS to pursue the most critical sub-suppliers first.

Furthermore, when Harland, Brenchley, and Walker (2003) conducted four case studies on the electronic sector, they concluded that less than 50% of the risks in the supply chain was visible to the focal firm.

This emphasizes the importance of thorough supply chain assessments to reduce the focal firm’s vulnerability, but at the same time indicating that there is much potential still, for increasing visibility and risk assessments in supply chains.

5.4 Performance monitoring beyond first-tier suppliers

We find that there are two categories of monitoring performance beyond first-tier suppliers. Direct monitoring of sub-suppliers, which can take form of sub-supplier self-evaluations, buyer audits and third-party audits, and indirectly by monitoring the monitoring efforts of suppliers. The latter is done through reviewing audit-reports and evaluating monitoring strategy. This form of indirect monitoring of both tier-one and lower-tier suppliers is given special attention in the monitoring regime of Ericsson (Jansson and Norrman 2004), suggesting that it has merit beyond the first-tier.

Irrespective of monitoring categorizations and specific techniques, most companies monitor the performance of sub-suppliers in one way or another. For direct sub-supplier monitoring the focus appears to be on the sub-suppliers adherence to standards regarding ethics and compliance, while quality- and other product related risks are the responsibility of suppliers. There are several reasons why this division is sensible. If we look at the effect of a product quality deficiency originating at sub-supplier level, the focal organization is unlikely to bear the financial responsibility. If the tier-one supplier detects the deficiency, the cost of replacement goods will be assigned to either the sub-supplier or the tier-one supplier (depending of terms of their contract). If the deficiency is discovered by the focal organization upon receiving the goods, buyer-supplier contracts will according to our findings often include clauses that either requires the supplier to send replacement products or allows the focal organization to source comparable products at the tier-one suppliers expense.

Another argument for assigning the duty of performance monitoring regarding quality to a sub-suppliers subsequent downstream buyer is that they are more likely to have product-specific technical expertise exceeding that of the focal organization, making it easier to conduct effective monitoring.

In the case sub-supplier performance in CoC-compliance on the other hand, the detection of sub-standard performance will have immediate impact on the focal organization, making it more critical for the organization to monitor it themselves.

All companies in our sample who engaged in direct sub-supplier monitoring used supplier self-evaluation as a part of their monitoring process. This could be because of their simplicity and inexpensive nature. Despite their applicability, sub-supplier self-evaluation only appears to be complementary to other forms of monitoring. Noordewier, John, and Nevin (1990) finds that

the two main benefits of monitoring are the discouragement or discovery opportunistic behavior and improved purchasing performance. If an outside party does not check the information provided by the sub-supplier in self-evaluation forms, using them does not reduce the sub-suppliers room for opportunistic behavior. If the focal company conducts audits however, the self-evaluation forms may serve as a baseline to which the audit-results can be compared.

The focal organization has two different methods of direct auditing of sub-suppliers, namely buyer-audits and third-party audits. Which type focal organizations should utilize is situational. If the audit is based on the focal-company's internal ethical guidelines/CoC, an audit team from the focal company is likely to have more intricate knowledge about the program than third-party auditors. Furthermore, doing the audits themselves allows for updating and improving both codes-and auditing routines over time based on the gathered experience.

One of the weaknesses of buyer-audits compared to third-party audits is their lack of credibility in the eyes of external stakeholders due to the vested interest of the focal organization. These external stakeholders may include both buyers/consumers, and certification-agencies who accredit companies based their audits CSR and compliance efforts. Where the audit is based around industry standards rather than the focal company's own ethical guidelines and CoC's, third party certification-agencies may also have more intricate knowledge and experience about how to conduct the audit successfully.

Heide, Wathne, and Rokkan (2007) utilize two types of monitoring. Behavioral monitoring, which can be defined as "*evaluating the processes that are expected to produce the focal outcome*"- (Heide, Wathne, and Rokkan 2007 p.426) include the aforementioned auditing and self-evaluation forms. Where behavioral monitoring evaluates processes, "output monitoring" involves evaluating the results.

Within our sample there was one example of output monitoring where the focal organization kept track of deficiencies within incoming orders and using that information to determine whether or not to conduct more intrusive monitoring. For monitoring sub-supplier performance however, output monitoring alone is not a functioning approach unless the focal company traces deficiencies to a specific sub-supplier. This requires SCV and the use of root cause analysis. If

the focal company can both trace deficiencies and has a procedure for conducting root-cause analysis, output monitoring can be a functional, although reactive way of monitoring sub-supplier performance in terms of quality.

As stated by Heide, Wathne, and Rokkan (2007) behavioral monitoring can be perceived as more intrusive than output-monitoring. The question of access and power-dependence therefore becomes relevant. If the sub-supplier has a power advantage over the monitor and does not agree to behavioral monitoring, output monitoring may be a “second-best” option.

Our findings suggest that there is a substitutive relationship between screening and monitoring of sub-suppliers, thereby concurring extant theory on monitoring in buyer-supplier relationships e.g.(Ittner et al. 1999; Heide and Stump 1995), but not to the degree that focal companies can select one instead of the other.

5.5 Challenges to- and solutions for managing risk beyond first-tier suppliers

Our findings suggest that all companies' face challenges regarding SCRM beyond first-tier suppliers. The challenges are diverse in nature, grounded in different theories and require distinctly separate solutions. We find it appropriate to group the challenges into two categories; “*Barriers*” that hinder focal organizations from engaging in SCRM beyond tier-one suppliers, and “*Impediments*” which we define as challenges faced when engaging in SCRM.

Barriers

Visibility and access

In light of the finding that information-flow in all supply-chains in our sample is hierarchical with information siphoned through each tier both upstream and downstream, focal companies largely depend on their supplier for information on their lower-tiers. Thus, the relationship

between the focal organization and their first-tier supplier becomes a determinant of whether the focal organization has the opportunity to gain access and visibility in the lower tiers of the supply chain.

Based on our findings and extant theory within power dependence e.g.(Emerson 1962) we define four categories that firms may find themselves in regarding their relationships with tier-one supplier and its implications for SCRM beyond first-tier suppliers. These categories are listed and described in Table 13.

Table 13: The four stances within SCRM beyond first-tier suppliers (own production)

The four stances on SCRM-beyond tier-one	
Stance	Description
Control	The buying organization is actively mapping the supply chain, creating visibility and attempting to manage risk beyond first-tier suppliers. It can do so because it holds a favorable bargaining position with the immediate supplier, can dictate terms and require the disclosure of information.
Cooperation	The buying organization and its first -tier supplier can cooperate in conducting SCRM and share information- and responsibility irrespective of power-dependencies due to goal congruence and similar SCRM understanding.
Dependency	Due to the weak comparative negotiating position the buying organization has with its tier-one supplier it cannot extract information about the lower tiers of the SC. It is therefore entirely reliant on the supplier when it comes to SCRM beyond tier-one.
Trusting	The buying organization has the opportunity to manage SCR beyond first-tier suppliers, either by assuming a "Control" or "Cooperation" stance. Nevertheless, it chooses not to do so because of a high level of trust in its suppliers.

Focal companies fitting the “Control” or “Cooperation” descriptions are in situations where it is possible to conduct SCRM beyond first-tier suppliers. Those fitting the “Dependency” category much less so, while the “Trusting” companies choose not to.

“Control” and “dependency” are adverse concepts that fit Emerson`s (1962) findings on power and dependence in that the former, the power of the “controlling” company can overcome the resistance of their “dependent” tier-one supplier towards sharing information about the lower tiers. The opposite is true for focal companies in the “dependent” category.

For the “trusting” category, their inactivity can be explained by extant literature in SET and more specifically on the concept of affective trust and trust in competency (Ha, Park, and Cho 2011).

In order to be positioned to manage SCRM beyond first-tier supplier, focal organizations have to be either “controlling” or “cooperative”.

Thankfully, the stances described in *Table 13: The four stances within SCRM beyond first-tier suppliers (own production)* are not constant, and we would argue that companies currently in the “dependent” or “trusting” categories would benefit from transitioning to a cooperative or controlling stance. Which one of the two categories focal companies should aspire to is not clear-cut. While a cooperative approach, may reduce the cost of the supply chains SCRM efforts by that the companies involved share costs and responsibilities, it may also promote opportunism as each company place a higher importance on managing risks that are more critical to them.

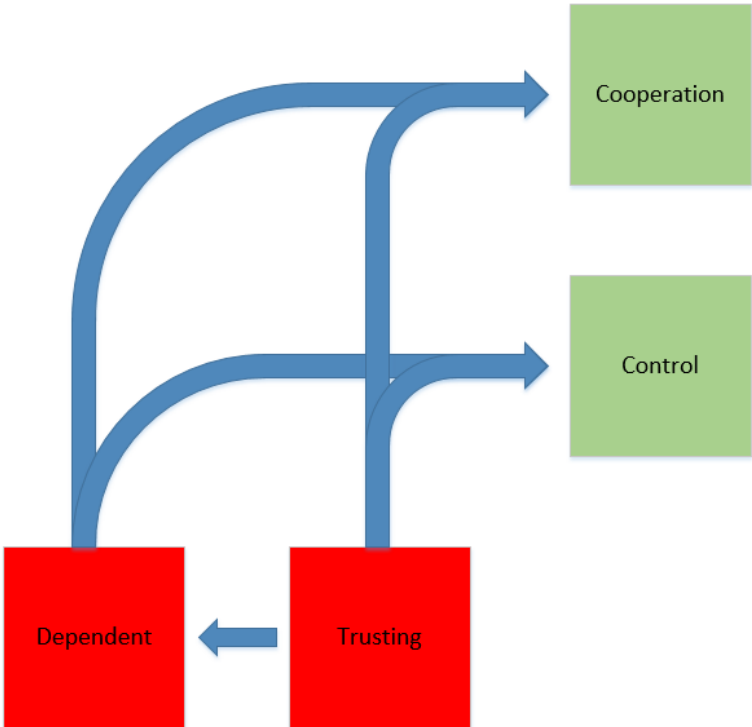


Figure 8: SCRM stance-mobility

For “dependent” focal companies, there are two transition-opportunities, first of which is to propose sharing the cost-and responsibility of SCRM with the first-tier suppliers in exchange for access. The second is through using “extension of power-network” as a balancing operation to shift power in the buyer-supplier relationship (Emerson 1962). It is worth noting that the

applicability of both these strategies relies on favorable external circumstances, and that there are therefore situations where “Dependent” organizations have no mobility. For “trusting” companies, a change in attitudes towards SCRM is needed in order for the company to position itself in such a way that SCRM is possible. However, a change in attitude, followed by a realization of inability to gain access would represent a lateral shift into the “Dependent” category.

Value and profits

In our findings, there were cases where focal firms chose not to conduct SCRM beyond first-tier suppliers because it was not considered a “value-adding activity” and thus not worth spending time and money on in the eyes of stakeholders. The common denominator for these cases is that they either were in industries with low margins, or had struggled financially in the last few years. Even if the claim that SCRM is not value-adding was true, the potential of SCRM to reduce cost related to disruptions, lower inventory buffers, product recalls, and belated deliveries should be enough to convince both management and shareholders of its potential to increase profits. Furthermore, it is worth noting that for companies that are already struggling financially and lack solidity, the consequences of disruptions could be more critical to the organization, thus suggesting that the benefits from SCRM beyond first-tier suppliers is even higher in these cases. As stated in chapter 4.3.5:

“A focal company which cannot afford the expense of conducting SCRM, can neither afford the consequences of large-scale disruptions to its supply chain or continuous sub-standard performance”

Impediments

Visibility and transparency

One challenge within SCRM beyond first-tier suppliers is that the transparency and visibility of the process is reduced when many people, business functions and companies share

responsibility for it. We find that low degrees of transparency and visibility in the SCRM-process hinders coordination and can create several undesirable results including overlapping procedures and monitoring-gaps. The effects are thereby both financial, by increasing the overall expenditure of the supply chain on SCRM, and quality-related by creating unrecognized gaps in SCRM efforts.

In order to create a joint SCRM approach that does not promote these disadvantageous effects information sharing is key. Thus, we support the findings on the positive effects of information sharing on coordination (Skilton and Robinson 2009) and visibility (Christopher and Lee 2015). Relevant information to share within the supply chain on SCRM efforts include risk-evaluations of suppliers, information on what procedures are put in place to reduce risk- and of the responsible person/team. Furthermore, the information about these issues should be updated on a regular basis, in order to maintain its relevance as a decision aid. The introduction of an IT-system to store and structure all this data would facilitate better use of the information shared in the supply chain. Research shows that this can be accomplished despite of unbalanced power relationships (Xiao, Xie, and Hu 2013).

The selection problem

The basis for problems of selection are resource constraints and supply chain complexity which makes it infeasible to instigate procedures for reducing SCR in at every tier of the supply chain, for every conceivable risk element- and product. It can apply to either products or sub-suppliers, and is closely related to “risk assessment”, which is discussed in detail in chapter 5.3.

Our findings suggest that criticality is the most compelling criteria for selecting focus-areas, which is in-line with the findings of Ellis, Henry, and Shockley (2010) on that a lack of substitutes - and the criticality of a product for the buyer is positively related to the impact of supply chain disruption. It also fits into existing theory of that the level of supplier criticality depends on sourcing optionality (Wagner and Bode 2008).

Although criticality should be of paramount importance when selecting which products and sub-suppliers to focus SCRM efforts on, purchasing value may also be important when it constitutes a major share of total purchasing value. The reason for this is that although there may exist substitute-products or alternative sub-suppliers, even a brief discontinuation would still have a significant financial impact. This perspective is captured in Ericsson`s Business

Interruption Value (BIV), which appears to be a viable decision-support tool, especially in cases where calculating the accurate probability of a risk-incident is not possible (Norrman and Jansson 2004).

After solving the selection problems, focal organizations have to determine which risk-reduction- and/or mitigation strategies to put into place. While most of these strategies are risk-specific, therefore difficult to make any general recommendations on, our findings on contingency planning deserves elaboration. Within the sample of our research there were several cases where finding alternative suppliers was a stated strategy to mitigate the effect of disruption risk. However, no one expressed that they assessed the capacity of said suppliers.

When developing contingency plans for supplier- or sub-supplier failure or disruption it is not enough to simply identify an alternate source of supply, as this new entity would need to have enough capacity to serve the needs of the supply chain. After identifying the alternate source of supply, the focal company should preferably secure capacity with the supplier by contract. The necessity of securing capacity is very visible when we examine the case of the phone producer Ericsson, who experienced major disruptions to their supply of radio-frequency chips after a fire in a supplier production facility. The same supplier was used by Nokia, a competitor who were able to reconfigure by securing capacity of an alternative supplier the moment news reached them of the fire. When Ericsson realized the extent of the disruption, the alternative supplier did not have spare capacity to cover their production volume (Jansson and Norrman 2004). If it is not possible to secure the capacity of an alternative sub-supplier or supplier proactively by contract, early-warning mechanisms should be put in place to make sure the focal company and other businesses in their supply chain can react to a disruption more rapidly than competing firms.

Based on the problems and solutions discussed in this chapter we propose an illustrative step-by-step model with feedback loops for how focal companies can manage SCR beyond tier-one suppliers in Appendix B: SCRM process diagram

Chapter 6

Implications and Conclusions

6.1 Chapter Introduction

This chapter provides a summary of the research as well as our conclusions regarding the theoretical- and managerial implications of our findings. In addition, the chapter recognizes the limitations of the study and suggest various avenues for future research.

6.2 Research summary

The main objective of this research has been to explore how focal companies can manage SCR beyond first-tier suppliers in the supply chain, and by doing so contributing to closing a research gap within SCRM.

Our findings span different theoretical concepts within SCRM including visibility, information sharing, monitoring, risk assessment, strategic sourcing and others. All of which are important steps for conducting SCRM beyond tier-one suppliers.

Visibility

Buying organizations have varying degrees of visibility into the identity and operations of sub-suppliers. However, more have information of identity than operations. As for having intricate knowledge about the operations of sub-suppliers there seems to be a correlation between focal firm having intricate knowledge and the amount of suppliers. Where the extent of the supply network is relatively low, the focal organization has intricate knowledge about all sub-suppliers operations, while more extensive supply networks necessitates the selection of a sub-set of suppliers due to restrictions of cost, time and manpower. Complete SCV is necessary for companies in order to uncover and adequately assess SCR.

Risk assessment

Criticality is a key concept when it comes to risk assessment beyond first-tier suppliers, and since the companies do not place equal importance on all types of risk, it becomes advantageous to have an assessment tool that allows the focal company to incorporate their own perceived criticality. Relevant elements for determining criticality includes the availability of alternative sources of supply and financial impact. Calculating a CRS for each sub-supplier based on multiplying criticality with probability for each type of risk may be helpful in solving selection problems.

Monitoring

There are numerous ways to monitor sub-suppliers, and it seems to be situational how companies approach monitoring. Factors such as the industry firms operate in, power-dependency relationship between focal firm and its suppliers, criticality of the product, as well as available resources are factors that decide to what extent firms monitor sub-suppliers. Behavioral monitoring is necessary to obtain sufficient depth of information regarding sub-suppliers. Ex-ante screening, has a moderating effect on the need for monitoring, but cannot replace it. The same is true for output monitoring, which can be a useful “second best option”.

Challenges- and solutions to SCRM

The main challenges to SCRM beyond first-tier suppliers include access to information, cost, selection problems, lacking technical knowledge and low supply chain transparency. The challenges are diverse in nature, grounded in different theories and require distinctly separate solutions, such as increasing visibility, positioning the firm as either “controlling” or “cooperative” and having open channels of communication.

6.3 Theoretical contribution and implications

This study makes extensive contributions to SCRM theory as well as extensions to existing theory about how to research SCRM beyond first-tier suppliers.

Our research shows that certain forms of risk does not equally effect each tier of the supply chain, thus exemplifying why focal organizations needs to be involved in SCRM throughout the supply chain irrespective of the level of trust they have in suppliers. Ref. Figure 3: The visibility frontier and its potential effect on risk detection.

In terms of SCV, we reaffirm the importance of visibility as a decision-support tool for mitigating supply chain risk, thereby concurring with existing SCRM research such as (Nguyen et al. 2017; Nooraie and Mellat Parast 2015). We also show that visibility is a determinant for whether or not a focal organization can manage SCR beyond first-tier suppliers, and that assessing SCV is therefore a natural starting point for researchers examining SCRM.

The study contributes to both Power Dependence Theory, TCT and SET by showing the usefulness of each approach in researching SCRM beyond first-tier suppliers. By using all of these theories, we developed a categorization of stances held by focal organizations regarding SCRM beyond first-tier suppliers.

By evaluating how buying organizations assess risk and comparing this to Eriksson's "best practice", we have established "criticality" as the most important factor. Furthermore, we find that when using the risk-assessments to solve selection-problems, both calculating CRS and BIV are good approaches. Which one to use depends on the information available to an organization. Where the probability of each risk element unfolding can be calculated with reasonable accuracy, our findings suggest using CRS, while BIV can be used where this is not the case.

Contributing to extant theory on monitoring, our research suggest that behavioral monitoring is necessary for the focal company to access sufficient information on sub-supplier practices to uncover- and discourage opportunism. This supports Maestrini et al's. (2018) view of a positive relationship between monitoring on opportunism, while opposing (Heide, Wathne, and Rokkan 2007). While we find that while output monitoring cannot replace behavioral monitoring, it can be helpful in assessing, and mediating risk originating in the lower tiers of the supply chain if the focal company traces the root causes of deviations.

The implications of this study rests on its ability to initiate the process of filling the research gap on SCRM beyond first-tier suppliers. Through elucidating ways to adapt extant theory to researching risk in the lower-tiers of supply chains and discovering how buying firms conduct the SCRM-process, this thesis presents a great reference-work that other researchers can use for hypothesis-generation and inspiration for further research into the field.

6.4 Managerial implications

Monitoring the sub-suppliers provide valuable information to the focal firm, without monitoring it is difficult for managers to ensure that sub-suppliers fulfill their obligations and contracts. This thesis contains several findings worth considering for managers. These findings are relevant not only to the firms included in our sample but also transferrable to other firms that seek to manage SCRM, regardless of industry.

The first consideration is that criticality should be one of the main decision-variables when choosing whom to monitor. To determine the criticality, firms should implement a CRS, based on their own perceptions of risk. The CRS score makes it easier to prioritize which sub-suppliers to focus on, and which suppliers that impose the most risk to the company's operations.

To manage SCRM beyond the first-tier, the bare minimum for the focal company is to know the identity of the sub-suppliers. However, to tackle the apparent risks, firms should monitor their sub-suppliers. Firms that have limited resources should at least strive to impose self-evaluation forms on their sub-suppliers or organize with their tier-one supplier to gather relevant information for their convenience. However, firms that have the opportunity should combine the aforementioned self-evaluations with more extensive monitoring efforts, e.g. audits and witness points, which will provide a more holistic picture of the situation, making it easier to manage SCR.

In a SCRM beyond first-tier supplier context, trust is an important aspect, as the degree of trust the focal firm has in its first-tier supplier could potentially determine the necessity to manage sub-supplier risks themselves, or if they can assign the first-tier supplier to do so. Teng and Das (2013) research on trust and control in creating cooperation finds that trust may reduce the need for complex contracts, but at the same time, a well-defined contract may reduce the need for trust. If the focal firm choose to outsource the monitoring or risk management responsibility to a first-tier supplier, we argue that it is important that both "affective trust" and "trust in competence" is present. The former emphasizing openness, mutual understanding and honesty, while the latter focus on the sub-suppliers capabilities, acknowledging their skills and expertise. Trust is something that develops over time, and is not constant; therefore, the measures of control managers implement should also differ over time.

In the early stages of trust development, it is rational to utilize contracts to increase the control. When the suppliers have proven themselves and trust is established, it is possible to rely more on trust than contracts.

We argue that there is a symbiotic relationship between SCRM beyond tier-one suppliers and sustainability. If a focal organization builds visibility in the supply chain to reduce risk, the information gathered may also be relevant for evaluating environmental- and social sustainability in the lower tiers of the supply chain. Consequently, the companies who actively conducts SCRM will accrue lower costs from ensuring sustainability in the supply chain than other organizations. Furthermore, several determinants of successful sustainability management, e.g. strategy alignment and risk perception (Leppelt et al. 2013), mirror our findings for SCRM. This strengthens the case for conducting sustainability and SCRM synchronously.

Managing risk beyond first-tier suppliers impose challenges to the managers. The challenges are diverse in nature, and require different risk management approaches. However, for the firms to manage risk, they need to position themselves correctly. Firms who seek to manage SCRM beyond tier-one should strive to position themselves in either a “cooperative” or “controlling” category. Those firms who are in the “dependent” category can try to convince their first-tier supplier that SCRM further upstream is important and beneficial for both parties. If this approach is not successful, “dependent” firms could look for other suppliers willing to conduct SCRM in cooperation with them. If they are able to find new suppliers and find themselves having more power in this relationship, it is possible to dictate terms, as the “controlling” firm can overcome the resistance of their “dependent” supplier. However, if the firm are unable to establish new suppliers nor convince the existing supplier to share cost and collaborate, the dependent focal firm are limited in its abilities.

For “trusting” companies, a change in attitudes towards SCRM is a prerequisite for the company to position itself in such a way that SCRM is possible. At this point, they might discover the possibilities of cooperation with their first-tier suppliers and establish SCRM initiatives. They might also be “controlling” the first-tier supplier if the external environment allows them too, and force SCRM strategies upon their suppliers and sub-suppliers. However, they might discover that their first-tier supplier are unwilling to conduct SCRM beyond first-tier suppliers, and that they cannot affect that decision.

If this is the case, they are not “controlling” anymore, but rather “dependent”, with the same aforementioned transitioning opportunities as those firms in the “dependent” category found in Figure 8: SCRM stance-mobility.

6.5 Limitations and suggestions for further research

In order to provide other researchers and readers the chance to evaluate the quality and future use of this thesis, this sections presents areas that provide opportunities for further research.

First, there are opportunities for future researchers to increase the literal replication, by increasing the number of cases. Therefore, we suggests that future researchers expand the case study cope, for example, by increasing the cases to five different industries with five companies in each industry to ensure that the results are significant.

Second, the study did not focus on a specific risk category but rather those risks our sample stated were most apparent to them. For future research, it would be interesting to go more in depth on each risk-type, for example quality risks, social risks and upstream disruption risks. This could provide better insights to why certain risks affect different industries, and how the companies can handle those risks.

Third, emerging technologies e.g. blockchain could affect the widespread traceability in a supply chain, trust between entities, and alter how modern contracting are conducted (Francisco and Swanson 2018). For future research, it would be interesting to see if some of these technologies could have a mitigating effect on SCRM beyond-first-tier suppliers.

Fourth, the study is based only on buying firms and thus lacks perspective of supplier firms. By only focusing on the buyers, we get one participants view of the situation. Suppliers and sub-suppliers could provide important information to better understand the whole situation, and allow us to get both sides view on different situations and issues. Future research may consider involving both buyer and suppliers in a study to get a more holistic understanding of SCRM beyond first-tier suppliers.

Fifth, the study is based on the present and previous experiences of the case companies regarding SCRM beyond tier-one and thus it does not capture the evolution of approaches to risk management. Future studies may consider deploying longitudinal design that will allow tracking changes in risk management approaches over time.

Sixth, the findings of our study suggests that managing risks associated with sub-suppliers is generally useful, the study did not set out to quantify the benefits of managing risk beyond tier-one suppliers. Future research may consider comparing performance of firms that manage risks associated with their sub-suppliers versus those that do not, and measure the effect of specific SCRM strategies.

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Appendices

Appendix A: interview-guide.

The interview-guide presented below is the standardized semi-structured interview guide used with minor adjustments in all case-interviews.

Interview-guide

1. In short, can you describe your business, and what kind of products and services you procure?
2. What does your supply chain look like? Is it stable or volatile?
3. What kinds of risk do you experience in relation to your company's operations?
-Especially connected to sourcing and procurement
4. Is there a framework for how to evaluate risk?

Visibility

1. Do you know who your sub-suppliers are?
2. How would you describe your relationship with these?
3. Is there any information-flow between you and your sub-suppliers? If so, how does it happen?
4. Why would knowing your sub-suppliers and eventual risk associated with them be of interest for companies? Which benefits do you see?

How can companies monitor sub-supplier performance?

- 1.) Which operations/activities would be relevant to monitor?
- 2.) What are the potential gains from monitoring sub-supplier performance and operations?

- 3.) How can/should the monitoring be organized? Self-evaluation, through subsequent tier in the supply chain , by the buying firm or by a third party?

Information flow.

- 1) If a sub-supplier detects an emergent risk which may influence your company, how do you imagine this information would reach you?
 - 2) What information would you be interested in receiving from your sub-suppliers?
 - 3) Would the relationship between you and your suppliers influence the experienced need for monitoring and control? If so, which factors would be relevant?
(relationship length, same nationality, historic performance)
 - 4) Will the importance, value or complexity of a product have an effect on which control measures are put in place, and the extent of these?
-
- 1) What do you perceive to be the greatest challenges when it comes to managing risk related to sub-suppliers?
 - Have you experienced any such challenges recently?
 - If so, how did you overcome them?
 - 2) Do you have a framework for how to react to/handle risk?
Ex. Criticality matrix
 - 3) How would you describe the relative power between you and your suppliers?
 - 4) How dependent are your suppliers on you, and vice versa? (In terms of size, sales volume and alternative suppliers/customers).

Contract-related

1)

In your experience, when you procure products from a supplier, is it usual/feasible to dictate guidelines for the supplier's sourcing?

- How about other types of clauses regarding requirements for security stock, storage financial security etc.?

GENERAL EXPERT QUESTIONS

1. Should companies conduct risk-related work aimed at suppliers beyond the first-tier? If so, in which circumstances, and by what measures?

Is there anything you would like to add?

Would it be possible for us to look at one of "X"'s contracts with one of its supplier (active or inactive)?

Appendix B: SCRM process diagram

Based on our findings from case interviews, best practices and existing SCRM literature, we propose a model for how companies can manage SCR beyond first-tier suppliers:

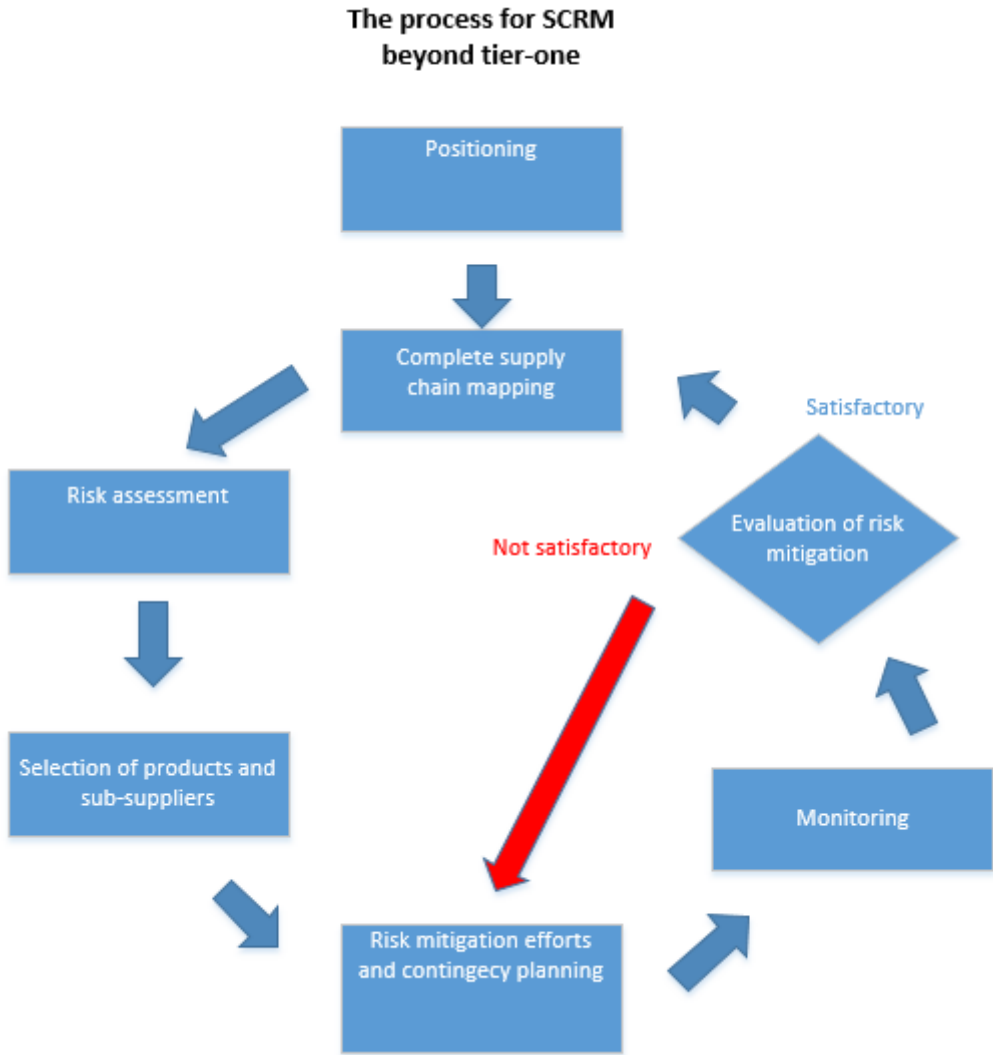


Figure 9: SCRM process diagram

The process begins with “positioning” and involves placing the focal organization in a position where SCRM is possible. This equals either a “control” or “cooperative stance as shown in Figure 8: SCRM stance-mobility.

The next step is to map out the supply chain, uncovering the identity and processes of each actor at every level of the supply chain before running a risk analysis that should include both an analysis of the external environment of the sub-suppliers and criticality of different types

of risk and products. By collecting the risk assessments in a database, the focal organization can sort sub-suppliers by either CRS or BIV, thus selecting what and who to focus SCRM-efforts on.

The next step is to develop mitigation strategies and contingency plans aimed at reducing the level of SCR to an acceptable level. After implementing these solutions, the organization should reevaluate the risk-level and conclude on whether risk has been lowered to an acceptable level. If this is the case, the SCRM-process starts over again in the case of changes in the supply chain or external environment. If not, new mitigation strategies should be implemented.