

**Stock Market Reaction to A Buyer's Supply
Chain Sustainability Management:**

*An event study examining the consequence to buyers and their
suppliers*

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Abstract

In response to increasing stakeholder pressure on firms to improve environmental and social performance, firms increasingly adopt supply chain sustainability management (SCSM) that place new requirements on their suppliers. This research explores how SCSM from a firm (i.e., a buyer) influence their own and their suppliers' financial performance using objective measures. The difference in the magnitude of the impact of SCSM on these two levels of the supply chain is explored. Factors that influence the impact of SCSM on financial performance are investigated for both buyers and their suppliers, focusing on the nature of SCSM and firm-level characteristics.

Event study methodology was used to measure the financial performance of buyers and suppliers by estimating the abnormal stock returns in response to buyers' SCSM announcements made between 1990 and 2016. In the buyer analysis, 308 announcements of buyers' SCSM were used. In the supplier analysis, a 'related firms' design was used by matching the suppliers to their paired buyers, to give a sample of 2189 supplier observations derived from 219 buyers' SCSM announcements. A cross-sectional regression analysis was used to test the effects of the factors on financial performance for each of the buyer and supplier observations in the samples. A paired sample t-test using the observations paired from the same announcements was used to investigate the different impact of SCSM on buyers and suppliers.

The impact of SCSM on both buyers' and suppliers' financial performance is statistically significant and negative and is more negative for suppliers. Three factors influence buyers' financial performance change in response to SCSM adoption. Less negative financial performance was found when several buyers jointly develop and mandate SCSM on their suppliers using a 'group SCSM' approach or when they emphasize the social dimension of SCSM (e.g., labor rights). However, buyers with high growth prospects suffer more negative financial performance.

Five factors influence suppliers' financial performance change in response to SCSM compliance. The suppliers that have a high level of buyers' dependence and high inventory slack have less negative financial performance when they are required to comply with their buyers' SCSM. However, group SCSM approach used by buyers and a long-term relationship with buyers increase suppliers' negative financial performance.

A high level of financial slack and dependence on buyers interactively create more negative financial performance.

There are two main research implications. While the impact of SCSM in a supply chain context (in dyadic relationships) suggests all parties are worse off, a buyer can shift the burden of SCSM to its suppliers as shown by the greater magnitude of negative financial performance for the supplier than the buyer. There are factors that both buyers and suppliers can consider and control to balance sustainability with financial performance through a buffer or benefit, when SCSM is being adopted.

The magnitude of the expected negative financial performance suggests challenges in SCSM adoption for managers, particularly the shift of risks and costs to suppliers. Managers may deal with business risks relating to SCSM based on the influential factors proposed by this research to buffer against the negative impacts. The negative financial performance over the supply chain suggests that the long-term prospects for SCSM are fragile. Policy implications include additional societal support (e.g., tax support) for the firms adopting SCSM.

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Abbreviations

AR	→	Abnormal Return
BDS	→	Buyer's Dependence on Supplier
CAR	→	Cumulative Abnormal Return
CIK	→	Central Index Key
COGS	→	Cost of Goods Sold
CRSP	→	Center for Research in Securities Prices
CTC	→	Cash-to-cash Cycle
eSCSM	→	Environmental Dimension of SCSM
EU	→	European Union
IBM	→	International Business Machines Corporation
JIT	→	Just-in-time
NGOs	→	Non-Government Organizations
NRBV	→	Natural Resource-based View
OEM	→	Original Equipment Manufacturer
OHSAS	→	Occupational Health and Safety Assessment Series
OLS	→	Ordinary Least Squares
RDT	→	Resource Dependence Theory
RFID	→	Radio-frequency Identification
ROA	→	Return on Asset
ROE	→	Return on Equity
SCM	→	Supply Chain Management
SCSM	→	Supply Chain Sustainability Management
SDB	→	Supplier's Dependence on Buyer
SEC	→	Securities and Exchange Commission
SEF	→	Theory of Swift and Even Flow
SIC	→	Standard Industrial Classification
SRM	→	Supplier Relationship Management
sSCSM	→	Social Dimension of SCSM
TBL	→	Triple Bottom Line
TCE	→	Transaction Cost Economics
VIF	→	Variance Inflation Factor
VUB	→	Theory of Variation and Uncertainty Buffering
WCED	→	World Commission on Environment and Development

Chapter 1. Introduction

“At approximately 9:00 a.m. local time on Wednesday, April 24, 2013, Rana Plaza, an eight-story commercial building in Savar Bangladesh, collapsed. [...], there were 1133 fatalities and 2348 injuries. [...], the Rana Plaza disaster is one of the worst industrial accidents in history. The scale of this unspeakable tragedy increased awareness of [...] the need to improve supply chain governance mechanism for working conditions and safety [...].” (Jacobs & Singhal, 2017, p. 1)

Human activities have created substantial environmental and social damages; for example, climate change and poor working conditions are threatening people's livelihoods. Society has been increasingly calling on firms to become more sustainable through balancing their environmental and social performance with economic/financial growth. Due to firms' close work in supply chain operations in modern business, firms' aggregate sustainability performance is the function of their supply chain partners' conducts (Tate et al., 2012). The societal demand for sustainability, therefore, has been extended to request firms to manage their supply chain partners' environmental and social performance through supply chain sustainability management (SCSM) (e.g., improving work safety). However, the 2013 Rana Plaza disaster has revealed the gap between the societal desirability of SCSM and firms' adoption of SCSM in practice, with many factories in Rana Plaza operating as the supply chain partners of high-profile Western firms. Are these high-profile Western firms reluctant to manage their suppliers' environmental/social performance because they are concerned about the possibility of negative financial performance? Are these suppliers also reluctant to comply with their buying firms' SCSM mandates in fear of negative financial performance? Are there any factors that influence the negative financial performance of the firms and their suppliers in SCSM adoption? This research examines these questions by empirically investigating the relationship between SCSM and financial performance and what the influential factors are in the relationship.

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1.1 Sustainability and SCSM

In today's business society, no firm can avoid the pressure of sustainability. Governments have legislated regulation concerning sustainability, and consumers have continuously requested that firms offer sustainable products and services. Sustainability is a macroeconomic concept that is focused on using resources to meet the needs of present human development without compromising the ability of future generations to meet their needs (WCED, 1987). In the face of regulations and market demands, firms commonly transfer the macroeconomic concept of sustainability into daily business activities through the triple bottom line (TBL) (Elkington, 1998). TBL states that in business activities, firms should balance financial, social, and environmental dimensions (Elkington, 1998; Marshall & Toffel, 2005). For example, while firms' aim is financial growth, they should also measure their performance on the reduction of the use of energy and other resources, waste, and pollution, and on the provision of diversity, equitable opportunities, workplace safety, and democratic processes and accountable governance structure (Gimenez et al., 2012; Jeurissen, 2000).

A firm's sustainability performance is influenced by how sustainably the firm's supply chain partners operate (Tate et al., 2012). The societal expectation of sustainability has been widely extended from a firm's operations to supply chain operations, which demands the firm's SCSM. The concept of SCSM has undergone rapid development in recent years (Touboulic & Walker, 2015). SCSM covers a broad scope of supply chain operations in a sustainable manner (e.g., product design and product life extension) (Carter & Rogers, 2008; Linton et al., 2007). One of the key perspectives in SCSM is procurement/purchasing (Touboulic & Walker, 2015), which involves the buyers (the downstream firms in the supply chains close to the 'point of sales') issuing a requirement or mandate to their suppliers (the upstream firms in the supply chains; mainly first-tier suppliers) to improve environmental and social performance through SCSM practices. These SCSM practices mainly include buyers' evaluation, monitoring, assessments, and selection of their suppliers based on certain environmental and social conditions.

1.2 Research gap

Stakeholder theory and resource dependence theory (RDT) provide the theoretical lens to study SCSM as a systematic approach, as shown in Figure 1.1. Stakeholder theory

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(Freeman, 1984) supports that buyers' adoption of SCSM is caused by the pressure from buyers' downstream stakeholders (e.g., government, Non-Government Organizations [NGOs], and consumers). Buyers' failure in managing their suppliers' sustainability performance may place buyers in a risky position of being punished by the downstream stakeholders (e.g., loss of sales) (Busse, 2016). RDT supports that buyers' power in the management of buyer-supplier relationships enables buyers to mandate their suppliers' sustainable operations (Hall, 2000; Touboulic et al., 2014). Suppliers have to comply with SCSM practices in order to maintain the business with buyers, which are their most important financial stakeholder.

Supply Chain Sustainability Management

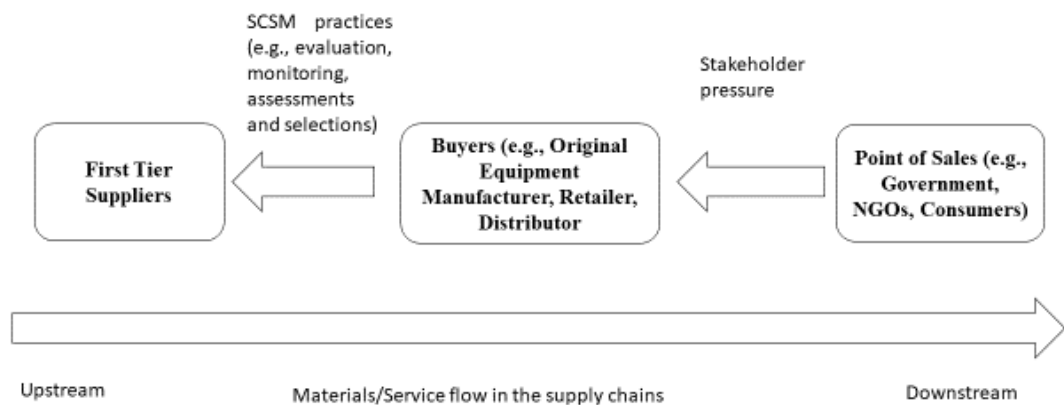


Figure 1.1 SCSM Chart

Buyers' SCSM can effectively transfer downstream stakeholders' pressure regarding the responsibility of environmental and social performance to the upstream suppliers (Hall, 2000; Zorzini et al., 2015). Nonetheless, are there business risks and costs to the firms relating to SCSM adoption, such as increasing operational complexity and transaction costs due to the additional requirements of sustainable operations in buyer-supplier relationships? Can buyers and suppliers gain sufficient benefits (e.g., reputation from stakeholders) to offset the business risks and outweigh the costs, thus improving their financial performance? A review of the literature shows that the answers to the questions have remained unclear. This research identified three research gaps relating to these questions.

First, the relationship between buyers' SCSM adoption and their financial performance is unclear. While the conceptual literature points out that SCSM enables buyers to

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improve their financial performance by using the theories, such as Natural Resource-based View (NRBV) (Carter & Rogers, 2008; Markley & Davis, 2007), empirical studies provide conflicting findings on the buyers' financial performance in SCSM as discussed in the literature review by Touboulic and Walker (2015). Most importantly, there is a common bias in the empirical studies investigating buyers' financial performance. Researchers have drawn attention to the social desirability bias in the use of survey-based methods to study buyers' financial performance (Carter & Easton, 2011; Walker et al., 2012). Social desirability bias refers to positive self-evaluation bias when collecting perceptual data through questionnaires or interviews as in survey-based search (Dam & Petkova, 2014; Mullainathan & Bertrand, 2001). While survey-based methods have been predominantly used in studying buyers' financial performance relating to SCSM, a majority of these studies have not addressed social desirability bias (Carter & Easton, 2011). This bias remained unaddressed in the meta-analysis by Golicic and Smith (2013) which found buyers' positive financial performance relying on the data largely generated from survey-based research. Thus, the positive relationship between SCSM and buyers' financial performance supported by the previous studies (Golicic & Smith, 2013; Schmidt et al., 2017)) may be a biased result.

In fact, there are business risks and costs associated with SCSM in practice (Pagell & Shevchenko, 2014), as reflected by the reluctance of firms in managing their sustainability performance in the case of Rana Plaza disaster (Jacobs & Singhal, 2017). However, what the business risks are is concealed by the desirability for the positive financial performance in the SCSM research (Wu & Pagell, 2011), particularly with the perceptual measures that bear social desirability bias. Therefore, a methodology with objective measures is required to explore the costs relating to SCSM adoption, providing buyers' managers with insight into business risk when they adopt SCSM.

Second, suppliers' financial performance has not been widely investigated. Most of the SCSM literature has remained focused on studying buyers' financial performance. However, SCSM is the operation between supply chain partners, particularly with buyers' immediate suppliers. The unclear impact of SCSM on suppliers' financial performance makes suppliers' managers hesitant in working with their buyers to implement SCSM practices. Moreover, without exploring suppliers' financial performance, only a limited understanding of the impact of SCSM on supply chains can be reached. Any improvement in buyers' financial performance with SCSM adoption may be achieved by moving the business risks to their suppliers. The green bullwhip effect illustrates the buyers' shift of

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the costs to their suppliers by adding rigorous practices and compressing timeline of compliance (Lee, Klassen, Furlan, & Vinelli, 2014). There has been no clear empirical evidence on how suppliers' financial performance is affected by the green bullwhip effect and if suppliers, thus, have more costs than their buyers in SCSM.

Third, there is little understanding of the factors (e.g., nature of SCSM practices and firms' attributes) that influence the buyers' and suppliers' business risks relating to SCSM. Without exploring these factors, the SCSM literature offers limited insight into what to do when these business risks appear (Pagell & Shevchenko, 2014). Also, buyers and suppliers have different attributes and operations in their supply chains and SCSM adoption. Thus, different sets of influential factors may be found for buyers and suppliers respectively. However, within the SCSM literature, there has been a lack of studies on the overall influential factors and very little specific exploration based on different supply chain positions.

1.3 Research objectives and questions

Only the analysis incorporating these business risks and associated costs can reveal the true relationship between SCSM and financial performance. Given buyers' supply chain power, these business risks can be transferred to their suppliers. Suppliers may, thus, bear more costs in their SCSM compliance. The identification of business risks is only the first step. The exploration of the factors that mitigate the business risks supports the development of sustainability in the supply chains. Both buyers and suppliers can effectively manage their financial performance by adopting these factors as strategies, when they make efforts to improve their environmental and social performance. Improved sustainability with no detriment to financial performance is true sustainability (Pagell & Shevchenko, 2014). These thoughts lead this research to three research objectives and subsequently five research questions in Table 1.1, which are developed into specific hypotheses in Chapter 2 along with a review of the literature.

Table 1.1 Research Objectives and Questions

<i>Research objective one: to investigate the impact of buyers' SCSM on their financial performance, using objective measures.</i>	
	<i>Research question 1.1: What is the impact of buyers' SCSM on their financial performance?</i>
	<i>Research question 1.2: What factors influence this impact?</i>
<i>Research objective two: to investigate the impact of buyers' SCSM on their suppliers' financial performance by using objective measures, providing a supply chain impact of SCSM.</i>	

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	<i>Research question 2.1: What is the impact of buyers' SCSM on their suppliers' financial performance?</i>
	<i>Research question 2.2: What factors influence this impact?</i>
Research objective three: to investigate the different impact of buyers' SCSM on the financial performance of buyers and suppliers.	
	<i>Research question 3: Is there a difference in financial performance between buyers and their paired suppliers relating to buyers' SCSM?</i>

1.4 Research approach

To achieve these research objectives, event study methodology and cross-sectional regression analysis were adopted in this research. Event study methodology is a technique that isolates the component of stock returns due to firm-specific events by adjusting them for market factors. These adjusted returns are referred to as 'abnormal returns' (Hendricks & Singhal, 1996). The buyers' abnormal returns to the SCSM announcements made by buyers were used as the estimate of buyers' financial performance (research question 1.1). The abnormal returns as an objective measure of financial performance avoid social desirability bias.

In the analysis of suppliers' financial performance, the methods of studying 'related firms' in event study methodology were used. The paired supplier observations were derived from buyers' SCSM announcements. The suppliers' abnormal returns to the buyers' SCSM announcements were used as the estimate of suppliers' financial performance relating to SCSM (research question 2.1). The abnormal returns from buyers and their paired suppliers to the same SCSM announcements were tested with a paired sample t-test in the estimate of the difference in financial performance between buyers and suppliers (research question 3).

Several influential factors based on the review of the literature were hypothesized. The cross-sectional regression analysis was used to test the effects of the influential factors on the financial performance for each of the buyers' (research question 1.2) and suppliers' observations in the samples (research question 2.2).

1.5 Research contribution

By achieving the three research objectives above, four general contributions to the literature are made.

First, this research contributes empirical evidence to the literature that buyers have a negative financial performance when they adopt SCSM. The business risks and costs

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from the buyers' perspective are discussed in this research. The use of objective measures and a relatively large sample ensures an unbiased result.

Second, this research is the first to explore suppliers' financial performance relating to SCSM. The finding on suppliers' negative financial performance not only fills the research gap in the investigation of SCSM from suppliers' perspective but also demonstrates the impact of SCSM in a supply chain context (with the analysis on both buyers and suppliers' financial performance).

Third, suppliers were found to have a more negative financial performance than buyers. This finding contributes to the understanding of the green bullwhip effect, indicating that the buyers' financial burden is shifted to suppliers, while the stringent sustainability practices and compressed timeline are transferred to suppliers.

Fourth, this research contributes to the literature by exploring the factors that influence the negative financial performance of both buyers and suppliers. Thus, this research not only identifies the business risks for both buyers and suppliers in SCSM but also provides practical solutions to reduce the business risks. The findings on these influential factors indicate an opportunity to mitigate the negative financial performance in SCSM and trigger the development of an SCSM framework that has a systematic approach to balance the environmental and social performance with financial performance.

The theoretical contribution of this research is underlined by its suggestion, explanation, and extension to relevant theories in the SCSM research. Stakeholder theory has commonly been used to explain stakeholder pressure as the major force of firms' adoption of sustainability practices (Busse, 2016; Pagell & Shevchenko, 2014). This research finds there is a lost value in the supply chain dyads adopting SCSM practices, indicating a lack of support from downstream stakeholders. The stakeholder theory in the SCSM context merely proposes the coercive force (e.g., punishment on environmental misconducts but few rewards on sustainable operations). The study of the group approach of SCSM, as a hybrid form, is an extension to transaction cost economics (TCE). The positive impact of the group approach for buyers but the negative impact for suppliers found in this research suggests the insight of this extension to the TCE in the SCSM context, where this hybrid form is shifting buyers' transaction costs to their suppliers. The theory of swift and even flow (SEF), and the theory of variation and uncertainty buffering (VUB) are the theoretical lenses in this research to develop several main hypotheses (e.g., the disruption to the even flow of operations and thus negative financial performance for buyers and suppliers; the effect of operational and financial slack on protecting the even

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flow of operations). The present research expands the application of SEF from single firms to the level of supply chain dyads. The finding of negative financial performance at both parties in a supply chain dyad suggests that the disruption to suppliers' even flow increases the variabilities in their buyers' operations and adds cost. With regard to VUB, this research explains the theory by identifying the effectiveness of inventory slack and exploring the conditional effect of financial slack in the SCSM context.

In summary, the novelty of studying supply chain dyads in this research contributes a more complete impact of SCSM on financial performance. Particularly, the finding of buyers' cost transfer suggests the importance of study SCSM at the supply chain level and the SCSM research can not solely rely on the finding from the buyers' perspective. The present research also took the initial step to explore the managerial strategies managers can consider to mitigate negative financial performance. The significant findings suggest that there are opportunities to reduce business risks relating to the SCSM.

1.6 Thesis outline

This section of the thesis outlines the central topics of this research.

In Chapter 2, the extant literature is investigated more comprehensively. There are several sections of interest. The chapter starts with a review of two broad background concepts: sustainability and supply chain management (SCM). The discussions on stakeholder theory, resource dependence theory (RDT), TCE, the theory of SEF and VUB as the theoretical lenses in this research are presented in the sections on sustainability and SCM. The application of stakeholder theory and RDT to SCSM are discussed thoroughly to provide theoretical lenses for analyzing SCSM as a systematic approach that effectively transfers stakeholder pressure from the downstream to the upstream supply chains and ensures the improvement of environmental and social performance in the supply chains. By highlighting several research gaps in the literature with a focus on buyers' and suppliers' financial performance and influential factors, this research attempts to develop hypotheses to fill these research gaps with the research outcomes. The hypotheses development are in the core sections of Chapter 2.

In Chapter 3, the details of the methodology adopted in this research are presented. Given the positivist paradigm, event study methodology is introduced. In particular, the methods of 'related firms' in the analysis of suppliers are discussed in detail through steps, due to the sophistication of the methods. The variable construction sections present the

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details of how each of the hypothesized mitigating sources is constructed as the independent variables in the cross-section regression models and tested against the abnormal returns of buyers and suppliers as the dependent variables. Different regression techniques are chosen for the buyer and supplier analysis, and the reasoning for the choices are discussed. Finally, a paired sample t-test is introduced as the method to test the difference in the financial performance between buyers and suppliers.

In Chapter 4, the test results conducted through the methods in Chapter 3 are presented in graphs and tables and discussed accordingly. After presenting descriptive statistics to validate the collected data in the analysis, the main results are introduced. The order of Chapter 4 is to demonstrate the test results of the financial performance and the results of the hypothesized influential factors firstly from buyers' perspective and secondly from suppliers' perspective. Finally, the test results on the difference between buyers' and suppliers' financial performance are displayed.

In Chapter 5, the discussions based on the research findings in Chapter 4 are given. The academic implications are presented along with a comparison of the findings of this research with those of the previous literature. While the findings with statistical significance are discussed as the main contributions of this research to the literature, the hypothesized items without statistical significance are also critically discussed. Practical implications are also discussed, with the focus on raising managers' awareness of negative financial performance and providing them with the practices needed to accommodate negative financial performance. Finally, the theoretical contributions of this research are provided at the end of Chapter 5. These include suggestion, explanation and extension to stakeholder theory, the green bullwhip effect, TCE, SEF, and VUB.

In Chapter 6, answers to the research questions are given, and the research objectives are evaluated. The chapter also positions this research in a much broader context than merely the findings on financial performance and influential factors. The changes and development of SCSM research and the effect of downstream stakeholders in the SCSM system highlight the relevance of this research in the wider context. Chapter 6 concludes the thesis by discussing the limitations identified through the analysis process, and several proposed avenues for future research.

Chapter 2. Literature Review

This chapter explores the current literature relating to SCSM in order to understand the principal concepts, identify the research gaps and objectives, and develop hypotheses. Figure 2.1 illustrates the structure of this chapter.

Sustainability and SCM are two aligned concepts leading to SCSM (Ashby et al., 2012). This chapter starts with an overview of sustainability followed by SCM. In the discussion on sustainability, TBL is introduced as a tool to operationalize sustainability at the corporate level when firms are motivated to conduct sustainable development by stakeholder pressure as illustrated in stakeholder theory.

The concept of SCM is outlined in order to discuss the management of the dyadic relationships between buyer and supplier. The theoretical underpinnings of SCM relevant to this research are the theories of RDT, TCE, SEF, and VUB, which provide theoretical lenses to understand buyers' and suppliers' financial performance in supply chain operations.

Drawing on the discussion of sustainability and SCM, the concept of SCSM is explored. This research focuses on the procurement/purchasing perspective of SCSM, where buyers adopt SCSM to improve their suppliers' environmental and social performance. The application of stakeholder theory and RDT in SCSM explains why buyers adopt SCSM and why suppliers comply with their buyers' SCSM, suggesting the systematic approach of SCSM. SCSM practices, governance mechanisms, and dimensions are explored to further provide background information on SCSM.

SCSM conceptualizes that financial performance increases with environmental and social performance. However, the impact of SCSM on buyers' financial performance remains unclear in the literature, while suppliers' financial performance has not been widely studied. Also, there has been a lack of investigation on the factors that influence buyers' and suppliers' financial performance in SCSM. SCSM research provide no insight into what to do when SCSM is detrimental to financial performance. These research gaps are explored in the review of the literature and lead to the research objectives of this research.

Three research objectives are presented in section 2.4, and the hypotheses are developed accordingly in section 2.5. First, the impact of SCSM adoption on buyers'

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financial performance and the influential factors on buyers' financial performance are studied. Second, the impact of SCSM compliance on suppliers' financial performance and the influential factors on suppliers' financial performance are investigated. The influential factors for both buyers and suppliers focus on the nature of SCSM (e.g., SCSM dimensions) and firm-specific characteristics (e.g., operational slack). Third, the difference in the financial performance between buyers and suppliers in SCSM is explored. The investigation of the financial performance of both buyers and suppliers provides the supply chain impact of SCSM. The exploration of influential factors on the firms' financial performance in SCSM (both buyers and suppliers) offers strategies to mitigate the business risks in relation to SCSM.

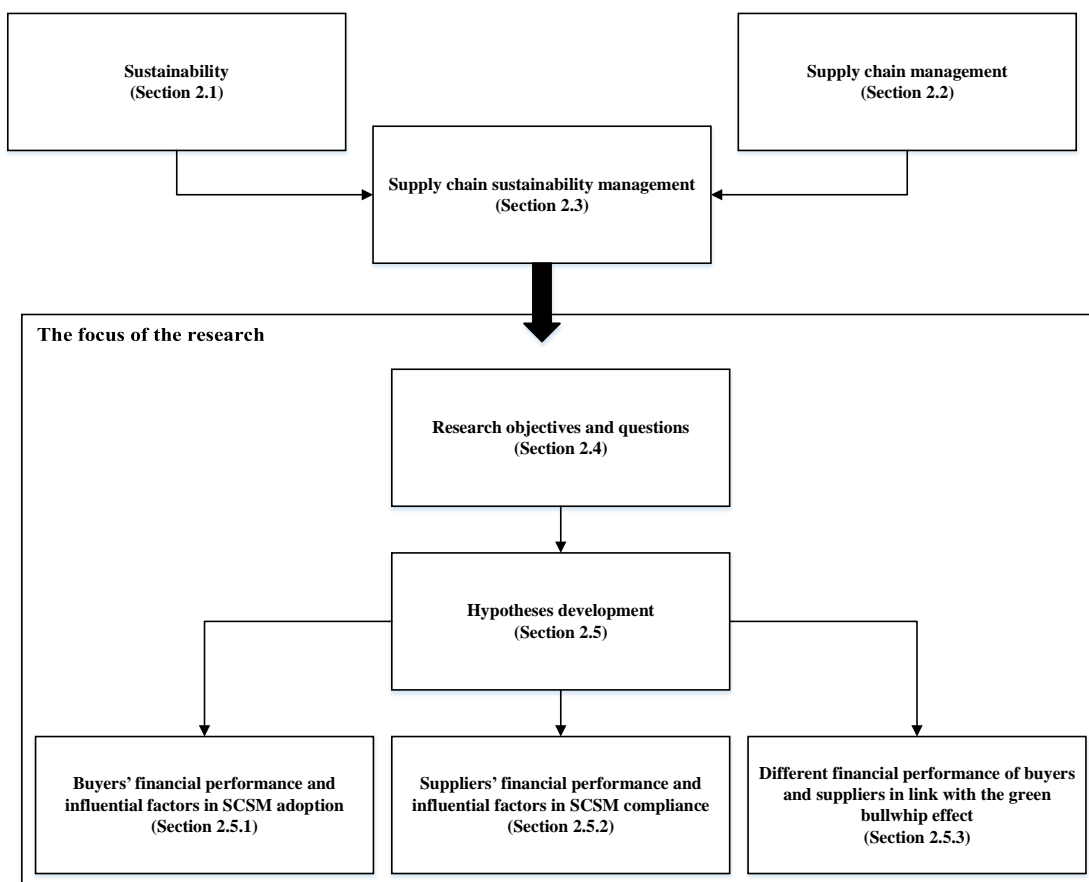


Figure 2.1 Structure of Literature Review Chapter

2.1 Sustainability

In 1987 the World Commission on Environment and Development (WCED) report (commonly known as the Brundtland Report after its chairwoman) was published in response to the increasing gap between environmental concerns on the increasingly evident ecological consequences of human activities and socio-political concerns about

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human development issues. The report led to the popularization of the concept of ‘sustainable development’ within society (Robinson, 2004). Sustainability was defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p. 8). Specifically, the report underlined the need for poverty alleviation, environmental improvement, and social equitability through economic growth (Mebratu, 1998). The importance of the Brundtland Report is that it provided a transition of sustainability development from a set of technical concepts to the political and business mainstream (Linton et al., 2007), suggesting that education, institutional development, and law enforcement must be a part of sustainable development (WCED, 1987). The Brundtland Report constituted a major political turning point for the concept of sustainable development (Mebratu, 1998). Since its publication, legislations have been adopted worldwide by governments to initiate national/regional sustainability (Linton et al., 2007). For instance, the European Union (EU) legislated on the restriction of hazardous substances (RoHS) directive in the electrical and electronic industries, requiring certain hazardous substances (e.g., lead and mercury) to be substituted with safer alternatives in order to increase the recycling and/or reuse of such products (European Union, 2003).

In the mid-1990s, authorities were probably the most active players in the attempt to implement sustainable development. However, the focus has recently shifted strongly towards business as a major actor, as most managers have accepted corporate sustainability as a precondition for doing business (Dyllick & Hockerts, 2002).

2.1.1 Corporate sustainability

The world is being shaped by the sustainability development facilitated by political forces at the global and national level; the wide societal acceptance of sustainability creates market demands on sustainable products; the disclosure of environmental and social problems has been increasing on the corporate level. The regulations, market forces, and firms’ risk aversion push corporations to integrate sustainability concepts into business (Shrivastava, 1995).

On a corporate level, the concept of sustainability illustrates the new relationship that firms have with societal, institutions and natural ecosystems (Schwartz & Carroll, 2008). In today’s business, managers should not have a single focus on economic development but should perceive the necessity of sustainability in business success. Firms are required

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to incorporate the sustainability concept into business routines, so as to meet the needs of firms' direct and indirect stakeholders (e.g., shareholders, employees, clients, pressure groups, communities), without compromising their ability to meet the needs of future stakeholders (Dyllick & Hockerts, 2002).

While the concept of sustainability is appealing, it is not always clear to a manager how to address these factors and develop day-to-day responses to improve sustainability. There are three major difficulties when business firms integrate corporate sustainability. First, sustainability is a macroeconomic and societal definition, which may provide policies on the global and national level. Firms, however, find it difficult to determine how their individual roles fit within the broad principle of sustainability (Gimenez & Tachizawa, 2012; Shrivastava, 1995). Second, sustainability does not prioritize between present needs and future needs, while the firms' benefits, costs, and strategies may conflict in short and long-run development (Starik & Rands, 1995). Third, future needs are unsure, and importantly the technologies and resources required to predict and meet these needs are not clearly demonstrated in the sustainability concept (Marshall & Toffel, 2005; Starik & Rands, 1995).

These problems create difficulties in the implementation of corporate sustainability and encourage researchers and practices to explore the solutions to help firms operationalize sustainability in business activities. TBL developed by Elkington (1998) in his book "Cannibals with Forks" is usually used as a way to operationalize sustainability at the corporate level. In the next section, TBL will be discussed.

2.1.2 Triple bottom line

Elkington (1998) used the term "cannibal" to refer to business firms in the rapidly evolving capitalist economies, where "it is the natural order of things for corporations to devour their competitors" in order to gain financial growth (Jeurissen, 2000, p. 229). However, if "the cannibal adopts the fork," which refers to business firms undertaking sustainability measures while achieving economic prosperity, the business itself, its shareholders, the stakeholders, society, and the environment all benefit (Jeurissen, 2000). Thus, Elkington (1998) developed TBL, whereby firms combine environmental, social, and economic/financial bottom lines in daily business decisions to pursue long-term sustainable growth.

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Four important sustainable business strategies suggested by Elkington (1998) are summarized below. First, firms should build risk management relating to sustainable issues to avoid potential costs. With the increasing attention on sustainability since the Brundtland Report, firms face growing political and market pressure, where external watchers benchmark and rank their sustainability performance (Jeurissen, 2000). Only integrating environmental and social performance into business activities can ensure continued economic growth. Second, firms should understand the social or ethical values which are related to economic value creation. Business values are expanded from a focus on tangible, owned assets to intangible assets which are generated from firms' social status. Third, sustainability is not a challenge; rather it is an unprecedented source of commercial opportunity to create competitive advantages. Technological innovation and improved eco-efficiency in relation to sustainability provide firms with resources to succeed (Jeurissen, 2000). Fourth, the firms' business time perspective should be changed from a short-term economic dimension to long-term sustainability (Dyllick & Hockerts, 2002). Firms have historically overemphasized short-term profits. However, the spirit of sustainability requires firms to meet both present and future stakeholder demands. Firms, therefore, should develop a long-term business vision which ensures competitiveness and reduces social and environmental degradation. These business strategies have a close correspondence to firms' daily activities, and thus ensure TBL is widely adopted as the framework of corporate sustainability (Carter & Rogers, 2008; Gimenez & Tachizawa, 2012).

However, there are criticisms of TBL. First, Jeurissen (2000) discussed that a key obstacle in implementing TBL is the requirement that business firms radically change while ignoring the already existing disordered business world from the environmental and social perspective. It is, thus, questionable whether firms are motivated to really incorporate environmental and social bottom lines into business activities when firms are required to use existing financial resources to build social status. Second, by relating social and environmental values to financial performance, TBL, in fact, merely illustrates firms' goals on financial performance with the addition of environmental and social commitments (Norman & MacDonald, 2004). Third, it is always problematic to meet all stakeholder demands simultaneously, as various stakeholders have different weights assigned to firms' financial, social, and environmental performance (Dyllick & Hockerts, 2002; Norman & MacDonald, 2004).

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The third criticism suggests critical questions in sustainability, which is the role of stakeholders. Who are the firms' stakeholders? Why do firms choose to listen to these stakeholders who demand environmental and social performance? Stakeholder theory provides a theoretical lens to explain these questions. In the next section, stakeholder theory will be introduced.

2.1.3 Stakeholder theory

Stakeholder theory is concerned with the reciprocal relationships between firms and their numerous stakeholders, where firms can achieve business success by taking stakeholders' interest into account (Donaldson & Preston, 1995). Freeman (1984) defined that a stakeholder is any group or individual who can affect or is affected by the achievement of the organization's objectives. Internal stakeholders may include owners, managers, and employees. External stakeholders may cover suppliers, customers, competitors, local communities, NGOs, or activist groups, media, and government agencies (Busse, 2016).

Stakeholder theory illustrates the firms' relationship with these stakeholders by referring to three features: instrumental, descriptive, and normative (Donaldson & Preston, 1995). Instrumental stakeholder theory demonstrates the benefits of firms managing stakeholder relationships (Jones, 1995). Descriptive stakeholder theory discusses the categories and importance of stakeholders, and how firms take into account stakeholder interest (Jawahar & McLaughlin, 2001). Normative stakeholder theory presents the normative ethical reason why firms should consider stakeholder interests. The normative and ethical reason for firms' sustainability is ambiguous (Donaldson & Preston, 1995). This research focuses on sustainability as firms' self-interested pursuit of financial performance. Hence, normative stakeholder theory is not within the scope of this research. The present research applies instrumental and descriptive stakeholder theories as theoretical lenses to discuss the competing stakeholders' interest in relating to firms' sustainability and the financial benefits of managing the stakeholder relationships.

Instrument stakeholder theory views the relationships with stakeholders is a means to achieve firms' business success. Firms stand to gain by investing in the creation and maintenance of relationships with stakeholders (Jones, 1995). Descriptive stakeholder theory further categorizes the stakeholders and posits the way in which firms can manage

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the various stakeholder relationships. Firms can identify stakeholder relationships based on stakeholder power, legitimacy, and urgency (Jawahar & McLaughlin, 2001).

Stakeholder power relates to the degree to which a stakeholder group can influence firms to do something that they would not have done otherwise (Busse, 2016). The degree of power is decided by firms' dependence on the stakeholder group for resources (Jawahar & McLaughlin, 2001). Stakeholder legitimacy indicates the normative principle of stakeholders' requests (Mitchell et al., 1997), where legitimate requests are consistent with a generalized perception of desirable, proper, or appropriate social values, belief, and definition (Busse, 2016). Stakeholder urgency identifies the timely scale of a stakeholder group's claim, which shows the requested degree of firms' immediate response to the stakeholders' requests (Mitchell et al., 1997). The most salient stakeholders should have a high degree of power, legitimacy, and urgency. The firms' adherence to these stakeholders creates the highest financial performance as well as competitive market position (Busse, 2016).

Stakeholder theory explains the reason that firms adopt corporate sustainability while financial performance is still not assured. Campbell (2007) discussed that the imperative of maximizing financial profit is at the heart of the modern corporation. The investment in environmental and social performance does not necessarily improve financial performance, and thus firms hesitate to proactively adopt corporate sustainability (Hall, 2000). However, there has been increasing public awareness of corporate sustainability, as discussed in section 2.1.1. There have been emerging firm stakeholders that have a high level of concern on sustainability issues and are influential in firms' financial performance. Governments have taken a tougher regulatory position in the first instance to force firms to change their environmental and social performance. The violation of these regulations results in costly legal obligations. A variety of NGOs has emerged as a strong force to monitor the environmental and social behaviors of firms. The NGOs' disclosure of firms' environmental and social misconduct to end consumers creates a great business risk. Firms' damaged reputation leads to increased costs, where consumers may stop buying the firms' products, and firms have to invest in restoring the reputation to consumers. These stakeholders create a substantial pressure for firms' adoption of corporate sustainability.

As discussed in descriptive stakeholder theory, these stakeholders (e.g., government, NGOs, consumers) have great stakeholder power, legitimacy, and urgency, as the firms rely on these stakeholders to continue their operations and sales. The investment in

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corporate sustainability represents the firms' legitimacy and thus maintains the relationship with these stakeholders as suggested by instrumental stakeholder theory. The adoption of corporate sustainability avoids the harm of sustainability-related risks to firms' financial performance.

In summary, stakeholder theory explains that firms' adoption of sustainability is forced by the pressure from their stakeholders. These stakeholders have a high concern for sustainability issues and are influential on firms' financial performance due to their stakeholder power, legitimacy, and urgency.

Suppliers and buyers (i.e., business customers) are important stakeholders as supply chain partners. In today's business, firms' operations are increasingly based on 'supply chain vs. supply chain' (Ashby et al., 2012). Suppliers' and buyers' engagement in sustainability ensures they can meet the demands of those stakeholders (e.g., government, NGOs, and consumers) in terms of environmental and social performance (Carter & Rogers, 2008). In the next section, the perspective of supply chain management (SCM) will be presented as background information, leading to the discussion on the integration of sustainability into SCM.

2.2 Supply chain management

The flow of goods from source to end market involves the operations of multiple firms, which jointly work on the delivery of the goods between each other and thus create a chain of supply. The concept of a supply chain was developed from logistics literature in the 1990s (Houlihan, 1988). A supply chain encompasses all activities associated with the upstream and downstream flow and/or transformation of products, services, finance, and information from a raw materials stage through to the end consumers (Seuring & Müller, 2008). A supply chain may have multiple degrees of complexity according to the number of actors involved (Mentzer et al., 2001). Analytically, a typical supply chain chart is presented in Figure 2.2. Suppliers, buyers, and consumers in end markets, as supply chain actors, create the fundamental composition and have direct contact along the supply chain.

The specific activities between these supply chain actors comprise the supply chain process. The core process of a supply chain includes source, make, deliver, and plan from the upstream to the downstream supply chain, as in Figure 2.2, where the plan is used to manage the source-make-deliver process (Huan et al., 2004). The source process contains

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the supply chain activities from suppliers to buyers, make is buyers' internal value-added production, and deliver comprises the supply chain activities from buyers to end consumers in the market.

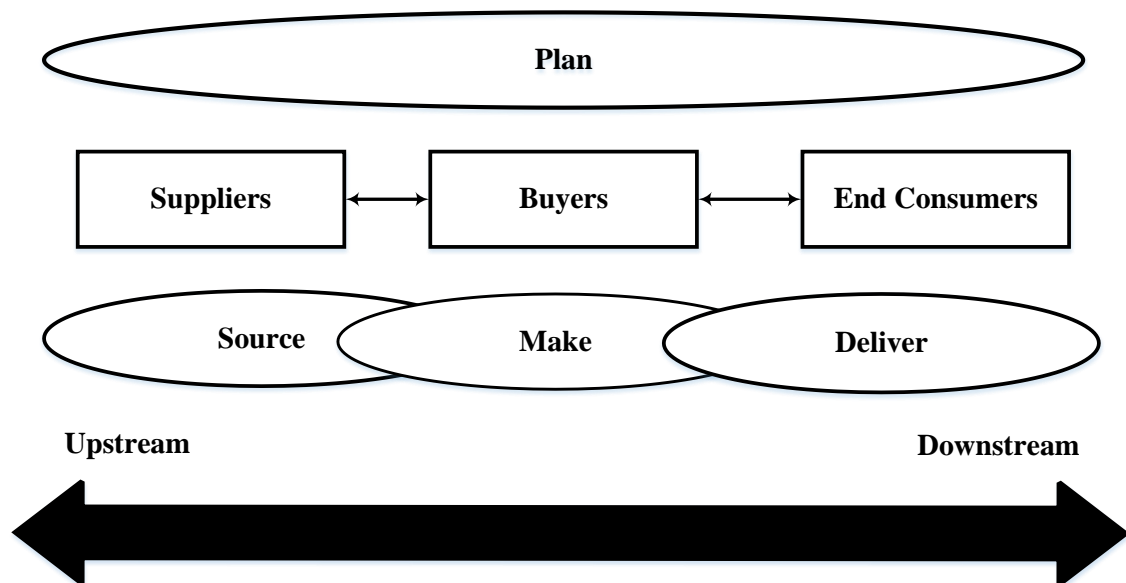


Figure 2.2 A Typical Supply Chain Chart

A supply chain is only a phenomenon of business (Mentzer et al., 2001). The operations in a supply chain do not ensure firms reduce costs and explore market opportunities. The integration of the operations from many independent organizations is difficult, as each of these supply actors has its own objectives. Hence, a mechanism is required to coordinate firms' functions and create a high level of supply chain performance, where in general the overall costs are low, and the responsiveness to market demand is high (Beamon, 1999). Supply chain management (SCM) is such a mechanism to integrate the efforts across firms.

2.2.1 Supply chain management definitions

The increasing uncertainty of market demand, the stiff competition on time and quality, and particularly the trend of global sourcing requires firms' decision making at a supply chain level. The traditional interface between different firms has now become the integration of supply chain operations, which develops SCM (Cooper & Ellram, 1993; Cooper et al., 1997).

Because of a large number of parties and functions in a supply chain, SCM has evolved from different disciplines and multiple perspectives. Thus there are many SCM

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definitions (Croom et al., 2000). Vaaland and Heide (2007, pp. 20-21) classified three groups of SCM definitions:

- **Actor-oriented definitions** focus on the capabilities of supply chain actors to organize and manage the flow of materials from ‘point of origin’ to ‘point of sales’;
- **Process-oriented definitions** focus on activities and processes in the supply chains, where SCM is the “integration of key business process from the end user to original suppliers that provide products & services and information that add value to customers and other stakeholders.” (Lambert et al., 1998, p. 1); and
- **Relation-oriented definitions** focus on the relationship between the actors in the supply chain and how cooperation and mutual interest can lead to improvement.

Encompassing these aspects in SCM, Mentzer et al. (2001, p. 18) developed the SCM definition 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.

This definition illustrates two important factors of SCM relating to this research. First, A supply chain should be viewed as a single entity rather than a set of fragmented parties each working on their own function (Houlihan, 1988; Mentzer et al., 2001). Thus any individual firm’s operational and financial performance are directly or indirectly influenced by any of their supply chain partners’ operations, as seen in Figure 2.2. Second, SCM requires relationship management between supply chain actors. The inter-functional coordination along a supply chain relies on the commitment, risk, and dependence between firms (Mentzer et al., 2001). While the supply chain relationship is unable to be visually presented in Figure 2.2, relationship management is an important source to support the coordination between actors and process.

This definition conceptualizes SCM in a broad sense that covers many nuances (Burgess et al., 2006). There are SCM concepts that are developed grounded in this broad definition while explains the specific aspects in SCM. In the next section, the concepts of the demanded oriented supply chain, supply chain integration, and complex adaptive system are introduced, due to their relevance to the sustainability issues. The discussion provides a further review of SCM.

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2.2.2 The development of supply chain management concepts

The changes in the markets with fierce competition, short product life cycle, and stochastic demands have forced firms to revisit their supply chain management strategies (Gunasekaran & Ngai, 2005). In the past years, there have been many changes in the concepts of SCM that firms have applied to seek for satisfying the marketplaces. The demand-oriented supply chains, supply chain integration, and complex adaptive system are three important concepts in the development of SCM and related to SCSM (Childerhouse & Towill, 2011; Wolf, 2011; Wu & Pagell, 2011). In this section, these three concepts are discussed to provide a broad review of background information about SCM.

In the debate of the best practices of SCM, the product-oriented supply chain and the demand-oriented supply chain are two strategies that firms can adopt according to the operations requirements (Croom et al., 2000). While the product-oriented supply chain focuses on physical efficiency (e.g., cost reduction) and determines supply by inventories, the demand-oriented supply chain requires that the supply chain is designed based on consumer data and implements strong collaboration between supply chain partners to achieve a more efficient response to consumer needs (Childerhouse et al., 2002). In modern business practices, many firms have struggled to continuously capture efficiencies using a product-oriented SCM strategy, because the inventory-driven supply can “bear little resemblance to what is optimally required by the whole system” (Childerhouse & Towill, 2006, p. 358). To cope with the rapid changes of market conditions, firms often adopt market-responsive strategies, such as end-consumer driven product specifications, as the core concept in the demand-oriented supply chain (Basnet & Seuring, 2014).

Supply chain integration is an important requirement for the demand-oriented supply chain (Childerhouse & Towill, 2006). Supply chain integration suggests the strong sharing and coordination in the dimensions of organizational relationship, information, and resources, where the optimization of the overall systems in supply chains can achieve better performance than a string of optimized sub-systems (Childerhouse & Towill, 2011). The integrated supply chains facilitate the smooth material/service flows, and thus improve the flexibility and responsiveness to the market demands.

From the perspective of sustainability, market demand has changed to require the additional environmental and social attributes considered in the product and production

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design. The demand-oriented supply chain concept indicates that firms need to change operations accordingly to meet the changes. However, sustainable operations are frequently beyond the traditional business models (Touboulic & Walker, 2015), which complicates implementation of the demand-oriented supply chain when sustainability is desired. Wolf (2011) discussed supply chain integration with regard to sustainability as being far outside of traditional SCM dimensions. Firms are challenged by the integration with stakeholders that request sustainable operations, responsibility sharing, and aligned incentive and rewards when they seek to create supply chain integration and demand-oriented supply chains that enhance sustainability. Thus, there seems a gap between the idealized prescription and actual practices in “sustainability-demand-oriented supply chains.”

Another important SCM view is the complex adaptive system, where a supply chain is regarded as a self-organizing, dynamic, and evolving system, and, therefore, a supply chain *emerges* rather than results from a design of singular entity (Pathak et al., 2007). This view holds that the efforts in control, implementation, planning, and measurement of supply chains may be only effective to a certain extent due to the complex nature of supply chains. There are always emergencies, such as new and unexpected process, structure, pattern, and properties, which decrease the effectiveness of these design efforts. These emergencies increase dynamism in the market environment and create a “rugged landscape”. A “landscape” represents the potential states that a system can attain in the market environment. When a landscape is rugged, the highest point in this landscape (i.e., an optimal state for the system) is difficult to be found and may be determined by tightly coupled components. Supply chain members are unlikely to identify the global optimality at the system level in such a rugged landscape (Choi et al., 2001). Managers need to remain vigilant of these emergencies and adapt business goals and infrastructure appropriately to the market environmental changes (Matos & Hall, 2007). Choi et al. (2001) discussed from the view of complex adaptive system that a firm survives a longer time if it adjusts goals and infrastructure quickly according to the changes of their customers, suppliers, and competitors; also, a supply network gains greater efficiency if it can expose and change weak members rather than being artificially bound by long-term relationships.

The complex adaptive system view of supply chains illustrates firms’ decision making in dealing with the increased emergencies with regards to sustainability. Sustainable operations change firms’ decision making boundaries and parameters, and there is an

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absence of complete and reliable information on the interactions between environmental and/or social attributes and economic performance (Matos & Hall, 2007). Thus, sustainability creates emergencies that force firms to go through a rugged landscape, where global optimal state in the system is unlikely to be determined, and thus firms rely on the available information and adapt their goal to the local optima (Wu & Pagell, 2011), such as seeking self-interest by transferring costs to weak supply chain members. The supply chain actors die if they could not quickly adapt their goals to these emergencies and the changes in their partners' goals (Pathak & Dilts, 2002). The view of the complex adaptive system suggests that from the perspective of sustainability, firms in supply chains are more likely to make locally focused decisions that have less-than-optimal outcomes at the system level (Wu & Pagell, 2011).

The discussion on the demand-oriented supply chain, supply chain integration, and complex adaptive systems provides a wide review of SCM concepts and improves the understanding of sustainability in the SCM context. The level of analysis through these SCM concepts can be on a dyadic, chain, or network level (Croom et al., 2000). This research focuses on a dyadic relationship between buyers and their suppliers.

A dyadic relationship refers to the firm as a buyer and its direct supplier in the purchasing and supply context (Miemczyk et al., 2012). SCM research particularly focuses on the dyadic relationship (Chen & Paulraj, 2004). The buyer-supplier relationship is in the most elementary supply chain (Mentzer et al., 2001). Therefore, the study of the dyadic relationship simplifies the investigation of complex SCM issues. Moreover, as the basic element in a supply chain, that is, multiple buyer-supplier relationships, which include the buyer's buyer, and the supplier's supplier, demonstrate the multiplier effect over the entire supply chain (Deitz et al., 2009).

The study of a dyadic relationship is of paramount importance in the present sustainability research. There is a lack of research investigating the supply chain impact of sustainability (Pagell & Shevchenko, 2014). The relationship aspect of a dyad is a widely researched area and has generated abundant works (Chen & Paulraj, 2004). Therefore, there is a strong theoretical foundation to take an initial step from a dyadic relationship to explore the complex impact of sustainability on a supply chain. Moreover, Zimmer et al. (2016) discussed two challenges to manage sustainability beyond a dyadic relationship. First, contractual relationships are important for firms to acquire procurement information and to subsequently conduct analysis and develop activities for sustainable operations. The missing contractual relationships between firms beyond

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dyadic relationships (e.g., buyers and their second-tier suppliers) create a difficulty to manage sustainability at the inter-firm level. Second, the exponential increase of sub-suppliers further upstream hinders firms' systematic sustainability management. Consequently, the present research focuses on dyadic relationships. The initial investigation of a dyadic supply chain impact in this research provides a foundation for research exploring triadic or chain impacts.

The present research follows the literature (Busse, 2016; Foerstl et al., 2015; Hall, 2000; Schmidt et al., 2017) to define that buyers are the firms in the downstream supply chains close to the 'point of sales'. Buyers are high-profile firms in the end markets. Suppliers are the firms in the upstream supply chain. Due to the low proximity to the point of sales, suppliers are often not directly exposed to the pressure and demand in the end markets.

In SCM research, theories can shed significant light on research thought (Ketchen & Hult, 2007) and represent the keystone of knowledge production (Handfield & Melnyk, 1998). Through the theoretical lenses, the present research can draw understanding in the analysis of buyer-supplier relationships, such as, why these relationships exist and how they can be managed. Since the present research focuses on a dyadic relationship, the theories used in this research refer to RDT and TCE which are applicable to the analysis of supply chain dyads (Grover & Malhotra, 2003; Mahapatra et al., 2012). In addition, the theories of SEF and VUB provide the theoretical lenses to understand the performance impact relating to the operational changes in supply chains. In the next sections, these four SCM theories that are relevant to this research will be introduced.

2.2.3 Theoretical underpinnings of SCM

This research focuses on firms' financial performance in buyer-supplier relationships. There must be a focus on the benefits and costs of managing the relationships and operations between buyers and suppliers. The theoretical perspectives that are employed in this research are resource dependence theory (RDT), transaction costs economics (TCE), the theory of swift, even flow (SEF), and the theory of variation and uncertainty buffering (VUB). These theories provide insights into the role of power, transaction costs, the costs of disruptions to the operations, and the buffering mechanisms to the disruptions, which link with firms' financial performance. In the next sections, these theories will be discussed.

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2.2.3.1 Resource dependence theory

RDT (Pfeffer & Salancik, 1978) proposes that the reason for creating buyer-supplier relationships is that very few firms are self-sufficient concerning strategic and critical resources. Firms are interdependent in businesses. Buyers require critical and scarce raw materials and components from suppliers, and suppliers depend largely on buyers for sales.

In the supply chain operations, buyers and suppliers bring resources together and jointly create value by reducing the overall costs and improving responsiveness to consumer demand. However, the sharing of value is dependent on the power (Kim & Wemmerlöv, 2015), which serves as a way of managing the buyer-supplier relationships as suggested in RDT (Touboulic et al., 2014). A powerful supply chain partner in the relationships can retain the large share of value resulting from the exchange, while a less powerful supply chain partner is more likely bear the high share of risks and costs (Casciaro & Piskorski, 2005; Touboulic et al., 2014).

Power is generated by two forces (Dabhilkar et al., 2015). The first is the criticality of the resources. A supplier that has commercially and operationally important items required by a buyer has a higher level of power than the buyer. The second is the availability of the alternatives to source the same resources. A buyer that has many alternative suppliers producing the same item is more powerful than any of these suppliers. When power imbalance exists in a relationship where a firm is more powerful than another, the powerful firm is likely to exercise power to adjust the other party's operations (e.g., requiring flexible arrangements beyond the contract terms), whereas the less powerful firm is more likely to comply with the requests (Touboulic et al., 2014).

In buyer-supplier relationships, buyers, on average, are more powerful than suppliers (Hall, 2000; Touboulic et al., 2014). Buyers are commonly the channel leaders that rule and govern the supply chain operations, have high proximity to end consumers in supply chain positions, and design the product and service offered to the end markets (Seuring & Müller, 2008). Buyers are relatively larger firms than suppliers in terms of sales/revenue and therefore, have a higher load of resources, capabilities, and information (Kim & Wemmerlöv, 2015). Buyers commonly have many alternative suppliers, while financial resources and market information on buyers are essential to any single supplier (Kim & Wemmerlöv, 2015).

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The power position in favor of buyers enables them to mandate their suppliers' engagement in what is deemed appropriate for the buyers. A large portion of heavy manufacturing is conducted by suppliers, while buyers mainly do the assembly and distribution (Tate et al., 2012). The integration of the suppliers' operations is essential to the buyers in response to the market demands. A powerful buyer is able to mandate the changes in its suppliers' operations to meet the market demand. Recent technical and organizational innovations are often initiated by powerful buyers that mandate the applications of their suppliers (Hall, 2000), such as radio-frequency identification (RFID) integration between Wal-Mart and its suppliers (Deitz et al., 2009).

Relational mechanisms are advocated and likely to be against the use of power in buyer-supplier relationships (Heide, 1994; Liu et al., 2009). Relational mechanisms emphasize the inherent and moral control, governing exchanges through consistent goals and a cooperative atmosphere; the trust between buyers and suppliers can build in relational mechanisms (Liu et al., 2009). The use of power may reduce the trust in the relationship (Heide, 1994).

However, strategic use of power may lead to systematic performance improvement (Maloni & Benton, 2000). Power always exists in supply chains and is largely taken by buyers (Kim & Wemmerlöv, 2015; Maloni & Benton, 2000). Buyers have the power to make positive changes (e.g., sustainability) by coordinating supply chains (Hall, 2000). Benton & Maloni (2005) found that from the operations perspective, a powerful buyer dominant relationship may improve the effectiveness and efficiency of supply chain operations, and thus the overall performance, given that buyers carefully leverage the application of power. As the firms in the downstream proximate to end markets, buyers have access to the market information and vision on supply chain operations. The power increases buyers' capabilities to integrate the supply chain operations as a whole in the effective and efficient response to the market information. Buyers' conscious and considerate use of power may also lead to suppliers' satisfaction and willingly compliance (Benton & Maloni, 2005). In the case of RFID integration, Wal-Mart's power ensures the rapid adoption of RFID tags by its suppliers to reduce out-of-stock incidences, track products, and cut supply chain costs (Deitz et al., 2009).

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2.2.3.2 Transaction cost economics

Another important aspect of managing buyer-supplier relationships is the transaction costs, as illustrated in TCE (Williamson, 1981). TCE, in general, posits that the firm is viewed as a governance structure as opposed to a production function (Grover & Malhotra, 2003). Under certain conditions, the costs of conducting economic exchange in a market may exceed the cost of organizing the exchange within a firm. The firm should use transaction costs as the unit of analysis to make the business decision between ‘buy’ and ‘make’, where the firm will make the products or service internally, if it is too costly to transact within the market (Hawkins et al., 2008).

Two assumptions in TCE are bounded rationality and opportunism. Bounded rationality indicates that cognitive ability is limited in business decision making, as the pertinent facts relating to business are incomplete due to a lack of information. In contractual relationships between buyers and suppliers, there is uncertainty and therefore permanent fixture, which involves renegotiations and contingency clauses as a dispute arises and the uncertainty is resolved (Hawkins et al., 2008).

Opportunism is the second assumption in TCE. Opportunism is defined as firms’ self-interest seeking with guile through cheating, deception, breach of contract, false promises, withholding information, and disguising attributes or preferences (Hawkins et al., 2008; Williamson, 1981, 1987). Blois (2006) discussed that the firms’ opportunism is the norm in an exchange relationship, where firms will engage in opportunism when it is profitable.

One of the antecedents to opportunism is firms’ dependence/power (Hawkins et al., 2008). In buyer-supplier relationships, when a buyer observes a supplier that is highly dependent on itself (e.g., few alternative buyers), the buyer may utilize monopoly power to conduct opportunistic behavior on the supplier, for example, requesting a price reduction (Yigitbasioglu, 2010). A key factor that increases the supplier’s dependence on the buyer is ‘asset-specific investment’ (Hawkins et al., 2008). Asset-specific investment refers to the degree of investment made by the supplier of goods and or/service for a specific buyer, including site specificity, physical specificity, human assets specificity, and dedicated assets. These investments are specific in the transaction with the buyer and cannot be put into other buyer-supplier relationships (Williamson, 1981, 1987; Yigitbasioglu, 2010). The asset-specific investment increases the level of suppliers’ opportunism risks. Suppliers are locked in the relationship, as these asset specific

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investments return little value in the transactions with others buyers. Suppliers' vulnerability via the hold-ups puts them at risk of buyers' opportunism (Hawkins et al., 2008).

To safeguard against the risks of opportunism, firms must develop effective governance mechanisms in relationships. Governance mechanisms are the means by which order is accomplished in a relationship in which potential conflict threatens to undo or upset opportunities to realize mutual gains (Gimenez & Sierra, 2013; Tachizawa & Wong, 2015). In a buyer-supplier relationship, buyers utilize governance mechanisms, such as quality assurance inspections and on-time delivery surveillance to ensure suppliers' compliance with agreements (Hawkins et al., 2008).

However, transaction costs are increased with all forms of governance (Dyer, 1997). Four types of transaction costs may arise (Adobor & McMullen, 2014; Dyer, 1997; Hawkins et al., 2008; Hill, 1995). Search costs are used to collect information to identify exchange partners. Bargaining costs rise due to the changing circumstances coupled with bounded rationality, which leads to negotiation and renegotiation. Monitored costs are those that guarantee the fulfillment of contractual obligations. Enforcement costs refer to ex-post bargaining and sanctioning a trading partner that does not perform according to the agreement.

TCE suggests that firms (both buyers and suppliers) should make efforts to minimize these transactions costs, which can ensure the improvement of financial performance through the transactions in buyer-supplier relationships (Grover & Malhotra, 2003).

2.2.3.3 The theory of swift, even flow and the theory of variation and uncertainty buffering

The ultimate goal of SCM is to meet market demands with low costs through integrated operations in supply chains (Mentzer et al., 2001). However, what should firms do to meet the market demand with low costs? The theory of swift, even flow (SEF) and the theory of variation and uncertainty buffering (VUB) are the two relevant theories discussing the answer to this question.

SEF was developed by Schmenner and Swink (1998), which proposes that continuously improved productivity is the best way to meet market demands with low costs. Productivity is "getting more outputs from a given set of inputs" (Schmenner, 2015,

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p. 341). Productivity is associated with variability and speed in operation (Stratton, 2008).

The theory of SEF holds that,

The more swift and even the flow of materials through a process, the more productive that process is. Thus, productivity for any process – be it labor productivity, material productivity, or total productivity – rise with the speed by which materials flow through the process, and it falls with increases in the variability associated with the demand on the process or with the steps in the process itself. (Schmenner & Swink, 1998, p. 102)

A low evenness of flow and speed in operations flow reduce productivity and thus create negative financial performance (Schmenner, 2001). The reduction of variability (i.e., even flow) and improvement in speed (i.e., swift) are two essential factors in the theory of SEF (Schmenner, 2015). Variability causes disruptions to the even flow of operations. The increasing demand volatility and variety in production (e.g., overproduction, inventory, and defects) raise the variability and thus must be reduced. Improvement in speed is gained by reducing throughput time as much as possible, where throughput time is the time taken to produce something from start to finish. By reducing the disruption and throughput time, “one eliminates the non-value added aspects of production, which is where the cost and inefficiencies lie” (Schmenner, 2015). Therefore, financial performance can be improved. Lean management is very much in tune with the theory of SEF (Seuring, 2009), where quality enhancement, waste elimination, and inventory reduction are significant techniques to keep the even flow.

The second theory is VUB proposed by Stratton (2008). The theory of VUB was developed from the theory of SEF. VUB supports that low evenness of flow in operations reduces productivity and thus degrades financial performance. However, VUB stresses that supply chain strategies should encompass the operations trade-off between cost-efficiency and availability (i.e., meeting market demand) (Stratton, 2008). VUB discusses the need to respond to a dynamic market by strategic buffering while continuously keeping the even flow in operations. The rapid changes in markets make the disruptions to the even flow of supply chain operations unavoidable (Craighead et al., 2007). For example, the increasing market demand for sustainability in the 21st century has been pressuring firms to substantially change their operational processes (Seuring & Müller, 2008). While firms should make efforts to reduce the variability and improve speed as SEF suggests, there are always residual variation and uncertainty such as these unavoidable disruptions to the even flow of operations (Stratton, 2008). Firms should

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strategically identify the operation trade-offs (e.g., costs and availability). The continuous reduction of variability (e.g., overproduction and inventory) may reduce the costs but also firms' ability to cope with variation and uncertainty of market demands. Firms should continuously maintain swift and even flow in operations. However, buffer mechanisms (e.g., spare inventory and capacity) should be built to enable the trade-off balance between cost-efficiency and availability (Stratton, 2012). Strategic buffering reduces the disruptions caused by variation and uncertainty, thus facilitating the even flow of operations. Firms are able to continuously meet the market demands, which mitigates the negative impact of the disruptions on financial performance.

In summary, VUB supports the premise of SEF that variation and uncertainty cause disruptions to even flow in operations, and thus degrade financial performance. VUB further emphasizes that financial performance is protected from these disruptions through the use of buffering mechanisms.

The theory of SEF and VUB are important in this research. Sustainability requires firms to improve their environmental and social performance in addition to ordinary business activities (Hall, 2000; Tachizawa & Wong, 2015). The stakeholder demand for sustainability thus increases the variation and certainty in supply chain operations. Unless a great scale of additional benefits can be generated by sustainable operations, in light of the theories of SEF and VUB, sustainable operations create disruptions to even flow of operations, thus undermining firms' financial performance.

VUB suggests that financial performance can be protected by buffering mechanisms. The market demand for sustainability creates a disruption to the even flow of operations. The firms that have strategically adopted buffering mechanisms can utilize the spare resources (e.g., additional inventory and capacity), mitigating the impact of the disruptions to the even flow. Thus, the firms are able to continuously meet market demands, which offsets the negative impact on financial performance caused by sustainable operations.

Sustainability has been widely extended to firms' supply chains (Touboullic & Walker, 2015). In a dyadic relationship, suppliers are mandated by their buyers to improve environmental and social performance through supply chain sustainability management (SCSM). SCSM is an additional transaction term in buyer-supplier relationships (Tachizawa & Wong, 2015). SCSM is expected to increase the variation and uncertainty and thus disrupt the even flow of suppliers' operations in line with the theories of SEF

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and VUB. The buffering mechanisms adopted by suppliers can effectively mitigate the negative impact of disruption as suggested by VUB.

2.2.3.4 The relationships among the used theories

Multiple theories are used in this research to explain different aspects of SCSM. This section discusses the interweaving of these theories and clarifies their relevance to this research.

Stakeholder theory provides a theoretical background to understand the stakeholder pressure for sustainability at the supply chain level. Specifically, in dyadic relationships, the stakeholders that require sustainable operations have different power, legitimacy, and urgency over each of the buyers and suppliers. Additional forces are required to transfer this stakeholder pressure in the supply chains, where the governance of buyers increases suppliers' compliance with the supply chain sustainability practices. Thus, stakeholder theory provides the understanding of the role of governance for buyers and compliance for suppliers in the procurement/purchasing perspective of SCSM. The difference in role between supply chain dyads requires this research to focus on different sets of operational strategies in the analysis of buyers and suppliers.

Grounded on this generic background through stakeholder theory, the theory of SEF supports the analysis of financial performance of buyers and suppliers. SEF suggests that the compliance with additional environmental and social operational requirements disrupts the suppliers' even flow, and consequently increases the variabilities in buyers' operations with a detrimental financial impact. The theory of VUB supplements the theory of SEF; when the disruption to the even flow is inevitable, buffering mechanisms can protect firms from financial loss. The theory of VUB supports the exploration of slack resources in the SCSM context.

Buyer's governance ensures the suppliers' compliance with sustainability practices. TCE provides a theoretical lens to understand the relationships between different governance mechanisms and financial performance. RDT complements TCE by understanding the power perspective in dyadic relationships. Power imbalance influences the firms' governance in the relationships, and thus changes the financial performance.

The application of these interwoven theories strengthens this research to develop the hypotheses from a more complete theoretical frame relating to SCSM. In the next section,

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SCSM will be discussed in detail as the background, leading to the analysis of financial performance for buyers and suppliers in the SCSM context.

2.3 Supply chain sustainability management

Firms' operations are bounded by supply chains; traditional operational performance (e.g., cost, quality, flexibility, and delivery) is dependent on the integration of the operations of supply chain partners (Vachon & Klassen, 2006). A firm's sustainability operations and performance, therefore, depend on how their supply chain partners operate in a sustainable manner (Tate et al., 2012). Increasing environmental and social misconducts have been disclosed on the suppliers' side, which raises stakeholders' and thus firms' concerns about sustainability issues in supply chains. Moreover, "real" sustainability should not be only in the products that are sold to consumers but also contained in the process by which the products are manufactured. A shirt that is woven from sustainably grown cotton may be promoted by a buyer as a sustainable garment, even though it was sewn by a Bangladeshi supplier under highly unsustainable conditions (Busse, 2016). Therefore, sustainability must be conducted and studied in the supply chain context, which encourages the integration of sustainability into SCM research.

SCM literature has been well-developed due to its evolvement from established operations research and supply chain practices. It provides a theoretical background to integrate sustainability issues, and thus develops SCSM (Ashby et al., 2012). SCSM is a relatively new research field; the earliest publication is around the beginning of the 21st century (Carter & Easton, 2011). However, the interest in SCSM has been growing rapidly over the years due to the increasing understanding of sustainability issues in the supply chain context (Zailani et al., 2012).

A prominent SCSM work is the study of Carter and Rogers (2008), which used a conceptual theory building approach to present a theoretical framework of SCSM. This framework was conceptualized with TBL and focuses on the interaction of environmental, social, and economic/financial performance in SCM. Importantly, Carter and Rogers (2008) illustrated the tangible actions and four supporting facets of SCSM. The examples of these tangible actions that fall in TBL include cost saving on reduced packaging, reuse, and recycling, lower health and safety costs due to improved working conditions, reduced labor costs in the form of higher motivation and productivity, shorter lead-time, improved product quality, lower disposal costs resulting from environmental

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management systems, and enhanced organizational reputation from environmental and social engagement (Carter & Easton, 2011; Carter & Rogers, 2008).

The four supporting facets of SCSM discussed by Carter and Rogers (2008) are in Figure 2.3 and are summarized by Carter and Easton (2011, p. 49) as below:

- strategy – holistically and purposefully identifying individual SCSM initiatives which align with and support the organizations’ overall sustainability strategy;
- risk management – contingency planning for both the upstream and downstream supply chains;
- organizational culture – ingraining and encompassing organizational citizenship, and including high ethical standards and expectations along with respect for society and the natural environment; and
- transparency – proactively engaging and communicating with key stakeholders and having traceability and visibility into upstream and downstream supply chain operations.

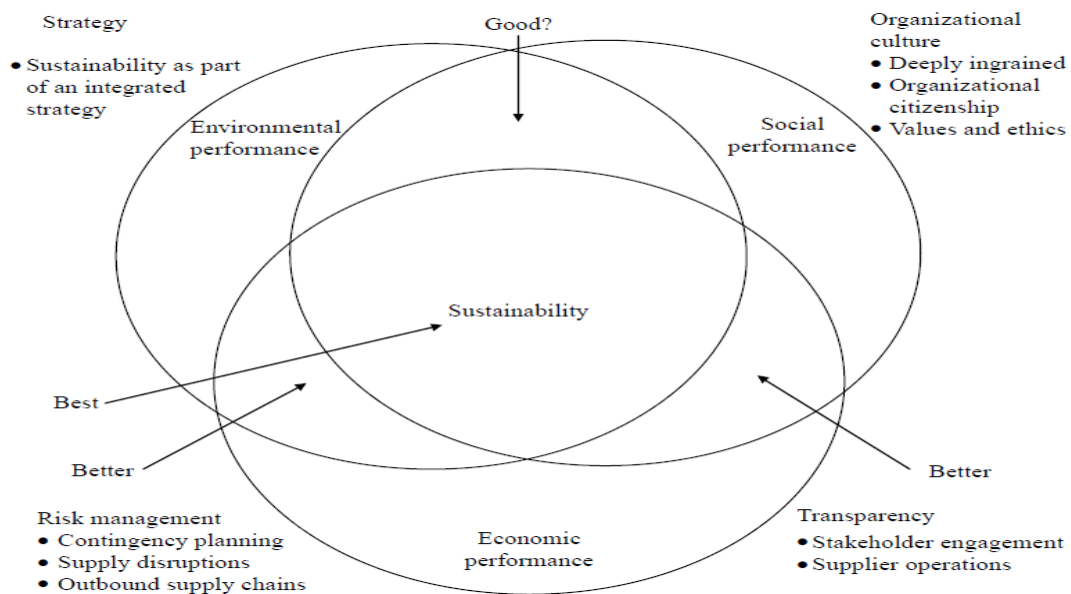


Figure 2.3 Four Supporting Facets of SCSM (adapted from Figure 2 in Carter and Rogers [2008])

Based on this conceptualization of SCSM, Carter and Rogers (2008, p. 368) defined SCSM as,

The strategic, transparent integration and achievement of an organization’s social, environmental, and economic goals in the systemic coordination of key inter-organizational business processes for improving the long-term economic performance of the individual company and its supply chains.

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This definition integrates some of the key theoretical perspectives into a comprehensive framework for SCSM, which can be tested in different contexts (Touboulic & Walker, 2015).

Carter and Rogers (2008) defined SCSM in a very broad way. The different orientations and functions of SCSM (e.g., actor, process, and relation) are covered in the definition, possibly because of the broad scope that SCSM originates from (Ashby et al., 2012). Researchers have commonly adopted this theoretical framework and subsequently focused on some of the specific aspects in SCSM. Touboulic and Walker (2015) distinguished two major perspectives in defining SCSM: the supply chain perspective and the procurement/purchasing perspective. The supply chain perspective of SCSM focuses on supply chain management for sustainable products (Seuring & Müller, 2008), indicating a focus on the closed-loop, life cycle analysis, and reverse logistics angle of SCSM (Ashby et al., 2012). In contrast, the procurement/purchasing perspective emphasizes supplier management in terms of the risks and the performance of sustainability (Seuring & Müller, 2008). This research focuses on the procurement/purchasing perspective of SCSM.

2.3.1 The procurement/purchasing perspective of SCSM

The procurement/purchasing perspective of SCSM focuses on buyers' management of their suppliers' environmental and social performance. Buyers develop supplier evaluation schemes which integrate environmental and social criteria (Seuring & Müller, 2008). Following Giunipero et al. (2012) and Pagell et al. (2010), the present research defines SCSM from the procurement/purchasing perspective as *“the management of all activities of the upstream components of a supply chain to maximize TBL performance, particularly through the selection, evaluation, and development of the supply base.”*

This definition illustrates new elements in the procurement/purchasing, suggests the important role of management on the supply base in TBL, and provides techniques for implementing SCSM. Historically, managers have focused almost exclusively on economic value when managing upstream components of the supply chains (Giunipero et al., 2012). However, the introduction of TBL changes the relationship of business firms with the natural environment and society. Managers are required to consider environmental and social values in procurement/purchasing in addition to economic value. Moreover, if the supply base is not incorporated, the buyers' pursuit of TBL

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performance is less likely to succeed and increases sustainability-related risks (e.g., reputation damage), because the components/material management is important in the process-sustainability that represents the truly sustainable development (Busse, 2016). Furthermore, this definition provides a clear set of techniques to implement SCSM from the procurement/purchasing perspective. The supplier selection, supplier evaluation, and supplier development are three processes in managing sustainability in the supply base (Zimmer et al., 2016). The three processes are independent but interrelated and thus provide multiple methods of managing the components of upstream supply chains.

This research focuses on the procurement/purchasing perspective of SCSM. A firm's sustainability efforts will not be successful without integrating goals with purchasing activities (Miemczyk et al., 2012). The implementation of SCSM beyond firms' own boundary to their suppliers may have a high level of complexity and difficulty (Giunipero et al., 2012). The study of SCSM from a procurement/purchasing perspective of SCSM explores the relational aspects of SCSM (e.g., supplier relationships), which have been limited in the SCSM research (Ashby et al., 2012). This research attempts to cover the gap in the literature by studying SCSM from the procurement/purchasing perspective.

Seuring and Müller (2008) discussed that one objective that buyers have when adopting SCSM is the avoidance of sustainability-related risk. In the next section, the present research uses stakeholder theory and RDT as theoretical lenses to explain what risk buyers try to avoid by adopting SCSM. Also, this research extends the discussions on the motives of SCSM adoption from suppliers' perspective and explains why suppliers comply with their buyers' SCSM, illustrating the systematic approach of SCSM.

2.3.2 Transfer of stakeholder pressure on sustainability to suppliers – stakeholder theory and RDT in SCSM

Firms without pressure may be hesitant to invest in sustainability because the investment does not necessarily improve their financial performance (Hall, 2000). Stakeholder pressure as discussed in stakeholder theory (section 2.1.3) is considered as the main driver of firms' commitment to sustainability (Hoejmose & Adrien-Kirby, 2012), which acquires firms' stakeholder legitimacy and thus avoid damage to financial performance (Fan & Lo, 2012). Therefore, sustainability, to a large extent, is a response to stakeholder pressure (Lee et al., 2014).

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However, stakeholder pressure on sustainability can vary greatly from one tier of the supply chain to the next (Busse, 2016; Schmidt et al., 2017). Upstream suppliers may not be exposed to the same type and extent of pressure as downstream buyers (Hall, 2000).

By applying stakeholder theory and RDT in the supply chain context as theoretical lenses, the present research discusses that the stakeholder pressure on sustainability is transferred by buyers from downstream stakeholders to upstream suppliers, where buyers avoid supply chain sustainability risk imposed by their downstream stakeholders. This transfer of stakeholder pressure in supply chains creates a systematic approach effectively operationalizing SCSM (Hall, 2000). The next sections discuss this systematic approach of SCSM in detail.

2.3.2.1 The difference in stakeholder pressure on sustainability between buyers and suppliers

In the SCSM context, primary stakeholder pressures are mostly from the downstream supply chain at the ‘point of sales’ (e.g., end consumers, NGOs, and regulators), or ‘downstream stakeholders’ (Seuring & Müller, 2008). Buyers (e.g., original equipment manufacturer [OEM], distributor, retailers) are positioned in the downstream supply chain close to the point of sales (discussed in section 2.2.1). Buyers, therefore, are under a high level of stakeholder pressure to commit to sustainability, as the commitment ensures buyers’ legitimacy and thus continuous sales in the end markets (Hall, 2000).

From suppliers’ perspective, there are two categories of stakeholders. The primary stakeholders are buyers. Buyers have contractual relationships with suppliers. This relationship is important for suppliers to create business success. Any failure of adherence to the buyers’ demands may create contractual losses (Busse, 2016).

The secondary stakeholders to suppliers are the actors in the downstream supply chains at the ‘point of sales’ (e.g., end consumers and NGOs) (Foerstl et al., 2015). Due to the positions in the upstream supply chains, suppliers rarely have direct contact with the point of sales, and therefore have a low profile at the end markets. The secondary stakeholders, thus, have a low level of stakeholder legitimacy and power from suppliers’ perspective as suggested by descriptive stakeholder theory (section 2.1.3). Suppliers, in turn, have few incentives to meet the requests from these secondary stakeholders. Consequently, the stakeholder pressure on sustainability without additional force is exposed at a low level to suppliers, as the pressure is primarily from the suppliers’ secondary stakeholders.

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Additionally, government regulations have been historically targeted at buyers; suppliers have little regulatory pressure (Lee et al., 2014; Schmidt et al., 2017). However, the concern with “supply chain sustainability risk” develops buyers’ motivations to add force and transfer the sustainability responsibilities to their suppliers.

2.3.2.2 Supply chain sustainability risk to buyers

The supply chain sustainability risk is defined as the risk that buyers’ downstream stakeholders could punish buyers because of their suppliers’ poor sustainability performance (Busse, 2016). These downstream stakeholders hold the buyer accountable for its suppliers’ sustainable operations because of buyers’ high profile at the point of sales (Hofmann et al., 2014). The punishment can be the withdrawal of important resources from buyers (e.g., stopping buying products) or costly legal obligations (Foerstl et al., 2010).

Two forces contribute to the supply chain sustainability risk. First, buyers’ operations are largely outsourced to suppliers. The outsourced or purchased materials and components from suppliers constitute the majority of value-added production in the buyers’ operations (Duan et al., 2000). Thus, a buyer’s truly sustainable development is primarily a function of the sustainable operations that the suppliers engage with (Tate et al., 2012). Moreover, in recent years, societal awareness of suppliers’ sustainability has been raised by the disclosure of many suppliers’ environmental and social misconducts, such as in the Rana Plaza disaster (Jacobs & Singhal, 2017). Buyers have higher visibility of these misconducts relative to their downstream stakeholders, due to the supply chain positions. These facts increase stakeholder pressure on buyers’ engagement in their suppliers’ sustainable operations.

Second, buyers, in general, are more powerful than suppliers (see section 2.2.3.1) and suppliers’ primary stakeholder (see section 2.3.2.1). As discussed in RDT (see section 2.2.3.1), buyers’ power enables them to make positive changes to the perspective of the sustainable operations in their supply chains. Buyers are able to influence suppliers’ operations by using purchasing power; suppliers are willing to comply with buyers’ mandates to retain the legitimacy in the relationships. Thus, buyers are capable of shaping their suppliers’ sustainability performance through SCSM practices at their discretion (Busse, 2016).

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Buyers' downstream stakeholders perceive the legitimacy and power of buyers' management of their suppliers' sustainable operations and thus hold buyers accountable for their suppliers' sustainability performance by imposing the supply chain sustainability risk (Caniëls et al., 2013). Supply chain sustainability risk creates a substantial cost to buyers (Hajmohammad & Vachon, 2016; Hofmann et al., 2014). These costs can be actual monetary costs due to the adverse publicity and lasting damage to buyers' brand and its trading revenue (Zorzini et al., 2015), opportunity costs, such as unrealized profits resulting from lost revenue (Busse, 2016), and most importantly, capital costs in the stock market due to investors' risk aversion (Wood et al., 2018).

Buyers, in turn, adopt SCSM to improve their suppliers' environmental and social performance, which avoids the supply chain sustainability risk. The assessment, audit, and evaluation of suppliers' sustainability performance can diminish the probability of suppliers' sustainability misconducts and prevent the contagion effect on buyers' credibility. Buyers are less prone to an outcry of negligence on supply chain sustainability issues, and therefore, lower the costs of dealing with their downstream stakeholders (Cruz, 2009; Foerstl et al., 2010).

In summary, the systematic approach of SCSM is built by buyers' transfer of stakeholder pressure on sustainability from downstream stakeholders to upstream suppliers (Hall, 2000). Figure 2.4 visualizes the systematic approach of SCSM. It has been consistently found that buyers' SCSM is the most effective approach to improving supply chain environmental and social performance (Busse, 2016; Hall, 2000; Lee et al., 2014; Touboulic et al., 2014). The lack of pressure and incentives is the main limitation for decision making on SCSM for upstream suppliers. The stakeholder pressure on sustainability and buyers' power are two forces that work interactively to overcome the problem (van Hoof & Lyon, 2013).

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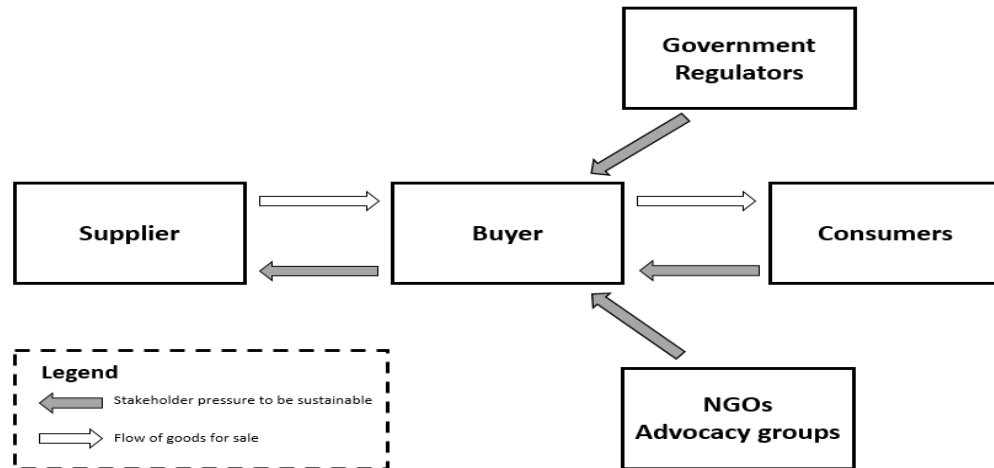


Figure 2.4 Transfer of Stakeholder Pressure for Sustainability in the Supply Chains

SCSM is operated and maintained by different practices which aim at specific environmental or social performance. The effectiveness of SCSM from the perspective of environmental and social performance is ensured by governance mechanisms. In the next sections, SCSM dimensions, (i.e., environmental and social), practices, and governance mechanisms will be introduced, which provides background information to develop the hypothesized relationships with financial performance.

2.3.3 SCSM dimensions

TBL consists of three dimensions of sustainability: environmental, social, and economic/financial performance (Marshall & Toffel, 2005). SCSM extends TBL by including the improvement of these three dimensions in a supply chain context (Carter & Rogers, 2008). Financial performance is firms' primary business objective (Jeurissen, 2000). The SCSM literature primarily focuses on environmental and social dimensions and the links of these two dimensions to financial performance (Hoejmose & Adrien-Kirby, 2012; Seuring & Müller, 2008; Touboulic & Walker, 2015). In line with the literature, this research focuses on the financial performance of the firms that adopt SCSM to improve supply chain environmental and social performance. Thus, with regards to SCSM dimensions, the focus is on the environmental and social dimension.

The social dimension of SCSM in this research is based on the study of Zorzini et al. (2015) and includes the following:

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- human rights and labor conditions, such as child and forced labor, working hours, and freedom of association;
- workplace safety, such as the provision of safe working environments and occupation health management systems;
- diversity and equity in employment, such as minority/female employment;
- animal welfare concerns, such as cage-free eggs, gestation crate-free pork;
- social impact on customers, such as food safety, level of hazardous chemicals contained in products;
- respect for local democratic intuitions, such as conflict-free smelters (requiring smelter suppliers to be certified not to source minerals from Democratic Republic of Congo, where the financial resources may be used to fund armed groups in a civil war).

The environmental dimension of SCSM has been widely studied in the SCSM literature (Miemczyk et al., 2012; Tate et al., 2012; Vachon & Klassen, 2006). This research focuses on the following:

- pollution prevention, such as air or water pollution-control activities;
- the measure and control of energy consumption/carbon emission/green-house-gas;
- recycling/reusing of materials, components, and waste;
- hazardous/restricted materials elimination/reduction;
- deforestation prevention;
- packaging reduction;

There is general agreement that the SCSM is mostly environmental-based while there is a deficit on the social dimension of SCSM (Ashby et al., 2012; Hoejmose et al., 2013; Miemczyk et al., 2012; Seuring & Müller, 2008; Touboulic & Walker, 2015; Walker et al., 2012). There are two reasons the SCSM literature is fragmented, particularly on environmental SCSM.

First, environmental SCSM has been developed over the years, where tangible, mature, and diverse measures/practices of environmental elements have been attained (Ashby et al., 2012; Miemczyk et al., 2012). These well-developed measures/practices encourage researchers and practitioners to explore environmental SCSM. Second, environmental and social dimensions of SCSM have different attributes in the supply chain context. Supply chain operations have a product focus, and thus are environmental in nature

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(Miemczyk et al., 2012). Adding environmental elements in operations (e.g., recyclability) is more likely to change the physical materials flow in supply chains than social elements (e.g., workplace safety). Multiple environmental SCSM elements are embedded in products/production; this close link to the daily-operations increases managers' interest in the environmental dimension of SCSM. The social dimension of SCSM, however, has not specifically identified its influence on product specification/development, order fulfillment, inventory management (Miemczyk et al., 2012).

The different attributes between the environmental and the social dimension of SCSM in supply chains create different impacts on firms' operations and thus on their financial performance when firms adopt SCSM. In this research, this difference in financial performance (for both buyers and suppliers) will be analyzed, providing a strategic choice that buyers can adopt in their SCSM, while identifying business risks that suppliers need to deal with in their SCSM compliance. Detailed discussions will be presented in section 2.5.1.6 from the buyers' perspective and 2.5.2.3 from the suppliers' perspective.

2.3.4 SCSM practices and governance mechanisms

SCSM practices are the additional requirements regarding sustainability issues in buyers' purchasing of inputs on top of traditional criteria (e.g., cost, quality, speed, and flexibility) (Zailani et al., 2012). The following SCSM practices are summarized according to the literature (Miemczyk et al., 2012; Tate et al., 2012; Zailani et al., 2012; Zorzini et al., 2015):

- supplier auditing, monitoring, evaluating, assessing: buyers audit, monitor, evaluate, assess suppliers' operations to determine their level of compliance with environmental and/or social conditions;
- production/product labeling or disclosure: buyers require suppliers to disclose the environmental or safety attributes in production (e.g., carbon emission) or in the product (i.e., the use of unsafe paint in toys);
- product content restriction: buyers specify that purchased products must not contain undesirable attributes, such as hazardous chemicals;
- recyclable or reusable materials/components: buyers specify that purchasing products must have desirable recyclable or reusable attributes;

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- sustainability management system: buyers require suppliers to develop environmental/social management systems to reduce, for example, the energy use/pollution or ensure workplace safety, where the management systems can be required to be either certified by third-party organizations or evaluated by the buyers;
- supplier selection criteria: buyers select only to purchase from suppliers that can meet certain environmental and social conditions.

While these SCSM practices are in place, there is uncertainty about their effectiveness in improving supply chain environmental and/or social performance (Tachizawa & Wong, 2015). Suppliers may have low commitments to these practices, and perform opportunism as discussed in TCE (see section 2.2.3.2). Bounded rationality restricts the buyers' awareness of their suppliers' commitment to these SCSM practices. Opportunistic propensities in the inter-organizational relationship indicate that suppliers are highly likely to perform opportunism if there is no control on the commitments to these SCSM practices (Jiang, 2009b). Buyers commonly adopt governance mechanisms to ensure suppliers' commitment to SCSM practices. Thus these practices can effectively be used to improve supply chain environmental and social performance (Gimenez & Tachizawa, 2012).

2.3.4.1 SCSM governance mechanisms to ensure the improvement of environmental and social performance

In the SCSM context, two broad types of SCSM governance mechanisms are market governance and relational governance (Jiang, 2009a). There are different terms used in the literature in the typology of the SCSM governance mechanism, such as assessment and collaborative (Gimenez & Sierra, 2013; Gimenez & Tachizawa, 2012), formal and informal (Tachizawa & Wong, 2015), buyer-to-supplier and peer-to-peer (Jiang, 2009b), and assessment and development (Foerstl et al., 2010). These terms, in general, represent the same attributes as market governance and relational governance. Market governance is the “structural arrangements designed to influence the behaviors of trading partners in an explicit way, which explicitly specifies the expected roles, responsibilities, processes, and output standards and is often based on hierarchical controls” (Tachizawa & Wong, 2015, p. 22). Market governance is standardized and straightforward. It relies on

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administrative authority and thus does not require significant investments from the buyers enforcing these SCSM practices (Jiang, 2009a).

Relational governance represents “the structure arrangement designed to influence the behaviors of trading partners based on social control and trust” (Tachizawa & Wong, 2015, p. 22). Buyers collaborate with suppliers to improve environmental and social performance. Relational governance requires buyers’ significant investments in their SCSM (Gimenez & Sierra, 2013). Some of the buyers’ investment may turn to asset-specific investments (Jiang, 2009a).

This research focuses on market governance. Buyers are most likely to use market governance in their SCSM (Hoejmosse & Adrien-Kirby, 2012). Market governance creates low costs to the buyers that manage their suppliers’ SCSM compliance relative to relational governance (Jiang, 2009a). Also, buyers, in general, have higher supply chain power than their suppliers (Kim & Wemmerlöv, 2015). Therefore, buyers are able to mandate their suppliers’ compliance by hierarchical controls through market governance.

Gimenez and Sierra (2013) found that market governance is an enabler of relational governance. Assessment and evaluation by using market governance enable buyers to gain the identification of suppliers’ commitment to SCSM and the sustainability knowledge in designing their SCSM (Foerstl et al., 2010). The study on market governance as the most commonly used governance provides practical business strategies.

Two most common mechanisms of market governance are third-party certification and code of conduct (Gimenez & Tachizawa, 2012; Hoejmosse & Adrien-Kirby, 2012). Buyers and suppliers have a different scale of engagement when these two governance mechanisms are used. In this research, these two governance mechanisms are discussed in link with buyers’ and suppliers’ financial performance. Detailed discussions will be given in sections 2.5.1.4 and 2.5.2.4 respectively.

In general, SCSM governance mechanisms ensure the improvement of supply chain environmental and social performance, while the scale of the improvement may vary between governance mechanisms (Foerstl et al., 2015; Gimenez & Sierra, 2013; Tachizawa & Wong, 2015). In the definitions of broad SCSM given by Carter and Rogers (2008) (see section 2.3) and SCSM from the procurement/purchasing perspective (see section 2.3.1), this improvement of environmental and social performance is predicted to increase firms’ financial performance. However, there remains debate in the SCSM literature over the value of SCSM from the financial performance perspective (Pagell &

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Shevchenko, 2014). The next section will discuss the financial performance in SCSM, leading to the focus of this research.

2.3.5 The financial performance in SCSM

It remains uncertain if financial performance improves with the adoption of SCSM. The synergy of TBL has been largely discussed in the SCSM studies, where the firms (both buyers and suppliers) are predicted to improve financial performance when they adopt SCSM to improve environmental and social performance (Carter & Rogers, 2008; Golicic & Smith, 2013; Schmidt et al., 2017; Seuring & Müller, 2008). However, there has been a lack of consistent empirical evidence to support firms' positive financial performance in SCSM (Dam & Petkova, 2014; Wang & Sarkis, 2013; Wu & Pagell, 2011). Pagell and Shevchenko (2014) discussed that previous research has often focused on the synergy of TBL while overlooking trade-offs. Pagell and Shevchenko (2014) discussed from a theoretical perspective the reason that the literature has often proposed the synergy of TBL. Addressing the positive impact of environmental and social issues on financial performance is a way to gain the legitimacy of the SCSM field, where it is assumed that such business actions regarding environmental and social issues often harm financial performance (Pagell & Shevchenko, 2014). There has been a long debate and thus an uncertainty on the financial performance relating to SCSM (Hall, 2000; Hoejmosé & Adrien-Kirby, 2012; Pagell & Shevchenko, 2014; Touboulis & Walker, 2015). This uncertainty seems to indicate that the assumption of synergy is unlikely to be realistic.

Pagell and Shevchenko (2014) discussed the possible trade-off with financial performance in SCSM using the theoretical lens of stakeholder theory. Sustainability research is grounded in stakeholder theory, where firms' adoption of SCSM is in response to their stakeholders' requests (as discussed in section 2.3.2). However, stakeholder theory does not predicate the introduction of environmental and social practices based on firms' positive financial impact (Pagell & Shevchenko, 2014). Supply chains often have no choice but to adopt environmental and social practices to satisfy the demand and needs of their stakeholders, such as NGOs, governments, and environmental/social-conscious consumers (Monika, Jonatan, & Lydia, 2012; Pagell & Shevchenko, 2014; Wu & Pagell, 2011). These stakeholders are not interested in financial performance in the supply chains but rather focus on the supply chain impact on society and the natural environment (Wu & Pagell, 2011). There may exist a trade-off in TBL, where financial performance may

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not be ensured following the adoption of SCSM and its emphasis on improving environmental and social performance. SCSM studies have solely focused on the synergy of TBL and provided limited insight into what to do when a trade-off is required, resulting in greater business risk to the firms in practice (Pagell & Shevchenko, 2014).

There are studies that support the congruence between lean and green (i.e., environmental management) (Hajmohammad et al., 2013; King & Lenox, 2001), discussing how the pursuit of waste minimization is the common goal for lean and green and the profits of going green. However, this connection relies on the link of lean management with cost reduction; the primary reason for firms to implement the initiatives of 'green-lean' is to reduce costs (Drohomeretski et al., 2014). While these green-lean initiatives have some environmental benefits, they are not in the context of SCSM, where stakeholder pressure on environmental performance is the primary reason for both buyers and their suppliers to engage sustainable operations as discussed in section 2.3.2. There is, therefore, a gap between lean and environmental management in SCSM (Kumar et al., 2016). For example, waste is considered differently in SCSM and lean (Johansson & Sundin, 2014). While lean considers unnecessary activities as waste and advocates the standardization in processes to reduce waste, SCSM focuses on reducing physical wastes to the natural environment and requires additional activities to be undertaken (e.g., additional evaluation and changes of operations to reduce pollution) in product development process. Therefore, firms that use only a lean-green approach cannot fully meet their stakeholder demand in the SCSM context as SCSM often requires more disruptive changes that may go beyond merely 'reducing wastes' as lean focuses on.

The present research critically discusses the trade-off with financial performance when buyers and suppliers adopt SCSM. While the buyers and the suppliers that adopt SCSM may have benefits (e.g., reputation and competitive advantages) (Golicic & Smith, 2013; Markley & Davis, 2007), there are also substantial costs relating to SCSM (e.g., transaction costs and the disruptions to the even flow of their operations) (Dam & Petkova, 2014; Wang & Sarkis, 2013). Will these costs outweigh benefits, leading to negative financial performance for buyers and their suppliers? What strategies that managers can adopt to balance the trade-off in SCSM? This research aims at answering these questions with empirical evidence, contributing to the SCSM research by revealing the financial performance in SCSM in a supply chain context (both buyers and suppliers) and providing business strategies for SCSM adoption and compliance, focusing on the nature of SCSM and firm-specific characteristics.

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Transaction cost economics (TCE) is the mostly used theoretical lens in the analysis of the financial performance in SCSM, referring to the changes in transaction costs when SCSM is adopted. In the next section, the application of TCE in SCSM will be introduced.

2.3.6 The application of transaction cost economics in SCSM

TCE has been widely applied to understand the relationship between financial performance and sustainability in the context of transactions (Touboulic & Walker, 2015). SCSM is a transaction term in addition to the traditional conception of business in buyer-supplier relationships (Touboulic & Walker, 2015) and has different performance measures from traditional SCM (Tachizawa & Wong, 2015). The additional negotiation, inspection, and evaluation in supplying criteria based on environmental and social performance raise the transaction costs. These transaction costs include both direct costs of managing the relationship with additional supply criteria and opportunity costs driven from poor SCSM governance decisions (Gimenez & Sierra, 2013).

TCE suggests that individual bounded rationality, opportunism, and asset specificity influence transactions costs, and firms should choose “make” or “buy” mechanism to economize transactions costs (Jiang, 2009b; Williamson, 1981). This bounded rationality is particularly high in SCSM. Environmental and social performance are different from traditional operational performance (e.g., quality, cost, speed, flexibility) in daily business activities (Tachizawa & Wong, 2015). Sustainability problems are commonly hidden in suppliers’ operations (Jacobs & Singhal, 2017). Thus, buyers often have the insufficient expertise and low visibility of sustainability issues in suppliers’ operations, leading to a high level of bounded rationality in managing suppliers’ compliance with SCSM, thus increasing transaction costs.

Moreover, suppliers’ opportunism in their SCSM compliance may develop, where suppliers violate the pre-agreed environmental and/or social conditions in operations (Gimenez & Sierra, 2013). Buyers, however, have to bear substantial costs from the suppliers’ opportunistic behavior (e.g., supply chain sustainability risk), as downstream stakeholders hold buyers responsible for their suppliers’ sustainability performance.

The suppliers’ opportunism in SCSM can be controlled through buyer monitoring, audit, assessment, and evaluation (Jiang, 2009a). Buyers may conduct plant visits to investigate the suppliers’ compliance with SCSM practices and provide training on SCSM guidelines. Suppliers may be required to validate SCSM compliance with self-

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reported documents or certification, while buyers may set pre-requisitions on sustainability conditions for selecting suppliers. Nonetheless, these efforts involve the buyers' investment in human, financial, time, and technological resources to, for example, negotiate SCSM conditions, develop sustainability expertise, and identify compliant suppliers. Moreover, it is likely that some of the buyers' investments in SCSM enforcement may turn out to be asset-specific (e.g., suppliers' training and auditing efforts) (Jiang, 2009a). These investments refer to the transaction costs relating to SCSM (Hill, 1995). As discussed in TCE, buyers can keep 'buying' from suppliers while bearing the transaction costs, if these transaction costs are manageable, where the overall benefits of SCSM (e.g., reduction of supply chain sustainability risk and associated costs) outweigh these transaction costs. Nonetheless, if these transaction costs are substantially high, it is necessary to replace the buyer-supplier transactions with a formal hierarchy (Hill, 1995). For example, Unilever built a \$100 million palm-oil plant in Indonesia to produce traceable and certified palm-oil, rather than enforce its suppliers to prevent deforestation caused by palm-oil production. The reason is that Unilever "struggles to keep tabs on where each batch of palm oil originates" (Evans, 2013, p. 1).

Consequently, the effective management of transaction costs is important in SCSM. In this research, TCE is adopted as one theoretical lens to analyze the transaction costs in SCSM. These transaction costs are expected to influence the overall financial performance that buyers and suppliers may have in SCSM.

2.3.6.1 Governance mechanisms and financial performance

In section 2.3.4, it was discussed that SCSM governance mechanisms ensure the improvement of environmental and social performance. From the financial performance perspective, TCE suggests that the correct choice of governance mechanisms offer a way to minimize transaction costs (Grover & Malhotra, 2003). An effective SCSM governance mechanism ensures suppliers' compliance and meanwhile reduces the associated transaction costs by curbing suppliers' opportunism and reducing SCSM enforcement costs (Tachizawa & Wong, 2015). The scale of reducing suppliers' opportunism and enforcement costs may vary between governance mechanisms that buyers adopt and thus influences buyers' and suppliers' financial performance in SCSM. This research focuses on two of the most common governance mechanisms: third-party certification and code of conduct (Hoejmose & Adrien-Kirby, 2012). In sections 2.5.1.4

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and 2.5.2.4, these two governance mechanisms and their link with buyers' and suppliers' financial performance will be discussed in detail.

An additional governance mechanism in the modern SCSM model is that a group of buyers collaboratively enforce SCSM on their suppliers. This governance mechanism is named 'group SCSM' in this research. This SCSM governance mechanism was briefly discussed by Carter and Rogers (2008) and Jacobs and Singhal (2017). However, the theoretical perspective and empirical evidence of group SCSM and its link with financial performance have not been provided in the literature. In this research, the discussions in the group purchasing literature are followed to analyze group SCSM (which is why this governance mechanism is named 'group SCSM' in this research) (Nollet & Beaulieu, 2005; Sandberg & Mena, 2015; Tella & Virolainen, 2005). Group SCSM is a hybrid form between 'buy' and 'make', where buyers can manage the transaction costs of SCSM while remaining efficient in utilizing other critical resources in markets as independent firms (Hawkins et al., 2008; Tella & Virolainen, 2005). This hybrid form extends to TCE which provides the dichotomy between 'buy' and 'make'. The findings on the effect of group SCSM enable this research to provide a theoretical contribution to TCE. Group SCSM will be discussed in detail regarding buyers' and suppliers' financial performance in sections 2.5.1.5 and 2.5.2.5 respectively.

An additional theory used in the SCSM literature is the natural resource-based view (NRBV), which suggests the sources of competitive advantages may be developed from SCSM, and thus improve financial performance (Carter & Rogers, 2008; Hart, 1995; Touboulic & Walker, 2015). Nonetheless, the studies that have adopted NRBV show controversial findings on financial performance in relation to SCSM (e.g., Pullman et al., 2009; Schmidt et al., 2017; Vachon & Klassen, 2008). The next section will discuss the previous SCSM studies on buyers' and suppliers' financial performance and identify the research gaps. It will also present the research objectives and questions of this research.

2.4 The research objectives and questions – the impact of SCSM on the financial performance in a supply chain context

Prior sections introduced the background and theories of SCSM. In this section, the research objectives are introduced, focusing on the financial performance of both buyers

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and suppliers in relation to SCSM. Previous studies have investigated firms' financial performance in SCSM (mostly focus on buyers) (Dam & Petkova, 2014; Golicic & Smith, 2013; Schmidt et al., 2017; Wang & Sarkis, 2013; Zhu & Sarkis, 2004). However, the findings of these previous studies are contested, most likely due to the use of a perceptual measure and a small sample size, as well as their focus on single firms while SCSM is a supply chain practice influencing multiple firms (Carter & Easton, 2011). This research is designed to extend the literature, where objective measures and a relatively large sample are used, and the financial performance in SCSM is investigated in a supply chain context. Specifically, this research focuses on three groups of financial performance relating to SCSM. The first group is the financial performance of the buyers that adopt SCSM and who require their suppliers to improve their environmental and social performance. The second group is the suppliers that are required by their buyers to comply with SCSM. The third group is the different impacts of SCSM on the financial performance of the buyers and their paired suppliers. In the next sections, the research objectives relating to each group of financial performance will be introduced in detail by reviewing the literature.

2.4.1 The buyers' perspective on SCSM and their financial performance

The first group is the financial performance from the perspective of buyers. The SCSM literature has widely studied buyers' financial performance, but the findings remain contested (Dam & Petkova, 2014; Golicic & Smith, 2013; Schmidt et al., 2017; Wang & Sarkis, 2013). There are prior studies that have argued that SCSM has a positive impact on buyers' financial performance (e.g., Pullman et al., 2009; Schmidt et al., 2017; Vachon & Klassen, 2008). These previous studies have mostly referred to NRBV theory.

NRBV was developed from a classic resource-based view which identifies the properties of the resources that are required to develop firms' competitive advantages: (i) valuable, (ii) having only a few substitutes, (iii), difficult to replicate (Vachon & Klassen, 2008). NRBV illustrates the three strategies in the sustainability context that firms may adopt to create these resources (Hart, 1995; Pullman et al., 2009; Russo & Fouts, 1997; Vachon & Klassen, 2008). First, pollution prevention technologies imply more tacit knowledge through skill development and a "green" team, which creates casual ambiguity, and thus competitors may find it difficult to replicate. Second, product

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sustainability management through life-cycle analysis and reverse logistics may create a web of information interaction and knowledge exchange between different stakeholders in the supply chain, which develops the product stewardship. Third, the innovation of cutting-edge technologies and the transfer of these technologies particular to emerging and developing economies can lead to sustainable development that is firm-specific.

The findings of the studies that have adopted NRBV, however, provide an unclear impact of SCSM on buyers' financial performance. These studies mostly used survey-based methods. Schmidt et al. (2017) found positive financial performance when firms adopt environmental supply chain management. However, Pullman et al. (2009) found both social and environmental supply chain practices are not significantly related to buyers' cost performance in the food industry. Vachon and Klassen (2008) found that environmental collaboration with suppliers (i.e., buyers working with suppliers to improve environmental performance) improves buyers' operational performance by using a perceptual measure (i.e., cost, quality, delivery, flexibility). However, the authors found by using objective measures of buyers' operating performance (i.e., scrap rate, on-time delivery, cycle time, and set-up time), three of the four measures were insignificant. Carter (2005) found an indirect relationship between purchasing social responsibility and buyers' cost reduction, which is mediated by organizational learning.

Further studies, where the authors did not rely on NRBV, do not reduce the ambiguity for buyers' financial performance relating to SCSM. These studies have been mainly survey-based research. Carter et al. (2000) found that environmental purchasing is positively related to buyers' net income and negatively related to the cost of goods sold. Hollos et al. (2012) found that buyers' co-operation with suppliers on sustainability is not significantly related to buyers' cost reduction and operational performance. Zailani et al. (2012) found that environmental purchasing has a positive effect on buyers' economic and operational performance in Malaysia. Zhu et al. (2005) found that environmental supply chain practices do not improve buyers' economic performance in Chinese manufacturing industries. Rao and Holt (2005), however, found green inbound (i.e., environmental purchasing from suppliers) increases buyers' economic performance in South East Asia. By using case study, Worthington (2009) found that large purchasing organizations can benefit from supplier diversity practices, such as improved service delivery and better stakeholder relationships. However, by using event study methodology, Dam and Petkova (2014) found buyers' negative financial performance when buyers adopt environmental supply chain management.

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2.4.1.1 The reasons for the contested findings of buyers' financial performance in SCSM

Within the literature, the findings of buyers' financial performance in SCSM have remained contested. These contested findings are mainly caused for two reasons as discussed below.

First, the substantial costs are hardly analyzed in the studies that adopt NRBV. NRBV provides a conceptual framework that supports intangible resources such as sustainability know-how, culture, and reputation, which can also be strategic resources. However, the relationship between intangible resources and performance outcomes is often difficult to detect and causally ambiguous (Pullman et al., 2009). In particular, the huge costs relating to developing these intangible resources commonly outweigh the potential benefits. SCSM practices are not the same as these traditional operational practices used for assuring costs, quality, speed, and flexibility in a supply chain (Tachizawa & Wong, 2015), which implies that SCSM will lead to variability in buyers' operations and thus disrupt the even flow of their operations as suggested by the theory of SEF (discussed in section 2.2.3.3). Moreover, SCSM involves the management of suppliers' operations. Buyers, however, do not always have visibility or accountability to their suppliers' operations (Hendricks et al., 2017). In particular, sustainability problems are more hidden in operations than cost/quality/speed/flexibility issues, which increases buyers' transaction costs in the inter-organizational relationship under the discussion of TCE (Gimenez & Sierra, 2013). Additionally, as SCSM focuses on process sustainability rather than product sustainability (Busse, 2016), it is questionable that the extent of SCSM practices can improve buyers' reputation. It is likely that considerable costs may offset these benefits proposed by NRBV, while the studies adopting NRBV seems merely focusing on the benefits.

Second and perhaps even more important, through the use of a systematic literature review, many scholars have found that the dominant methodologies in SCSM research are survey-based methods and case studies (Ashby et al., 2012; Carter & Easton, 2011; Hojmosse & Adrien-Kirby, 2012; Seuring & Müller, 2008; Touboulic & Walker, 2015); however, social desirability bias has rarely been addressed in these studies (Carter & Easton, 2011; Walker et al., 2012). In this context, social desirability bias refers to the use of perceptual measures (mainly in survey-based research and cases studies) to investigate sustainability issues, where the respondents may feel pressured to be

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perceived in a socially acceptable way with regard to sustainability and the findings on financial performance may be more positive than they are in reality (Carter & Easton, 2011; Walker et al., 2012). Carter and Easton (2011) found a large majority of survey-based research does not assess social desirability bias or discuss the potential limitations associated with this bias. Social desirability bias was also not evaluated in the meta-analysis by Golicic and Smith (2013), even though their finding of positive buyer financial performance in environmental supply chain management was largely based on survey-based research.

Therefore, SCSM research requires the application of a methodology to objectively explore buyers' financial performance, especially the associated costs of SCSM. The present research, therefore, uses event study methodology (Kothari & Warner, 2007) to investigate buyers' financial performance in SCSM. Event study methodology estimates financial performance by using the stock market reaction to announcements. The announcements in this research are the SCSM announcements made by buyers that require their suppliers to improve their environmental and social performance. The stock market reaction to the SCSM announcements is the component of the stock return of buyers adjusted for market factors (i.e., confounding factors), referred to as 'abnormal return to the SCSM announcements' (Wood & Wang, 2018). By using event study methodology, the findings in this research do not suffer social desirability bias. Also, the stock market reaction is a more encompassing measure than perceptual measures (e.g., by including intangible assets), where the holistic perspective that includes both the benefits and costs relating to SCSM is more likely to be captured (Dam & Petkova, 2014; Hendricks et al., 2017), leading to this research discovering the overall financial performance in SCSM.

2.4.1.2 The influential factors in buyers' financial performance in SCSM

This research is designed to explore the factors that influence buyers' financial performance, focusing on the nature of SCSM and firm-specific characteristics. Pagell and Shevchenko (2014) critically discussed that the present SCSM research remains focusing on searching for evidence of improved financial performance when firms adopt SCSM; however, SCSM research provides no insight into what to do when SCSM decreases financial performance. The influential factors to buyers' financial performance

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explored in this research can be provided as the business strategies to mitigate the negative impact of SCSM in business, thereby providing managers with insight on what to do when they face business risks caused by SCSM adoption.

The factors relating to the nature of SCSM have been discussed in the SCSM literature in connection with environmental and social performance; however, they have not been widely explored in relation to buyers' financial performance, such as buyers' SCSM governance mechanisms (Tachizawa & Wong, 2015) and SCSM dimensions (Miemczyk et al., 2012). Group SCSM as a new SCSM model, where buyers collaborate in their SCSM mandates with their suppliers, has not been widely studied.

The factors relating to firm-specific characteristics have not been widely studied in SCSM research in connection with buyers' financial performance. SCSM is a supply chain practice (Touboulic & Walker, 2015). Thus the abilities of buyers' coordination and control of their supply chain operations have substantial effects on the effectiveness of buyers' SCSM and thus influence their financial performance (Dam & Petkova, 2014). This research focuses on buyers' supplier relationship management (SRM) and growth prospects (buyers with high growth prospects are required to have a highly reliable and responsive supply chain [Fisher, 1997]).

Dam and Petkova (2014) used event study methodology to investigate buyers' financial performance in SCSM. However, they focused on a single environmental supply chain sustainability program with a small sample size (66 observations). Importantly, the factors that influence buyers' financial performance in SCSM were not explored in their study. The present research extends their study with a relatively large sample and tests the impacts of influential factors on buyers' financial performance. The first research objective, therefore, is,

Research objective one: to investigate the impact of buyers' SCSM on their financial performance, using objective measures.

Research question 1.1: What is the impact of buyers' SCSM on their financial performance?

Research question 1.2: What factors influence this impact?

2.4.2 The suppliers' perspective on SCSM and their financial performance

The second group of financial performance in SCSM is suppliers' financial performance. Suppliers are the firms that are required by their buyers to comply with SCSM. From suppliers' perspective, previous SCSM studies have remained focused on how to manage suppliers' compliance in SCSM (Caniëls et al., 2013; Hoejmose et al., 2013; Touboulic et al., 2014) and how suppliers can improve their environmental and social performance (Foerstl et al., 2015; Giunipero et al., 2012). Suppliers' financial performance in SCSM has not been widely studied.

Multiple conceptual studies have emphasized the importance of suppliers' commitment to the success of SCSM (Gimenez & Tachizawa, 2012; Hoejmose et al., 2013; Seuring & Müller, 2008). However, suppliers' commitment to SCSM is mostly motivated by its financial performance, or at least its non-detrimental impact on financial growth (Foerstl et al., 2015). The lack of empirical evidence on suppliers' financial performance leads to uncertainty amongst suppliers' managers on the business decisions regarding SCSM.

Moreover, previous studies have mainly focused on the financial performance of single firms (i.e., buyers) in SCSM, providing a limited impact of SCSM in a supply chain context. SCSM is a supply chain practice (Touboulic et al., 2014). Focus on single firms in SCSM does not capture supply chain impact (Pagell & Shevchenko, 2014). In the SCSM context, buyers mandate their suppliers (Hall, 2000; Touboulic et al., 2014). Buyers' positive financial performance may be caused by retaining the benefits (e.g., the reduction of supply chain sustainability risk), while letting their suppliers bear substantial costs in the process of mandates. The substantial costs of SCSM in supply chains can be overlooked if one assumes the positive financial performance in SCSM by merely relying on the finding from the buyers' perspective. Carter and Easton (2011) and Pagell and Shevchenko (2014) called for studying SCSM at least in a dyadic relationship to explore the supply chain impact of SCSM.

This research fills the gap in the literature by exploring suppliers' financial performance when they are required to comply with their buyers' SCSM. The clarity of suppliers' financial performance provides insight into business risks that suppliers may have in their SCSM compliance. Also, the investigation of both buyers' and suppliers' financial performance answers the calls of Carter and Easton (2011) and Pagell and

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Shevchenko (2014) by revealing the impact of SCSM in a supply chain context (with dyadic relationships).

2.4.2.1 The influential factors in suppliers' financial performance in SCSM

This research is also designed to explore the factors that influence suppliers' financial performance, focusing on the nature of SCSM and firm-specific characteristics. Since suppliers' financial performance has not been widely examined, there is a lack of studies exploring the influential factors from suppliers' perspective in SCSM research. This research fills this gap. These influential factors can be developed as suppliers' strategies in SCSM to reduce the negative impact of SCSM on their financial performance, while also providing suppliers' managers with insight into what they can do when they face the business risk caused by SCSM compliance.

The factors relating to the nature of SCSM refer to SCSM governance mechanisms, SCSM dimensions, and group SCSM. Governance mechanisms and dimensions are the SCSM specifications of buyers in their suppliers' compliance (Gimenez & Sierra, 2013; Jiang, 2009b). Suppliers are required to commit to different investments and change different elements in operations in various SCSM governance mechanisms and dimensions, suggesting different impacts on suppliers' financial performance. Group SCSM indicates that suppliers are required to comply with SCSM that a group of buyers collaboratively enforce. The additional coercive force that group SCSM creates may result in more costs in suppliers' compliance.

The factors relating to firm-specific characteristics are supply chain power, operational slack, and financial slack. Supply chain power influences suppliers' negotiation positions, thus the conditions in their compliance with buyers' SCSM (Dabhilkar et al., 2015; Hojmosse et al., 2013; Touboulic et al., 2014). The associated transaction costs in the negotiation and compliance conditions are expected to influence suppliers' financial performance in SCSM. Moreover, in SCSM compliance, suppliers are required to substantially change their operations by adding environmental and social elements into their manufacturing processes. While capital investment and resources are largely demanded (Giunipero et al., 2012), this change in operations creates a variability and thus disrupts the even flow of suppliers' operations as suggested by the theory of SEF (discussed in section 2.2.3.3.). Thus, financial slack that provides capital resources

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and buffering mechanisms in the form of operational slack in line with the theory of VUB (discussed in section 2.2.3.3.) may effectively reduce the costs that suppliers may have in SCSM.

In their study, Schmidt et al. (2017) found that suppliers have a positive financial performance when implementing green supply chain practices (e.g., the design of disassembly, reuse, recycling of materials and environmental packaging). However, they focused on suppliers' self-selected environmental practices. While these practices have some environmental impact, suppliers' self-selected practices are more likely to be concerned with reducing costs. In this research, the focus is on the suppliers that are mandated by their buyers' SCSM in line with the SCSM literature (Hall, 2000; Touboulic et al., 2014). The costs and benefits may be different between self-selected and buyer mandated practices. The finding in this research may provide a meaningful contrast with that of Schmidt et al. (2017) from a different focus.

Moreover, perceptual measures were used in the study of Schmidt et al. (2017), without addressing social desirability bias in their study. The use of event study methodology enables the objective measures in this research, where suppliers' abnormal return to their buyers' SCSM announcements is used to estimate the suppliers' financial performance in SCSM. The findings in this research do not suffer social desirability bias.

Most importantly, this research explores the factors that influence suppliers' financial performance in SCSM. A review of the literature has shown that there have been no such factors found in previous studies. This research contributes to the literature by providing knowledge of mitigating strategies that suppliers can have in their SCSM compliance. Therefore, the second research objective is,

Research objective two: to investigate the impact of buyers' SCSM on their suppliers' financial performance by using objective measures, providing a supply chain impact of SCSM.

Research question 2.1: What is the impact of buyers' SCSM on their suppliers' financial performance?

Research question 2.2: What factors influence this impact?

2.4.3 The different impact of SCSM on buyers' and suppliers' financial performance

The third group of financial performance that this research focuses on is the different impact of SCSM on the financial performance of buyers and their suppliers. The investigation on this difference in the financial performance further explores the supply chain impact of SCSM by identifying whether suppliers bear more costs as a result of their buyers' shift of the costs in SCSM mandates.

The exploration of the financial performance in SCSM is linked with the 'green bullwhip effect' (Lee et al., 2014). The green bullwhip effect indicates buyers distort the information of the requirements from downstream stakeholders to their suppliers by adding stringent practices and compressing the timeline of compliance. Buyers, therefore, create a buffer on the potential business risks (e.g., supply chain sustainability risks) that are caused by the delay in suppliers' compliance. Suppliers, however, have to bear more costs due to this buffer, suggesting buyers' shift of the costs to their suppliers. The green bullwhip effect is further supported by Seles et al. (2016).

In this research, the buyers and their paired suppliers (i.e., direct trading partners in the same supply chain) were used to test the difference in financial performance in line with the green bullwhip effect (Lee et al., 2014; Seles et al., 2016). This research contributes to the literature by providing the first empirical evidence that buyers shift the costs to their suppliers in SCSM. Therefore, the third research objective is,

Research objective three: to investigate the different impact of buyers' SCSM on the financial performance of buyers and suppliers.

Research question 3: Is there a difference in financial performance between buyers and their paired suppliers relating to buyers' SCSM?

This section discussed the research gaps in the SCSM literature, leading to the research objectives and questions in this research. In the next section, the research questions will be developed as hypotheses through reviewing the previous studies. The hypotheses testing will provide answers to the research questions and therefore achieve the research objectives.

2.5 Hypotheses development

The supply chain positions of buyers and suppliers are different (i.e., downstream versus upstream). The nature of SCSM for buyers and suppliers is not the same (i.e., managing versus complying). Buyers and suppliers perceive SCSM and are affected in different ways. Therefore, the impacts of SCSM on buyers and suppliers are separately discussed in the next sections. Figure 2.5 gives an overview of this section. The financial performance and the influential factors in SCSM are first examined in relation to buyers and secondly to suppliers. Finally, the difference in the financial performance of buyers and suppliers is explored in connection with the green bullwhip effect.

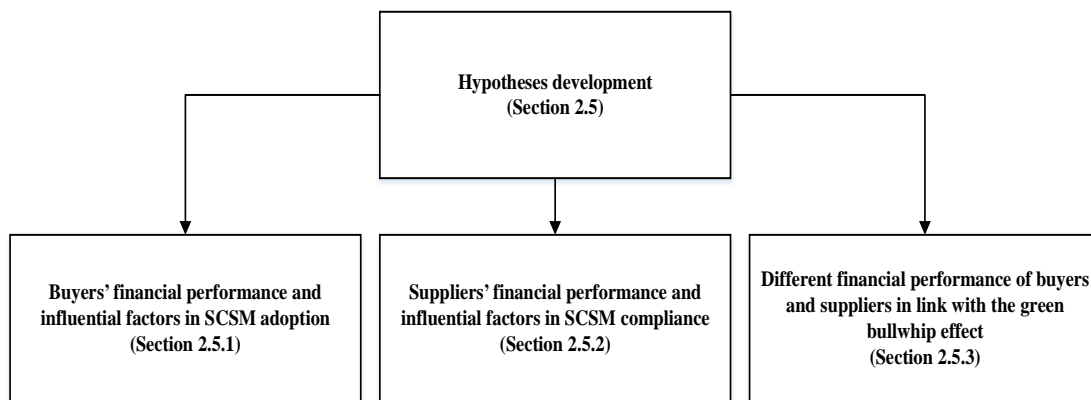


Figure 2.5 Overview of the Hypotheses Development Section

2.5.1 Buyers' financial performance and influential factors in SCSM adoption

This section focuses on developing the hypotheses regarding buyers' financial performance in SCSM. Buyers' negative financial performance is hypothesized. SCSM adds substantial transaction costs and disrupts the even flow of buyers' operations. The associated costs are predicted to outweigh the potential benefits that buyers may have when they adopt SCSM. Section 2.5.1.1 develops the hypothesis of buyers' negative financial performance in SCSM through the review of the relevant literature.

There are factors that influence buyers' negative financial performance. From buyers' perspective, this research focuses on two categories of factors: the nature of SCSM and firm-specific characteristics. The factors relating to the nature of SCSM are SCSM governance mechanisms, the group SCSM approach (i.e., buyers' collaboration in SCSM mandates), and the SCSM dimension (i.e., mandating the environmental or social dimension of SCSM). The factors regarding firm-specific characteristics are supplier

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relationship management (SRM) and growth prospects. These factors are developed as strategies for mitigating the negative financial performance or analyzed as particular business risks that buyers need to deal with. Sections 2.5.1.2 – 2.5.1.6 present the hypotheses regarding these influential factors.

2.5.1.1 The impact of SCSM adoption on buyers' financial performance

Buyers are pressured by their downstream stakeholder to adopt SCSM, which aims at improving suppliers' environmental and social performance (Hall, 2000; Touboulic et al., 2014). SCSM is additional to the traditional business activities that buyers primarily rely on to improve financial performance (Touboulic & Walker, 2015). In this research, SCSM is discussed as it represents an increase in buyers' transaction costs and a disruption to the even flow of buyers' operations. There are potential benefits to buyers that adopt SCSM, such as reputation, competitive advantages, and reduction of supply chain sustainability risk. However, these benefits are unlikely to offset the costs increased by SCSM adoption, which leads to hypothesizing the negative impact of SCSM on buyers' financial performance.

2.5.1.1.1 The increased transaction costs

Buyers' transaction costs are increased by the additional governance of environmental and social performance in buyer-supplier relationships. Currently, most supply chains are not sustainable from the perspective of environmental and social performance (Pagell & Shevchenko, 2014). Unsustainable conditions are mostly hidden in suppliers' operations, and thus the problems may be invisible to buyers and suppliers (Busse, 2016). Buyers are required to make a great effort to upgrade their suppliers' environmental and social performance. SCSM governance must be created by buyers to effectively improve suppliers' environmental and social performance and meanwhile to curb suppliers' opportunism in their SCSM compliances (Gimenez & Sierra, 2013). Buyers are required to undertake educational programs, set up teams to guide suppliers' sustainability development, and to conduct screening, inspection, evaluation, and site visits (Rao & Holt, 2005). The SCSM governance requires additional expenses of time, human, and financial resources (Adobor & McMullen, 2014), which increases buyers' transaction costs.

These transaction costs cannot be offset in daily business activities. The traditional SCM governance that buyers use in daily business activities focus on the traditional

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evaluation frame of supply chain performance (e.g., cost/speed/quality/flexibility). Environmental and social performance has different specifications from traditional supply chain performance (Tachizawa & Wong, 2015). Thus, the expertise of SCM buyers has developed in daily business activities with suppliers and cannot be effectively converted into SCSM governance to save these additional transaction costs. In turn, the additional transaction costs that are spent on developing SCSM expertise and governance cannot be effectively used to improve traditional supply chain performance that primarily contributes to buyers' financial growth (Wu & Pagell, 2011).

2.5.1.1.2 The disruption to the even flow of buyers' operations

The theory of swift, even flow (SEF, discussed in section 2.2.3.3) proposes that firms should keep even flow of their operations so that "each day of production resembles every other day of production" (Schmenner, 2015, p. 345). The even flow of operations can ensure productivity, which enables firms to meet the market demands with the lowest costs (Schmenner, 2001). Any variability in operations that disrupts firms' even flow of operations degrades their financial performance (Stratton, 2008).

SCSM adds environmental and social performance as supplying criteria in buyers' supply chains, thus disrupting the even flow of buyers' operations. SCSM requires substantial manufacturing and process changeovers in operations, which increases the variability of suppliers operational competence (e.g., flexibility, speed, costs, and delivery) that buyers require to keep competitive in the marketplaces (Dam & Petkova, 2014; Handfield & Bechtel, 2002; Zhu & Sarkis, 2004). SCSM is a buyers' supply chain practice on suppliers. Buyers have to tolerate the variability of operational competence from suppliers. This variability subsequently transfers onto buyers' operations, and thus disrupts the even flow.

Second, there is a risk of a supply chain glitch for buyers that adopt SCSM, which creates a persistent disruption to the even flow of buyers' operations. SCSM creates a rigorous procurement policy (Busse, 2016) and requires suppliers' investment in considerable capabilities and resources (Lee et al., 2014). The vulnerable suppliers may not be able to keep sufficient supply when implementing SCSM practices into their operations, which increases the risk of a supply chain glitch to buyers. When oil suppliers were required to modify their refineries to produce cleaner-burning diesel fuel, some suppliers were given extra time by the authority to meet the compliance in order to ensure an adequate supply to meet the demand (Business Wire, 1993). While Unilever

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committed to enforcing their palm oil suppliers to provide environmental certification, because of the concern over sufficient supply Unilever planned to insource the production by investing in building their own palm-oil plants (Evans, 2013). Although pressured by environmental groups to enforce SCSM practices amongst their wood suppliers, Home Depot was concerned at meeting market demand, as “if we bought all the certified wood on the market today, it would supply our 50 Los Angeles stores for a year [...] let alone 800 stores” (Dow Jones Business News, 1999). These business cases demonstrate the concern and risk of a supply chain glitch associated with SCSM adoption. Supply chain glitches have been widely found to create a substantial cost to buyers (Hendricks & Singhal, 2003, 2005, 2008b; Hendricks et al., 2009; Zsidisin et al., 2015), and the cost is persistent over the long term due to the severe loss of market share (Craighead et al., 2007). In ordinary business practices (i.e., in the absence of SCSM), the glitch could be solved by, for example, switching to alternative suppliers. In SCSM, the buyers’ commitment to the buyer-supplier relationship is the motive to ensure suppliers’ compliance (Busse, 2016). Buyers, hence, have to bear the severe and persistent disruption to the even flow of their operations caused by supply chain glitches.

In summary, SCSM increases the variability in buyers’ supply chains by adding environmental and social supplying criteria. This variability disrupts the even flow of buyers’ operations. In particular, the increased risk of a supply chain glitch caused by SCSM creates a high scale of disruption and more costs to buyers who adopt SCSM.

2.5.1.1.3 Benefits versus costs

There are benefits that buyers can achieve in SCSM adoption. Reputational assets are mostly discussed as an important benefit to firms that adopt sustainability (Carter & Rogers, 2008; Orlitzky et al., 2003). Firms can also have SCSM-related competitive advantages (Golicic & Smith, 2013; Thornton et al., 2013). Supply chain sustainability risk and associated costs can be reduced by SCSM (Busse, 2016). In this research, these benefits are predicted not to be sufficient enough to offset buyers’ costs associated with SCSM. In this section, a discussion on each benefit is given, and an explanation is provided on why these benefits are unlikely to outweigh the costs.

Reputational assets are discussed as the most important benefit for firms in the sustainability literature (Carter & Rogers, 2008; Orlitzky et al., 2003). Firms’ sustainability reflects the stakeholders’ expectations and thus earns firms positive brand image (Schmidt et al., 2017). The increased reputation creates assets, such as access to a

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new market, the charge of premium prices, and increasing sales (Roberts & Dowling, 2002; Thornton et al., 2013; Zhu & Sarkis, 2004).

Reputational assets are more relevant to product-based sustainability, where downstream stakeholders have high visibility of the outcome of firms' sustainability efforts (Orlitzky et al., 2003). However, SCSM is process-based sustainability (Busse, 2016), which refers to buyers' management in the operations of their upstream supply chains. There is an uncertainty that buyers' downstream stakeholders have clear visibility to buyers' efforts (Dam & Petkova, 2014). The low visibility to the operations relating to SCSM reduces the opportunity that buyers can offset their costs of SCSM by reputational assets.

Buyers may develop competitive advantages in their SCSM adoption. Mainly grounded by NRBV (discussed in section 2.4.1), these practices that buyers use in their SCSM can develop valuable and inimitable capabilities, such as sustainability know-how and innovation (Golicic & Smith, 2013; Schmidt et al., 2017). These capabilities contribute to the competitive advantages and thus create a heterogeneous performance of the buyers that adopt SCSM (Schmidt et al., 2017).

In the SCSM context, the performance outcome of these competitive advantages associated with SCSM is uncertain (Wu et al., 2008). Pullman et al. (2009) discussed that the competitive advantages developed from SCSM are mostly intangible assets (e.g., sustainability know-how), but the relationship between intangible assets and performance outcome are often causally ambiguous. There are additional investment and resources required to convert the intangible assets into useful resources, such as organizational learning (Carter, 2005). The scale of improvement in the financial performance relating to these intangible assets may not be large (Wang & Sarkis, 2013). Most importantly, these intangible assets are acquired by the increased transaction costs and the costs associated with the disruption to the even flow of buyers' operations.

SCSM is effective in reducing buyers' costs associated with supply chain sustainability risk (discussed in section 2.3.2.2). Downstream stakeholders hold buyers responsible for their suppliers' environmental and social performance. Suppliers' environmental and social misconduct can result in buyers' monetary costs due to the adverse publicity (Foerstl et al., 2010), opportunity costs of the lost sales (Busse, 2016), and capital costs due to investors' risk aversion (Wood et al., 2018). SCSM is consistently found to improve supply chain environmental and social performance, thus reducing buyers'

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supply chain sustainability risk and costs (Gimenez & Sierra, 2013; Hajmohammad & Vachon, 2016; Hojmosse et al., 2013).

However, SCSM merely ensures the reduction of the costs associated with supply chain sustainability risk but not the increase in any financial benefit. The transaction costs are increased, and the costs associated with disruption to the even flow of operations are created by buyers' SCSM adoption. Thus, the overall financial performance is negative. According to Pagell and Shevchenko (2014), in the SCSM context, buyers simply have to comply with stakeholder expectations in order to avoid pain (e.g., supply chain sustainability risk), but they adopt practices that have a negative impact on their financial performance.

In summary, buyers' transaction costs are increased by additional governance on environmental and social performance. SCSM increases the variability in buyers' supply chains, and thus disrupts the even flow of buyers' operations. While there are benefits, such as reputation, competitive advantages, and the reduction of costs relating to supply chain sustainability risk, these benefits cannot sufficiently offset the increased costs when buyers adopt SCSM.

In this research, event study methodology was used, where the abnormal return to SCSM announcements is used to estimate the financial performance of firms (both buyer and suppliers) relating to SCSM. (Event study methodology was briefly discussed in section 1.4 and will be discussed in detail in section 3.2). SCSM announcements are the announcements made by buyers mandating their suppliers' improvement in environmental and social performance. The abnormal returns associated with SCSM announcements are the component of stock return adjusted for market factors (i.e., confounding factors), estimating the financial performance relating to SCSM. This research follows the standard style of hypotheses in event studies in the literature (Jacobs & Singhal, 2017; Wood et al., 2017). The buyers' financial performance is predicted to be negative when they adopt SCSM. Therefore, it is hypothesized:

***(B)H1.** Buyers' abnormal return will be negatively related to their SCSM announcements that require their suppliers to improve environmental and social performance.*

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2.5.1.2 Buyers' supplier relationship management

Buyers' ability in supplier relationship management (SRM) is an essential factor in SCSM relating to buyers' financial performance (Seuring & Müller, 2007; Tidy et al., 2016).

SRM is a critical component of SCM (Johnston, McCutcheon, Stuart, & Kerwood, 2004). SRM is defined as the comprehensive management to enhance cooperation in business relationships, coordination in production processes, and communication in information systems between a buyer and its suppliers to continuously improve the efficiency and effectiveness in the supply chains (Cho et al., 2012). Good SRM indicates that a buyer is able to have a high level of flexibility in arrangements, shared planning, and joint responsibility in the partnership with its suppliers (Johnston et al., 2004), which increases supply chain responsiveness (Handfield & Bechtel, 2002). In the SCM research, good SRM has been widely found to contribute to the improvement of financial performance (Forkmann, Henneberg, Naudé, & Mitrega, 2016; Lambert & Schwieterman, 2012; Tseng, 2014).

In the SCSM context, SRM is found to be closely related to supply chain environmental and social performance. Seuring and Müller (2007) by a Delphi study found supplier management is one of four core issues in SCSM. SCSM requires the management of environmental and social performance outside the direct control of buyers, where buyers' ability in SRM substantially influences suppliers' engagement in SCSM implementation (Tidy et al., 2016). Previous studies have provided empirical evidence that good SRM can effectively transfer SCSM practices to good environmental and social performance (Hajmohammad et al., 2013; Simpson & Power, 2005; Tidy et al., 2016; Vachon & Klassen, 2006). However, there is little known from the financial performance perspective what the effect of SRM is in buyers' SCSM adoption. In this research, three reasons are discussed below to support that good SRM is expected to reduce buyers' negative financial performance.

First, good SRM provides buyers with additional assets and resources. SCSM disrupts the even flow of buyers' operations. Buyers are forced to make multi-criteria business decisions on supply chain designs, which evaluates not only traditional operational performance (e.g., quality, cost, delivery) but also sustainability performance (Cruz, 2009). This disruption can be reduced by good SRM. Buyers' SRM is an important relational asset (Liou & Gao, 2011). Good SRM can increase suppliers' commitment to

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vendor managed inventory, just-in-time delivery, and inventory positioning within the supply chain, which can substantially improve buyers' flexibility and response to the markets, and reduce inventory costs (Handfield & Bechtel, 2002). Also, good SRM provides a low cost of capital. The relationship asset built from the management of suppliers empowers buyers with a preferential payment schedule, and therefore, allows buyers to hold more liquidity (Liou & Gao, 2011). Buyers then have spare resources for core business activities. In the SCSM context, the additional resources created by buyers' good SRM can reduce the disruption to the even flow that SCSM adoption may create.

Second, good SRM improves buyers' operational competence through suppliers' asset-specific investments. Suppliers' willingness to deploy asset-specific investments is increased with buyers' excellence in SRM (Hawkins et al., 2008). Asset-specific investments motivate suppliers to include buyers' value and benefits as well as support buyers' operations (Corsten et al., 2011). The suppliers' asset-specific investment creates the buyers' idiosyncratic assets which are tailored to the buyers' operations but not available to the buyers' competitors. The buyers that have good SRM are able to better secure the resources generated in the buyer-supplier relationship than their competitors. While SCSM requires additional investment in buyers' supply chain operations, good SRM provides buyers with sources for retaining the competitiveness and meanwhile undertaking SCSM projects.

Third, good SRM decreases buyers' transaction costs by reducing suppliers' opportunism in SCSM compliance. Simpson and Power (2005) discussed that the management of suppliers' environmental and social performance is at extreme risk of opportunism without the protection of appropriate safeguards and monitoring, as the bounded rationality may restrict the buyers' SCSM specifications and identification of the suppliers' compliance. The potential risks of inappropriate SCSM practices and suppliers' behavioral uncertainty increase the buyers' enforcement and monitoring costs and may create reputational damage for buyers while the SCSM efforts are made. However, good SRM provides buyers with the ability to diminish the costs. Suppliers' asset-specific investment is increased by buyers' ability in SRM (Hawkins et al., 2008), where there is a high cost to suppliers to switch to other buyers (Yigitbasioglu, 2010). The suppliers, therefore, are engaged in continuously meeting and exceeding the buyers' requirements in order to secure the investment (Corsten et al., 2011), which reduces the possibility of suppliers' opportunistic behaviors and thus decreases the buyers' transaction costs.

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Moreover, good SRM represents either the buyers' power to suppliers or trust in buyer-supplier relationships (Simpson & Power, 2005). Both power and trust are found to improve the suppliers' compliance with buyers' SCSM practices (Dabhilkar et al., 2015; Hoejmose et al., 2013). Buyers can, therefore, reduce the risk of suppliers' opportunism in SCSM.

Fourth, the knowledge of suppliers' operations is increased through buyers' SRM ability (Cho et al., 2012). Buyers are able to develop appropriate SCSM specifications and practices, which reduces the disruption to the even flow of their operations and provides cost-efficient SCSM solutions. A buyer with a high level of SRM may have a constant import of new and critical knowledge over suppliers' operations (Simpson & Power, 2005). The transparency of suppliers' operations increases the buyers' precision in SCSM specifications and practices. For instance, the shorter lead times of a just-in-time system allows buyers to uncover the suppliers' genuine capacity and related efficiency. Buyers, thus, are able to mandate the appropriate measures of, for example, suppliers' carbon emission reduction or improvement on labor conditions, to reduce the disruption to the even flow of their operations while mandating SCSM practices. Moreover, precise SCSM specifications and practices target the suppliers' core sustainability incompetence, which makes sure there is an efficient use of buyers' resources in SCSM efforts and provides a high return on the investment by effectively reducing the supply chain sustainability risk.

By using principal component analysis, Tang and Liou (2010) identified three measures of SRM: the ratio of cost of goods sold (COGS) to sales, accounts payable turnover, and inventory turnover. Liou and Gao (2011) used these measures for SRM and found SRM is positively related to firms' financial performance¹. In this research, previous studies are followed by using the three measures to test the relationship between buyers' SRM and their financial performance in SCSM.

A low ratio of COGS to sales indicates the buyers' ability to generate a high gross profit margin through low purchasing costs from suppliers. It is, therefore, hypothesized, **(B)H2a**. *The buyers with a low ratio of COGS to sales will experience a less negative abnormal return to the SCSM announcements.*

¹ Inventory turnover was not measured in the study by Liou and Gao (2011), as they focused on the online game industry, where few physical inventories exist.

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A low level of accounts payable turnover indicates the buyers' ability to hold more financial resources through a preferential payment schedule with suppliers. It is, therefore, hypothesized,

(B)H2b. The buyers with a low level of accounts payable turnover will experience a less negative abnormal return to the SCSM announcements.

A high level of inventory turnover indicates the buyers' high inventory efficiency through high supplier responsiveness. It is, therefore, hypothesized,

(B)H2c. The buyers with a high inventory turnover will experience a less negative abnormal return to the SCSM announcements.

2.5.1.3 Growth prospects

Previous studies have consistently found that high growth prospects increase firms' negative financial performance when a disruption to the even flow of operations incurs, such as in the study of demand-supply mismatches by Hendricks and Singhal (2008a), the study of supply chain glitches (Hendricks & Singhal, 2003), and the study of medical device recalls by Thirumalai and Sinha (2011). SCSM disrupts the even flow of buyers' operations by adding environmental and social performance in supplying criteria. In this research, the interest is to investigate whether buyers with high growth prospects have more costs in their SCSM adoption in line with these previous studies.

Buyers with high growth prospects require highly reliable and responsive supply chains to keep producing a steady stream of innovative products. A high level of growth prospects indicates the high market expectation of a firm's growth, because the firm is likely to implement new projects, has high innovativeness, and thus can achieve high profit margins (Bose & Pal, 2012; Thirumalai & Sinha, 2011; Xia et al., 2016). High innovativeness is a typical attribute of firms with high growth prospects (Ni et al., 2016). However, innovative products are likely to have a short life cycle and a high level of demand uncertainty, because the high profit margin attracts competitors to erode competitive advantages by imitation (Fisher, 1997; Hendricks & Singhal, 2008a). In order to retain a high profit margin, the firms with high growth prospects are forced to introduce a steady stream of innovations and keep early sales in establishing market share. In the SCM context, buyers with high growth prospects, therefore, require highly reliable and responsive supply chains, where the suppliers' high flexibility in capacity and inventory,

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and high production speed can hedge buyers' risks of shortage and demand forecast errors (Fisher, 1997).

SCSM disrupts the even flow of buyers' operations. This disruption creates more costs to the buyers with high growth prospects due to the requirement for highly reliable and responsive supply chains. Most of the supply chains are currently not sustainable from the environmental and social perspectives (Pagell & Shevchenko, 2014). SCSM requires substantial changes in the current supply chain designs. Additional requirements for environmental and social performance in supplying changes buyers' production specifications and planned throughput time, which disrupts the even flow of buyers' operations. Buyers with high growth prospects have a relatively high requirement for supply chains to be reliable and responsive, and to meet quantity changes, provide timely delivery at short notice, and produce small production runs at more frequent intervals (Fisher, 1997; Xia et al., 2016). The disruption caused by SCSM decreases supply chain reliability and responsiveness required by buyers with high growth prospects. Low reliability and responsiveness decreases buyers' competitiveness, and could easily cause loss of current and future sales to the competitors (Hendricks & Singhal, 2008b). Hence, buyers with high growth prospects have additional costs when they adopt SCSM.

Buyers with high growth prospects are often characterized as having high innovativeness (Fisher, 1997; Ni et al., 2016). Klassen and Vereecke (2012) used case studies and found that innovativeness is a valuable capability to develop a good management system in SCSM and thus improve sustainability and financial performance. Innovative firms may creatively develop new traceable systems with suppliers to ensure safety management and develop new retail partnerships that include NGOs (Klassen & Vereecke, 2012). However, in the study of Klassen and Vereecke (2012), the substantial costs that SCSM causes from the operations perspective was not considered (disruption to the even flow of buyers' operations). SCSM disrupts steady supply chain operations that buyers with high growth prospects highly rely on to make profits. Buyers with high growth prospects thus have more costs in their SCSM adoption. Therefore, it is hypothesized,

***(B)H3.** The buyers with a high level of growth prospects will experience a more negative abnormal return to the SCSM announcements.*

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2.5.1.4 Governance mechanism

Section 2.3.4 introduced buyers' governance mechanisms in SCSM. In this section, the governance mechanisms are linked to buyers' financial performance, focusing on third-party certification and code of conduct. The choice of using governance mechanisms could be a buyer strategy to reduce negative financial performance.

This research focuses on market governance mechanisms. Two major market governance mechanisms are commonly used by buyers to manage suppliers' SCSM compliance, namely third-party certification and code of conduct. The compliance with third-party certification indicates that the suppliers are required to meet mandatory practices and make certified SCSM achievements (Hoejmose & Adrien-Kirby, 2012). The common third-party certifications are ISO 14001 (environmental management), SA 8000 (social management), and OHSAS 18001 (occupational health and safety management). Besides commercial certifiers, NOGs, for example, Carbon Disclosure Program, also certify SCSM. Code of conduct addresses buyers' expectations that suppliers will have responsible behaviors of a social and environmental nature (Preuss, 2009). By using a code of conduct, buyers set the SCSM goals and monitor the suppliers' compliance (Gimenez & Tachizawa, 2012).

The SCSM literature mostly focuses on the effect of governance mechanisms on suppliers' environmental and social performance (Foerstl et al., 2015; Gimenez & Tachizawa, 2012; Jiang, 2009a, 2009b). In general, scholars have concluded that different governance mechanisms can improve suppliers' commitment and thus environmental and social performance, while the scale of improvement in environmental and social performance is different across governance mechanisms (Gimenez & Sierra, 2013; Jiang, 2009b, 2009a; Tachizawa & Wong, 2015). This research extends these previous studies by investigating the effect of governance mechanisms on financial performance.

The use of third-party certification is likely to reduce buyers' costs relative to the use of code of conduct for two reasons. First, buyers acquire more legitimacy from stakeholders through third-party certification. Third-party certifiers, as independent and legitimate organizations, provide credibility for buyers' SCSM efforts (Adobor & McMullen, 2014). The standardized SCSM procedures by third-party certifications create comparable measures of buyers' efforts and their suppliers' SCSM performance (Hoejmose & Adrien-Kirby, 2012). Meeting a code of conduct is voluntary and less rigorous than third-party certification (Preuss, 2009). Lack of transparency reduces the

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credibility of buyers' efforts (Hoejmose & Adrien-Kirby, 2012). The main motive of buyers' SCSM enforcement is the response to stakeholder pressure, and thus to acquire legitimacy (Busse, 2016). The higher level of credibility through third-party certification improves the buyers' legitimacy to stakeholders and reduces the supply chain sustainability risk.

Second, buyers reduce transaction costs through third-party certification. Suppliers' environmental and social performance is difficult to measure (Tachizawa & Wong, 2015). Buyers, therefore, have to invest in capacity to monitor and audit the suppliers' compliance with the code of conduct. Through third-party certification, buyers, however, outsource the monitoring process in the marketplace (Adobor & McMullen, 2014), which creates economies of scale and scope in managing suppliers' SCSM compliance. In particular, buyers' internal competence in SCSM may be insufficient to conduct the required audits that are effective and economical. A third-party certifier provides the buyers with the support of their SCSM expertise, which effectively reduces the costs associated with the assessment of suppliers' compliance. Therefore, it is hypothesized,

(B)H4. The buyers that use third-party certification as a governance mechanism in SCSM will experience a less negative abnormal return to the SCSM announcements.

2.5.1.5 Group SCSM

A recent business approach of 'group SCSM' has emerged in response to stakeholder pressure on SCSM, where buyers collaborate in a group to mandate the standardized SCSM practices to the suppliers that they source from. In the SCSM literature, group SCSM has not been widely researched. This research follows the discussion of the group purchasing literature, where group SCSM shares similar attributes (e.g., Hu et al., 2011; Nollet & Beaulieu 2005; Nollet et al., 2016; Sandberg & Mena 2015; Schotanus et al., 2010). In this research, buyers that use the group SCSM approach are predicted to have less negative financial performance in their SCSM adoption in line with the discussion of the group purchasing literature.

2.5.1.5.1 The introduction of group purchasing as a general background

To validate the link between group purchasing and group SCSM, the concept of group purchasing is introduced. Group purchasing is defined as "a formal or virtual structure that facilitates the consolidation of purchases for many firms. Consolidation includes

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bidding, suppliers' evaluation, negotiation, and contract management" (Nollet & Beaulieu, 2005, p. 12). The core construct of group purchasing is the centralization of purchasing functions between buyers (Sandberg & Mena, 2015). Members in the groups, therefore, increase the bargaining power of their suppliers, which enables the reduction of purchasing costs and transaction costs with suppliers, and the transfer of know-how on supply markets between members (Bakker et al., 2006; Schotanus & Telgen, 2007; Tella & Virolainen, 2005). The two most common typologies of group purchasing are third-party group purchasing and consortium group purchasing (Bakker et al., 2006; Nollet & Beaulieu, 2005; Schotanus & Telgen, 2007). Third-party group purchasing is where a third-party organization negotiates and writes contracts according to the mandates given by members. Consortium group purchasing is where the purchasing function is performed by group discussion among members through a collaborative form.

The group purchasing literature has shown that group purchasing provides a hybrid form between market and hierarchy, which is the extension of traditional TCE (Tella & Virolainen, 2005). TCE presents the dichotomy of market versus hierarchy, which illustrates that buyers may balance transaction costs with suppliers by either market trading or integration (Williamson, 1981). However, if the transaction costs fluctuate between a moderate and high level, organizations may not want to integrate vertically; instead, they will search for an alternative solution to reduce the transaction costs. Group purchasing provides an "in-between" strategy to solve the dilemma (Schotanus et al., 2010). The collaboration enables buyers to efficiently adjust their negotiation positions with suppliers to reduce transaction costs, while continuously operating as separate companies to benefits from outsourcing (Tella & Virolainen, 2005).

Group SCSM has similar attributes to group purchasing. As stated by a group SCSM announcement, group SCSM's primary objective is to "enhance collaboration of the buyers in the area of sustainability in the supply chains [...] with a singularity of purpose and a common voice" (PR Newswire, 2014). Centralized SCSM to suppliers "promotes industry standards [...], potentially reduces inefficiency and duplications, and makes (suppliers' environmental and social) performance easier to audit and verify" (Business Wire, 2004). Similar to the typologies of group purchasing, group SCSM can be a form of a consortium, where members jointly discuss the standardized and specific SCSM practices that are required to suppliers, such as the Electronics Industry Citizenship Coalition (Business Wire, 2004), or members can outsource a part of SCSM monitoring and evaluation to a third-party; for instance, the Supply Chain Leadership Coalition was

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formed in partnership with Carbon Disclosure Project which surveys the suppliers about their carbon emission on behalf of the members (Spencer, 2007). Similar to group purchasing, group SCSM, as a hybrid form, enables the collaboration between buyers in SCSM and meanwhile keeps buyers' core business activities independent. The similar attributes support the use of the group purchasing literature to discuss group SCSM in this research.

2.5.1.5.2 Group SCSM

The present research defines group SCSM as 'a form of horizontal cooperation between buyers that facilitates the consolidation of sustainability practices over their suppliers; the activities can include supplier selection, evaluation, and negotiation from the perspective of environmental and/or social performance'. Group SCSM, therefore, adds collaboration in buyer-buyer relationships to the traditional vertical mandates of SCSM from buyers to suppliers. Group SCSM is often formed by industry peers who have similar product specifications and shared supply markets.

The term 'group SCSM' has not been widely used in the literature, as the main focus of SCSM has remained on buyer-supplier relationships (Gimenez & Sierra, 2013; Jiang, 2009b; Tachizawa & Wong, 2015). Few studies have implicitly discussed the aspects of this form of buyer-buyer relationship in SCSM adoption. Carter and Rogers (2008, p. 367) suggested

common auditing procedures adopted by an industry coalition can allow a single, effective supplier sustainability audit to be performance, which increases the transparency and supplier sustainability while lowering transaction costs for both supplier and the multiple buying organizations that might do business with that supplier.

Jacobs and Singhal (2017) empirically investigated the financial performance of firms that formed two groups after the 2013 Rana Plaza disaster to manage their suppliers' social performance in Bangladesh. However, the authors found no significant impact on these firms' financial performance. There is a lack of empirical evidence on whether this form of buyer-buyer relationship may be related to the buyers' financial performance. This research follows the group purchasing literature and discusses four benefits that buyers can have by using the group SCSM approach as in the next section.

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2.5.1.5.3 The benefits to buyers that use the group SCSM approach

First, group SCSM increases buyers' bargaining power, and thus reduces transaction costs with regard to negotiation costs and suppliers' opportunism. Group SCSM enables the consolidation and standardization of SCSM amongst a large number of suppliers that the buyers in groups source from (Carter & Rogers, 2008). The consolidated and standardized SCSM provides the members in SCSM groups with high bargaining power against their suppliers that buyers may not obtain individually (Schotanus & Telgen, 2007). The high bargaining power indicates the great importance of the transaction with the buyers in the suppliers' overall business (Deitz et al., 2009). Thus, by using the group SCSM approach, buyers improve their capabilities in the negotiation of SCSM compliance with the suppliers. The centralized SCSM enforcement of multiple buyers as one unit lowers the costs of providing incentives to the suppliers complying with SCSM practices (i.e., negotiation costs) (Adobor & McMullen, 2014). Also, buyers' high bargaining power deters suppliers' opportunistic behaviors. The joint monitoring and evaluation across members improve suppliers' commitments to SCSM. Members can use the joint forces to develop alternative suppliers if opportunism is discovered (Schotanus et al., 2010). As discussed in the group purchasing literature, the primary benefit to buyers is the increased bargaining power which reduces transaction costs (Tella & Virolainen, 2005).

Second, group SCSM creates economies of scale and scope. The buyers have monitoring and enforcement costs in SCSM, which are caused by investment in capacity to inspect and improve the compliances of the suppliers. SCSM groups commonly stipulate the standardized SCSM practices and monitoring programs. The centralized and standardized SCSM operations allow the buyers' recurrent use of the same investment in managing the compliance of multiple suppliers and even potential suppliers (Sandberg & Mena, 2015). Moreover, group SCSM commonly covers a large scope of environmental and social management. As stated by Electric Utility Industry Sustainable Supply Chain Alliance, the group engages the suppliers in improving impacts on "air emissions, water consumption, landfill reduction, and energy efficiency. The Alliance's scope could eventually widen to include other societal impacts" (PR Newswire [U.S.], 2011). The single investment of the members is utilized in multiple SCSM categories through group SCSM and creates the economies of scope. Additionally, the collaborative force reduces the members' workload in managing suppliers' compliance; the buyers, therefore, may spare the resources on core business activities.

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Third, group SCSM improves buyers' sustainability expertise. Individual buyers may not have sufficient knowledge and capabilities in supply management (Bakker et al., 2006); in particular, SCSM requires specific expertise, such as the measure of suppliers' environmental performance (Tachizawa & Wong, 2015). Group SCSM facilitates the formation of a closed and strategic bond in buyer-buyer relationships, and thus the exchange of the scarce resources and information by inter-organizational ties (Yu, 2014). The information sharing in SCSM groups helps individual buyers identify SCSM tools and methods and develop negotiation capabilities with suppliers. In particular, some SCSM groups work with professional organizations in environmental/social management to enforce and review SCSM compliance. The expertise of these professional organizations further improves the buyers' learning of know-how.

Fourth, SCSM groups work with downstream stakeholders (e.g., NGOs) on SCSM operations, which provides an opportunity to create a connected SCSM operation among supply chain partners. For example, Automotive Industry Guiding Principles works with CSR Europe (an NGO) which represents 38 National Partners (PR Newswire, 2014), and Supply Chain Leadership Coalition partners with the NGO, Carbon Disclosure Project (Spencer, 2007). The joint work creates a link between these buyers and downstream stakeholders, and thus effectively increases the buyers' reputation. It is uncertain if the downstream stakeholders are able to see the importance of buyers' efforts in SCSM (Dam & Petkova, 2014). The pooled buyers in SCSM groups, however, increase the willingness of downstream stakeholders' participation in SCSM operations. The direct propagation of buyers' SCSM efforts gains buyers reputation in end markets, which increases sales (Fan & Lo, 2012) and attracts capital investment (Barnett & Salomon, 2006).

In summary, the increase in barraging power, economies of scale and scope, sustainability expertise, and connected SCSM work with downstream stakeholders effectively reduce the buyers' costs in SCSM. Therefore, it is hypothesized,

(B)H5. The buyers that use the group SCSM approach will experience a less negative abnormal return to the SCSM announcements.

2.5.1.6 SCSM dimensions

In SCSM, buyers can choose to adopt the environmental or the social dimension of SCSM (Wang & Sarkis, 2013). The environmental dimension of SCSM (eSCSM) and the related practices include measurement and control of suppliers' energy use and

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greenhouse gas emission, air or water pollution-control activities, waste management, and recycling. The social dimension of SCSM (sSCSM) and the related practices include equality in employment regarding diversity and gender, working conditions health and safety imperatives, labor rights, and wages (Hoejmose et al., 2013; Miemczyk et al., 2012). In this section, the difference between sSCSM and eSCSM in relation to the buyers' financial performance is analyzed. Buyers can make a strategic choice between sSCSM and eSCSM to mitigate the negative financial performance.

Academic and managerial attention is higher on eSCSM than on sSCSM (Hoejmose & Adrien-Kirby, 2012; Seuring & Müller, 2008; Walker et al., 2012). The reason is that eSCSM is more developed and shows more maturity and diversity in term of the used measures than sSCSM (Miemczyk et al., 2012). Also, firms' supply chain operations have a product focus, where the physical product flow in the supply chain contains more environmental elements than social elements (Miemczyk et al., 2012). Many scholars have pointed out the deficit in the literature exploring the social dimension of sustainability (in both firms' internal sustainability and SCSM) and suggested more research focusing on sSCSM (Seuring & Müller, 2008; Touboulic & Walker, 2015; Zorzini et al., 2015). This research tries to answer their calls by exploring the benefits that buyers may have when they adopt sSCSM relative to eSCSM.

The choice between sSCSM and eSCSM can be buyers' strategy in SCSM. Klassen and Vereecke (2012) discussed that the improvement in social and environmental performance in supply chains can occur in a sequential wave. Busse (2016) further discussed that firms may measure the costs relating to SCSM practices (e.g., between eSCSM and sSCSM practices) and start with lower costs and incrementally move forward to higher cost practices, which reduces the negative impact of SCSM on operations.

The different effect of sSCSM and eSCSM on buyers' financial performance remains unclear in the literature. Wang and Sarkis (2013) found eSCSM practices are negatively related to lagged financial performance (measured by return on assets and return on equity two years after adopting SCSM practices), but sSCSM practices are insignificant. By using survey-based research, Pullman et al. (2009) found both eSCSM and sSCSM practices are insignificantly related to firms' cost performance in the food industry. The insignificant findings of these previous studies are probably because of the used measures (e.g., lagged financial performance) and methodology (i.e., survey-based research). In this research, event study methodology was used, where concurrent and objective measures are used in contrast to these previous studies. In this research, sSCSM is

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believed to reduce the buyers' negative financial performance in contrast to eSCSM for two reasons as discussed below.

First, the buyers that adopt sSCSM have a smaller scale of disruption to the even flow of their operations than those that adopt eSCSM. Supply chains have a product focus and are thus environmental in nature (Miemczyk et al., 2012), where adding environmental elements into operations (e.g., demands on recyclability) are more likely to change the physical materials flow in supply chains than adding social elements (e.g., workplace safety). The buyers' eSCSM practices change the suppliers' product specifications, which, in turn, requires buyers to upgrade the product specifications, order fulfillment, and sourcing strategies (Miemczyk et al., 2012). Hence, eSCSM is likely to create a higher scale of disruption in the buyers' operations than sSCSM. A practical business case is Home Depot's eSCSM. While Home Depot used "the power of its purchasing dollar to buy only certified woods", bowing to the pressure from stakeholders, it was concerned that with this eSCSM practice, only "50 Los Angeles stores would be supplied", "let alone 800 stores which could not meet customer demand" (Dow Jones Business News, 1999). In contrast, sSCSM (e.g., the demand for suppliers' improvement of labor rights and equality of employment) is less connected to the physical material flow in the supply chains. Thus, the scale of the disruption to buyers' operations is relatively low when buyers adopt sSCSM.

Second, sSCSM is connected to quality improvement and organizational learning. sSCSM refers to the management of human resource elements in operations. Buyers' sSCSM can increase suppliers' employee satisfaction and knowledge-enhancement, which are closely related to the sources required for successful quality management (Adam et al., 1997). Pullman et al. (2009) found sSCSM is positively related to quality performance in supply chains. sSCSM may indirectly facilitate the buyers' operations by reducing the waste and obsolete products offered by the suppliers. Also, Carter (2005) found that sSCSM can increase buyers' organizational learning. The knowledge of supply chain processes and supplier relationships is more likely to improve with the adoption of sSCSM. The increased organizational learning reduces the buyers' coordination costs in the supply chain operations.

In summary, sSCSM disrupts the even flow of buyers' operations on a relatively smaller scale than eSCSM, and contributes to quality improvement and organizational learning. Therefore, the buyers that adopt sSCSM are predicted to have less negative financial performance. It is hypothesized,

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(B)H6. The buyers that require suppliers' compliance with the social dimension of SCSM will experience a less negative abnormal return to the SCSM announcements.

2.5.1.7 Summary of the hypotheses in buyer analysis

The section finishes the hypothesis development in buyer analysis. A summary of these hypotheses is given in Table 2.1. The present research hypothesizes that buyers, in general, have a negative financial performance when they adopt SCSM. However, this negative relationship is moderated by buyers' supplier relationship management, growth prospect, governance mechanism, group SCSM, and social SCSM.

In the next sections, the relationship between SCSM compliance and suppliers' financial performance will be discussed.

Table 2.1 Summary of the Hypotheses in Buyer Analysis

Hypothesis	Hypothesis number	Predicted sign	Section number
Buyers' financial performance when they adopt SCSM	<i>(B)H1</i>	Negative	2.5.1.1
The factors that influence buyers' financial performance when they adopt SCSM			
Hypothesis	Hypothesis number	Predicted sign	Section number
The ratio of COGS to sales (the measure of supplier relationship management)	<i>(B)H2a</i>	Negative	2.5.1.2
Accounts payable turnover (the measure of supplier relationship management)	<i>(B)H2b</i>	Negative	2.5.1.2
Inventory turnover Accounts payable turnover (the measure of supplier relationship management)	<i>(B)H2c</i>	Positive	2.5.1.2
Growth prospect	<i>(B)H3</i>	Negative	2.5.1.3
Third-party certification (governance mechanisms)	<i>(B)H4</i>	Positive	2.5.1.4
Group SCSM	<i>(B)H5</i>	Positive	2.5.1.5
sSCSM (SCSM dimensions)	<i>(B)H6</i>	Positive	2.5.1.6

2.5.2 Suppliers' financial performance and influential factors in SCSM compliance

This section focuses on developing the hypotheses regarding suppliers' financial performance when they comply with their buyers' SCSM. SCSM disrupts the even flow of suppliers' operations by a substantial change-over in manufacturing, suggesting large compliance costs to suppliers. The compliance costs are unlikely to be offset by charging higher purchasing prices from buyers, as environmental and social performance has only been an order qualifying rather than an order winning attribute for suppliers. The suppliers that comply with buyers' SCSM have high implementation costs due to the continuous investment in improving and maintaining environmental and social performance. These compliance and implementation costs are higher than the benefits that suppliers may have in SCSM. In this research, the negative financial performance of suppliers that comply with their buyers' SCSM is predicted. Section 2.5.2.1 develops this hypothesis.

There are a number of factors that influence suppliers' negative financial performance. This research focuses on two categories of factors: the nature of SCSM that suppliers comply with and firm-specific characteristics. The factors relating to the nature of SCSM that suppliers comply with include buyers' SCSM governance mechanisms (i.e., third-party certification and code of conduct) that suppliers are required to commit, SCSM dimensions (eSCSM and sSCSM) that suppliers are required to comply with, and the group SCSM approach. The factors regarding firm-specific characteristics are supply chain power, operational slack, and financial slack. These factors are developed as strategies that suppliers can use to buffer their negative financial performance in SCSM or analyzed as particular business risks that suppliers are required to deal with. Sections 2.5.2.2 – 2.5.2.8 develop the hypotheses concerning these influential factors.

2.5.2.1 The impact of buyers' SCSM on suppliers' financial performance

Suppliers' sustainability engagement is reactively rather than proactively and altruistically developed (Hoejmose & Adrien-Kirby, 2012). The systematic approach discussed in section 2.3.2 illustrates that the stakeholder pressure on sustainability is transferred by buyers' SCSM to their suppliers and thus changes suppliers' operations. From the perspective of suppliers, the implementation decisions on SCSM practices are

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made under external pressure (Fan & Lo, 2012), in order to keep legitimacy with buyers (Lee et al., 2014; Schmidt et al., 2017). Thus, suppliers have a nature of compliance in SCSM.

2.5.2.1.1 Compliance costs of SCSM to suppliers

The compliance with SCSM requires substantial changes in suppliers' operations by adding environmental and social elements into manufacturing processes. These changes disrupt the even flow of suppliers' operations as suggested by the theory of SEF (discussed in section 2.2.3.3) and add compliance costs to suppliers. SCSM compliance requires suppliers to implement environmental and social practices in operations, which are beyond the traditional conception of suppliers' business (Touboulie & Walker, 2015). These practices may not align with the operational effectiveness and efficiency that suppliers have developed (Fan & Lo, 2012; Hojmosse & Adrien-Kirby, 2012), thus disrupting the even flow of suppliers' operations. In labor-intensive industries (e.g., in the textiles industry), the suppliers with abundant labor resources gain competitive advantages with low labor costs. sSCSM, however, is often imposed on the suppliers operating in labor-intensive industries due to the high risk of social misconduct (Yu, 2008). The investment in the improvement in labor conditions and reduction in working hours can substantially increase suppliers' labor costs and thus disrupt the operations by extending lead time. A buyer's requirement for reducing carbon emissions requires significant investment and considerable modifications in the production. The reduction in energy consumption and change of energy sources may decrease the utilization of capacity and disrupt the existing operations. While suppliers commonly compete fiercely with low cost and timely delivery (Jiang, 2009a), SCSM compliance is likely to reduce the operational effectiveness and efficiency that suppliers have built towards with cost reduction and high delivery speed. Moreover, environmental and social performance may take time to come to fruition (Giunipero et al., 2012). Suppliers must adapt to the disruption to the operations caused by SCSM compliance over a long-time horizon. In SCSM compliance, suppliers often operate sub-optimally from a competitive advantage perspective to maximize the value of the entire supply chains (Linton et al., 2007). While buyers can retain benefits such as reducing supply chain sustainability risk, suppliers often have to bear substantial compliance costs.

The compliance costs are unlikely to be compensated for by buyers. SCSM compliance is assumed to bring greater financial benefits, for example, increased selling prices to

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buyers (Busse, 2016). However, for suppliers, compliance with the buyers' SCSM mandates may only enable them to maintain their current business rather than develop new opportunities or enable them to win a greater volume or more valuable business from their buyers. While compliance may gain legitimacy from buyers, it is unlikely that the buyers will financially reward suppliers. SCSM compliance represents for the supplier an order qualifying (i.e., compliance with changing buyer mandates to allow for continuous sales) rather than an order winning attribute for suppliers (Dabhilkar et al., 2015; Dam & Petkova, 2014; Seuring & Müller, 2008). Buyers' SCSM is in response to stakeholder pressure (Pagell, Wiengarten, & Fynes, 2013; Zhu & Sarkis, 2007). There is still uncertainty as to whether buyers can improve their own financial performance in this manner as discussed in this research (section 2.5.1.1) and the literature review by Touboulic & Walker (2015a). Buyers are likely to deemphasize financially rewarding suppliers' compliance with improved SCSM performance (Dabhilkar et al., 2015). Sustainability compliance is often seen as a prerequisite for the supply relationship, whereas operational competence (e.g., superior quality or low cost), is still the key order winning strategy (Dabhilkar et al., 2015; Seuring & Müller, 2008). Consequently, there is little likelihood of financial benefits accruing from SCSM compliance.

2.5.2.1.2 Benefits and implementation costs of SCSM to suppliers

There are certain gains from firms' implementation of sustainable operations, such as competitive advantages from NRBV (Carter & Rogers, 2008; Schmidt et al., 2017) and reputation (Orlitzky et al., 2003). However, from suppliers' perspective, the substantial implementation costs may outweigh the benefits, and the distance to the point of sales may restrict suppliers' gain on reputation.

Although firms may develop tangible and intangible assets through improved sustainability performance (Albertini, 2013; Carter & Rogers, 2008; Giunipero et al., 2012; Markley & Davis, 2007; Srivastava, 2007), these benefits may not outweigh suppliers' substantial implementation costs in SCSM. NRBV (section 2.4.1) discusses the competitive advantages that suppliers may develop through sustainable development. Staff motivation and organizational learning may also be improved with SCSM compliance (Carter, 2005; Carter & Rogers, 2008). While these benefits are causally ambiguous in terms of performance outcome (Pullman et al., 2009), capital and cultural costs are increased to create new models and manufacturing-changeover, and suppliers have to continuously invest in maintaining environmental control and safety standards on

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operations (Giunipero et al., 2012). These investments also generate opportunity costs in which resources are not in core business activities in lieu of sustainability investment (Dam & Petkova, 2014), and, therefore, the traditional operational competence becomes compromised (Dabhilkar et al., 2015).

Reputation gains have been discussed as a great benefit to the firms implementing sustainable operations (Ellen et al., 2006; Orlitzky et al., 2003). However, the supply chain position of suppliers is distant from the point of sales, and thus many upstream suppliers have low public visibility and brand recognition (Schmidt et al., 2017). The gain of reputation may have less impact on improving the financial performance of suppliers. Moreover, suppliers' sustainable operations may be perceived as an effort of buyers' SCSM. Reputation is likely to accrue to the buyers. Suppliers may be swept up in their buyers' "window-dressing", where buyers pretend to be concerned with sustainability issues in order to gain reputation, leaving their suppliers to bear the costs associated with SCSM (Jo & Na, 2012; Thornton et al., 2013). Suppliers' outcry in response to Wal-Mart' SCSM as a buyer is an example of this window-dressing. While Wal-Mart developed a reputation for sustainability amongst consumers and stakeholders, their suppliers paid for the environmental gains (PR Newswire, 2007). In general, it is unlikely that compliance with a buyer's SCSM will develop valuable assets. Instead, it is likely to represent compliance and implementation costs to suppliers.

Given the compliance and implementation costs relative to the relatively marginal expected positive benefits as outlined, it is possible that SCSM compliance may have a negative impact on suppliers' financial performance.

In this research, the methods of studying 'related firms' in event study methodology were used (the methods were briefly discussed in section 1.4. and will be discussed in detail in section 3.2), where supplier's financial performance was estimated by using suppliers' abnormal return associated with their buyers' SCSM announcements. Buyers' SCSM announcements are the announcements made by buyers that require their suppliers' compliance with SCSM. The suppliers' abnormal return is the component of the stock return associated with the SCSM announcement, adjusted for market factors (i.e., confounding factors). This research follows the style of hypotheses in event studies that investigated related firms (Brown et al., 2009; Deitz et al., 2009; Fee & Thomas, 2004; Hertz et al., 2008). Suppliers' financial performance is predicted to be negative when they are required to comply with buyers' SCSM. It is hypothesized,

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(S)H1. Suppliers' abnormal return will be negatively related to their buyers' SCSM announcements that require suppliers to improve environmental and social performance.

2.5.2.2 Supply chain power

Supply chain power is a key element in SCSM, where firms' bargaining positions are changed in the negotiation of SCSM commitments in addition to standard exchange terms (Dabhilkar et al., 2015; Hoejmose et al., 2013; Touboullic et al., 2014). The present research follows Kim and Wemmerlöv (2015) in using the symmetric interpretation of power and dependence. A supplier's power over its buyer is equal to and based upon the dependence of its buyer on the supplier. Suppliers tend to have lower power than buyers, and thus more dependence on buyers than vice versa (Kim & Wemmerlöv, 2015). While the monopolistic power of buyers enforces the general compliance of suppliers in SCSM (Hall, 2000; Hoejmose & Adrien-Kirby, 2012), the specific balance of power between suppliers and their buyers may influence the negativity of suppliers' financial performance.

There are two perspectives in the analysis of supply chain power in SCSM. First is the supplier's dependence on the buyer (SDB). Second is the buyer's dependence on the supplier (BDS). TCE and RDT provide theoretical lenses to understand the influence of these two dependence perspectives on the suppliers' transaction costs and the proportion of value shared in SCSM compliance.

2.5.2.2.1 Transaction costs and supply chain power

On the one hand, the high dependence on a buyer increases the transaction costs of a supplier. A high dependence indicates the high level of asset-specific investment in the buyer by the supplier, which is a nontransferable investment whose unity is unique to the specific relationship with the buyer (Hawkins et al., 2008). The asset-specific investment may lock the supplier into the transaction and lead to the buyer's opportunistic behavior as discussed in TCE (section 2.2.3.2). The buyer that observes the supplier's vulnerability due to the asset-specificity investments can demand overly tough conditions in the supplier's SCSM compliance (Hoejmose et al., 2013), such as short-time length of implementation and stringent sustainability performance improvement, which, therefore, increases the suppliers' transaction costs.

In contrast, a high level of buyer's dependence on supplier reduces the supplier's transaction costs. A high level of buyer's dependence increases the buyer's loyalty, which

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may promote a deep or genuine buyer-supplier relationship (Kim & Wemmerlöv, 2015). The strong norm of solidarity in the relationship, in fact, reduces the buyer's opportunistic behavior (Hawkins et al., 2008). The buyer is more likely to provide supplier development aid and share information to support SCSM compliance. The supplier's transaction costs can be substantially decreased, or shared over the dyad, through the buyer's support for inventory flexibility, reduction of product obsolescence, or quick responsiveness to market demands (Markley & Davis, 2007).

2.5.2.2.2 The proportion of shared value and supply chain power

The dependence on a buyer-supplier relationship may determine the proportion of value shared by the parties, as discussed in RDT in section 2.2.3.1. There are potential benefits from SCSM, for example, the reduction on buyers' supply chain sustainability risk (Busse, 2016) and premium prices charged in end markets (Zhu & Sarkis, 2004). These benefits from SCSM are created by the joint force or even largely created by a supplier. However, suppliers that are highly dependent on buyers may merely capture a small number of benefits and have to bear substantial business risks and costs through SCSM compliance as their buyers can utilize its power to gain a disproportionate share of the value created through SCSM (Hawkins et al., 2008; Touboulic et al., 2014). For example, in the criticism of Wal-Mart's window-dressing, suppliers found it "especially galling that Wal-Mart...[was] forcing higher costs on them in the name of environmentalism"; Wal-Mart, however, was able to enhance its public image through its supply chain power (PR Newswire, 2007).

In contrast, suppliers that have a high level of buyers' dependence may be able to motivate buyers to equally share the value created by SCSM compliance. The high buyer's dependence on supplier (BDS) increases the importance of suppliers' operations in the buyers' overall business success. Buyers, thus, are more willing to pursue mutual benefits in the relationships (Touboulic et al., 2014). For example, the saved costs from reducing supply chain sustainability risk may be used to strengthen information sharing in the buyer-supplier relationship.

By using event study methodology, Deitz et al. (2009) found that suppliers that were mandated by Wal-Mart (i.e., the buyer) to conduct technology integration had positive financial performance, and the financial performance was more positive for the suppliers that were highly dependent on Wal-Mart. The authors discussed technology integration as a favorable supply chain practice mandated by buyers (i.e., improve suppliers'

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operational competence). Higher dependence on buyers indicates a greater positive impact on suppliers' overall business, thus more positive financial performance. In contrast, SCSM is a disruptive supply chain practice, where suppliers' even flow of operations is disrupted by additionally required environmental and social criteria in manufacturing. Thus, the suppliers that have a high dependence on buyers may suffer more disruption in operations, due to the high percentage of suppliers' overall business reliance on buyers. The finding in this research may provide an interesting comparison with the study of Deitz et al. (2009) by presenting a different impact of supply chain power on suppliers' financial performance in favorable (i.e., technology integration) and disruptive (i.e., SCSM compliance) supply chain practice.

In summary, a high supplier's dependence on buyer (SDB) increases suppliers' transaction costs and reduces the proportion of shared value in SCSM. Therefore, a high supplier's dependence on buyer (SDB) increases suppliers' negative financial performance in SCSM. Therefore, it is hypothesized,

(S)H2a. The suppliers with higher dependence on their buyers will experience a more negative abnormal return to buyers' SCSM announcements.

A high buyer's dependence on supplier (BDS) reduces suppliers' transaction costs and provides an opportunity to have equally shared value in SCSM. Therefore, it is hypothesized,

(S)H2b. Where there is higher buyer's dependence on supplier (BDS), the suppliers will experience a less negative abnormal return to buyers' SCSM announcements.

2.5.2.2.3 Relationship length

Relationship length is a factor that influences the power and dependence in a buyer-supplier relationship (Brown et al., 2009). Relationship length in this research means consecutive years that a supplier has a significant portion of annual sales (i.e., more than 10%) to a buyer. A long-term relationship with a buyer indicates the supplier's considerable asset-specific investment and thus a high degree of dependence on the buyer as discussed in TCE (Hawkins et al., 2008).

There is an ambivalent view on the long-term relationship in the analysis of suppliers' financial performance. On the one hand, trust is built in a long-term relationship (Coulter & Coulter, 2002; Johnston et al., 2004). Trust curbs buyers' willingness to utilize the

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suppliers' asset-specific investment in a long-term relationship to perform opportunistic behavior (Hawkins et al., 2008), as buyers are more likely to focus on joint success with the trust built in the relationship (Gulati & Sytch, 2007). Suppliers may reduce their transaction costs due to decreased buyer opportunism, thus improving their financial performance as the length of the relationship with buyers increases (Liu et al., 2009).

On the other hand, a supplier in a long-term relationship with its buyer is vulnerable to changes in power. The supplier's asset-specific investment is substantially developed in a long-term relationship. The asset-specific investment increases the supplier's dependence on a buyer, because of switching costs and holding up costs to the supplier (Yigitbasioglu, 2010). The supplier will have high costs if it seeks to switch to a new buyer, as the supplier's asset-specific resources are tailored to the buyer (Grover & Malhotra, 2003). The supplier will also have hold-up costs, where the buyer opportunistically requires the supplier's compliance with additional terms in the transactions (e.g., price reduction), because the buyer observes that the supplier is locked into the relationship due to the asset-specific investment in the long-term relationship (Hill, 1995). While suppliers have these costs in a long-term relationship, buyers may not face the same costs. Kim and Wemmerlöv (2015) found that in a long-term relationship the suppliers' asset-specific investment is substantially increased, but buyers do not have the same investment despite the increase in the length of the relationship with suppliers. The reason may be the dominant power of buyers in the relationship, and that buyers are more likely to manipulate the asset-specific investments (Kim & Wemmerlöv, 2015). Therefore, a long-term relationship is likely to create more costs for suppliers rather than for buyers. By using event study methodology, Brown et al. (2009) found that the suppliers in a long and dependent relationship with their buyers have significant and negative financial performance when their buyers conduct leveraged buyouts, providing empirical evidence that suppliers' costs increase with relationship length.

In the SCSM context, the negative impact of a long-term relationship is likely to affect suppliers' financial performance. Suppliers are required to comply with the buyers' SCSM. A long-term relationship increases the asset-specific investment of suppliers but not that of buyers (Kim & Wemmerlöv, 2015). SCSM adoption increases the buyers' transaction costs and creates a risk of disruption to the even flow of its operations (as discussed in section 2.5.1.1.2). Buyers may proactively leverage the power generated from the long-term relationship to claim benefits, but suppliers may not do this in the same way. For example, buyers may utilize their power to require stringent sustainability

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practices and compress the timeline of the suppliers' SCSM compliance, which may allow for maximum time to adjust buyers' operations process and buffer for a potential delay in suppliers' SCSM compliance (Lee et al., 2014). Hence, in a long-term relationship, more costs are likely to be imposed on the suppliers who are required to comply with buyers' SCSM. Hence, it is hypothesized,

(S)H2c. The suppliers with a long relationship with their buyers will experience a more negative abnormal return to buyers' SCSM announcements.

2.5.2.3 SCSM dimensions

Section 2.3.3 discussed the environmental (eSCSM) and social dimension (sSCSM) of SCSM. In this section, the different impacts of eSCSM and sSCSM on suppliers' financial performance are explored. The present research predicts that a supplier's sSCSM compliance (e.g., labor rights and safety) creates less negative financial performance than eSCSM compliance (e.g., the production of recyclable materials). There are three reasons.

First, suppliers' sSCSM compliance may be less stringent than that of eSCSM, which reduces suppliers' operational burden. The social elements of sustainability have not revealed its influences on product specification, new product development, order fulfillment, and supply chain collaboration (Miemczyk et al., 2012); thus, suppliers' improvement in social performance (e.g., labor conditions) may be less related to buyers' internal sustainable development. Therefore, suppliers' sSCSM compliance may be granted greater tolerance or leniency by buyers. The flexibility in the negotiation with buyers on resources allocation, compliance schedule, and specific practices reduces suppliers' operational difficulty. In contrast, buyers' environmental elements of sustainability require a high level of supplier responsiveness; for example, the success of buyers' total carbon emission reduction and recyclable products is closely associated with pollution management and material/components recyclability in suppliers' operations. If the supplier fails altogether or cannot supply products to specification, this may impact the buyer's business and reputation. The required responsiveness reduces suppliers' flexibility to coordinate resources, and therefore, increases costs.

Second, the compliance with sSCSM may improve suppliers' quality performance which, as one of the suppliers' key operational competences, may reduce the suppliers' compliance costs. Pullman et al. (2009) provided empirical evidence that social sustainability practices are positively related to quality performance; the relationship

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between environmental sustainability practices and quality performance is uncertain. Successful quality management requires human resource elements provided directly through sSCSM, where the improvement in employee satisfaction, attitude, motivation, knowledge, and skill effectively create a better quality performance (Pullman et al., 2009). A good quality performance maintained with the compliance of sSCSM may keep suppliers' operational competence in the view of buyers, thus increase suppliers' sales to their buyers, and reduce suppliers' compliance costs.

Finally, it is a reasonable conjecture that the capital costs of improving environmental performance are much higher than in improving social performance. eSCSM requires the application of new production technologies and manufacturing changeover, which demands greater investments. eSCSM may also generate increased labor costs, because the upgraded operations request additional labor training (van Hoof & Lyon, 2013).

Taken together, the evidence suggests that compliance with sSCSM has a smaller negative impact than compliance with eSCSM. Therefore, it is hypothesized,

(S)H3. When suppliers are required to comply with the social dimension of SCSM, the suppliers will experience a less negative abnormal return to buyers' SCSM announcements.

2.5.2.4 Governance mechanisms

Suppliers' SCSM compliance is ensured by buyers' SCSM governance mechanisms (Gimenez & Sierra, 2013). As discussed in section 2.3.4.1, the present research focuses on two governance mechanisms: third party-certification and code of conduct. These two mechanisms may impose a different impact on suppliers' financial performance.

These two mechanisms have different impacts on suppliers' financial performance for three reasons. First, third-party certification is more rigorous than a code of conduct (Hoejmose & Adrien-Kirby, 2012). The third-party certifiers have professional knowledge and tools to identify the compliance of suppliers, which commonly requires radical improvement in suppliers' environmental and social performance over a relatively short term. Globally, it takes most companies, making the greatest efforts, between 8 and 19 months to obtain ISO 14001 certification (Babakri et al., 2003). Nevertheless, a code of conduct involves a progressive development lasting years. The suppliers' compliance is less stringent (Hoejmose & Adrien-Kirby, 2012).

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Second, the compliance with third-party certification adds one supply chain link between suppliers and buyers, thus reducing suppliers' opportunities in their search for buyer support. Third-party certification is an independent and formalized procedure, and thus reduces suppliers' contact with buyers in SCSM compliance. Suppliers are less likely to receive information sharing, relationship development, or organizational learning from buyers. In contrast, the development of an action plan, plant visits, and meetings with buyers as activities in the code of conduct are more likely to facilitate the inter-organizational flow of knowledge and improve relationships (Tachizawa & Wong, 2015). Also, the decreasing contact with buyers in third-party certification prevents suppliers' exposure to the difficulties in implementation; thus, suppliers are unlikely to negotiate a flexible adjustment on SCSM requirements according to the available resources.

Third, compliance with the more rigorous third-party certification adds greater cost to the supplier than compliance with a code of conduct would. Besides implementation and maintenance costs, suppliers have to pay an accredited auditor for registration and renewing cost for third-party certification (e.g., ISO 14001 certification [Nishitani, 2009]). Also, due to the complex implementation of environmental and social management systems, suppliers have to pay for a consulting service (Babakri et al., 2003). In contrast, a code of conduct monitored by buyers reduces the links of compliance along the supply chains, and, therefore, decreases suppliers' transaction costs. The above discussion suggests that compliance with third-party certification may increase suppliers' negative financial performance in SCSM. It is, therefore, hypothesized,

(S)H4. The suppliers that are required to comply with SCSM through third-party certification will experience a more negative abnormal return to buyers' SCSM announcements.

2.5.2.5 Group SCSM

Section 2.5.1.5 discussed group SCSM, where buyers collaborate in a group to mandate SCSM practices to suppliers. This section focuses on the impact of group SCSM on suppliers' financial performance. The relevant concepts from the group purchasing literature (Anand & Aron, 2003; Li, 2012; Nollet & Beaulieu, 2005; Walker et al., 2013; Yang et al., 2017) are still referred to in the discussion. Group SCSM may increase the bargaining power of buyers, add stringency in suppliers' compliance, and create

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institution pressure in supply markets. Therefore, a negative impact is posed by group SCSM on suppliers' financial performance.

The centralized SCSM mandates from multiple buyers in a group increase buyers' bargaining power, which raises costs to suppliers. It is not surprising that the formation of group SCSM is to increase buyers' bargaining power, as discussed in the group purchasing literature (Nollet & Beaulieu, 2003). In the SCSM context, the effect of power is important in buyers' mandates, as suppliers' resistance may be high due to the possible financial loss (see section 2.5.2.1). The increase in buyers' bargaining power puts suppliers in an unfavorable negotiation position in SCSM compliance (Hoejmose et al., 2013). The implementation of SCSM is a costly process, and suppliers undertake most of the investment (Hoejmose et al., 2013). In compliance with buyers' business practices, suppliers commonly expect technological and financial support in the implementation of SCSM and share the possible benefits with improved sustainability performance. Nonetheless, the increasing bargaining power enables buyers to utilize coercive forces (e.g., threat to terminate the relationship) rather than to provide incentives to suppliers in their SCSM mandates.

Moreover, increasing SCSM expertise together with bargaining power enables buyers to impose overly stringent SCSM conditions, such as a short timeline and multiple tasks. In fear of suppliers' failure in SCSM compliance, either due to lack of resources or opportunism, buyers may deliberately push SCSM compliance to a higher standard and with a shorter schedule (Lee et al., 2014). While the increasing bargaining power provides buyers with the first condition, the developed expertise through group SCSM enables buyers to impose stringent SCSM compliance on suppliers. The lack of SCSM expertise is a common problem in buyers' mandates (Adobor & McMullen, 2014). In SCSM groups, buyers mostly share similar product specifications and market bases (Nollet et al., 2016); thus, their required SCSM expertise is comparable. The spill-over of know-how from other buyers in the same groups may improve a buyer's capabilities in the negotiation of specific SCSM requirements and the resources allocated to the suppliers (Schotanus & Telgen, 2007). Suppliers' investments heavily increase with the stringent SCSM mandates.

Furthermore, Group SCSM creates institutional pressure and cause suppliers long-term loss. Individual buyer mandates may merely cover a limited amount of suppliers. Group SCSM mandates, however, create an institutional pressure through the joint force between buyers, where the SCSM requests occur over entire supply markets, as pointed

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out in the discussion in the group purchasing literature (Nollet & Beaulieu, 2005; Schotanus et al., 2010). Group SCSM is likely to constantly push sustainability performance required of suppliers in the competition. Suppliers may have to maintain operations in a long-term struggle with substantial costs in SCSM compliance.

Carter and Rogers (2008) and Jacobs and Singhal (2017) discussed that the consolidation and standardization in SCSM compliance through the group approach of SCSM may reduce suppliers' costs by otherwise meeting different requirements from individual buyers. However, there are substantial costs that may offset the potential benefit. The increase in buyers' bargaining power, the stringency of SCSM compliance, and institutional pressure in supply markets add substantial costs to suppliers, suggesting a more negative financial performance for suppliers that comply with buyers using the group SCSM approach. It is, therefore, hypothesized,

(S)H5. The suppliers that are required to comply with buyers by using the group SCSM approach will experience a more negative abnormal return to buyers' SCSM announcements.

2.5.2.6 Operational slack

The theories of Swift, Even Flow (SEF) and Variation and Uncertainty Buffering (VUB) were introduced in section 2.2.3.3. In this section, drawing on the two theories, the buffer effect of operational slack on mitigating suppliers' negative financial performance is discussed.

Operational slack is defined as operational resources in excess of what is required to fulfill expected demand (Kovach et al., 2015). These operational resources are mainly firms' physical assets, for example, machines and inventory. SEF and VUB have a contradictory view of operational slack. SEF maintains that operational slack degrades financial performance by adding variabilities in the even flow of operations. Lean management is very much in tune with SEF in reducing operational slack. However, VUB supports that the buffering mechanisms in the form of operational slack reduce the negative impact of variation and uncertainty on the even flow of operations. Previous studies have also provided empirical evidence on the mitigating effect of operational slack when various disruptions occur (Hendricks et al., 2009; Wood et al., 2017).

The present research attempts to address the discussion in the literature while considering the effect of operational slack on suppliers' financial performance in SCSM

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compliance. The present research predicts that operational slack as a cushion upholds the even flow of suppliers' operations in their compliance with SCSM, and thus reduces suppliers' negative financial performance.

2.5.2.6.1 The contradictory view on operational slack

The theory of SEF suggests that high productivity is the best mechanism to improve firms' financial performance, where productivity is defined as "getting more outputs from a given set of inputs" (Schmenner, 2015, p. 341). High productivity is ensured by a swift and even flow of materials and information in operations (Schmenner & Swink, 1998). Therefore, any disruption to the even flow of operations may degrade financial performance (Schmenner, 2001). Firms should continuously reduce variabilities to ensure the even flow of operations. These variabilities are mainly the additional resources in productions, such as spare inventory and overproduction (i.e., operational slack), so that "each day of production resembles every other day of production" (Schmenner, 2015, p. 345).

Lean management is very much in line with the theory of SEF (Seuring, 2009). Lean management proposes reducing 'waste' in search of operational efficiency (Hopp & Spearman, 2004); thus lean practitioners have a negative view of operational slack (Modi & Mishra, 2011). Lean management arose from the study of Japanese manufacturing techniques, particularly in the automobile industry (Womack et al., 1990). Lean management formulated the managerial philosophy that the operational problem is an unceasing battle against 'waste', which represents non-value-added activities throughout a product's entire value stream (Hajmohammad et al., 2013) and relates to a number of techniques (e.g., just-in-time [JIT]) and practices (e.g., inventory reduction) to minimize the waste (Shah & Ward, 2007). Lean management is an integrated system that accomplishes the production of goods/services with minimal buffering costs in search of operational efficiency (Hopp & Spearman, 2004). The variability in supply, delivery time, and demand is managed through the integrated social-technical system (Shah & Ward, 2007). In line with the theory of SEF, lean management views operational slack as an inefficient use of resources, which adds production costs to firms (Modi & Mishra, 2011).

In contrast, the theory of VUB was developed from SEF and further discusses that there is still residual variation and uncertainty which disrupt the even flow of operations, given that firms have made efforts to ensure productivity by reducing variabilities in their operations (Stratton, 2008). Therefore, the extreme leanness in operations (e.g.,

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continuously cutting inventory) is harmful to financial performance. Buffering mechanisms as operational slack are effective in restoring the even flow following a disruption. Thus productivity and the negative impact of the disruption on the financial performance can be reduced (Stratton, 2012). VUB suggests three sources of buffering in the operational perspective are forward load (lead time buffer), inventory, and capacity (Stratton, 2008).

The rapid change in markets and many external risks often result in unavoidable disruptions to the even flow of firms' operations (Craighead et al., 2007). There is increasing recognition of the value of operational slack in response to the disruptions caused by residual variation and uncertainty. Kovach et al. (2015) discussed that there is growing demand instability in the market; managers should develop a response strategy through operational slack to hedge against the negative impact on firm performance. Azadegan et al. (2013) studied the role of operational slack on firm survival during the venture stage. They maintained that market uncertainty strongly threatens venture survival; firms, therefore, even in their early stages, must create operational slack to avoid failure. The studies of Hendricks et al. (2009) and Wood et al. (2017) investigated the effect of operational slack on firm performance in the case of stringent external risks. Hendricks et al. (2009) discussed the firms' vulnerability under lean operations in supply chain disruptions. The authors found that operational slack is the most straightforward and effective strategy for dealing with operational disruption. Other practices (e.g., outsourcing, single sourcing, reducing the supplier base, and focusing on improving the efficiency of the supply chain) may create substantial costs in dealing with disruptions to the even flow of operations. Wood et al. (2017) studied the effect of operational slack in toy recalls and found operational slack mitigated the firms' negative financial performance. Moreover, Wood et al. (2017) found that operational slack is more effective in reducing negative financial performance than financial slack (e.g., cash or cash equivalent), while financial slack was predicted to have a higher buffering effect due to its discretionary nature. In line with the theory of VUB, operational slack is a strategic reserve with operational flexibility to reallocate resources as necessary (Wood et al., 2017), which provides a buffering effect to the disruption of the even flow of operations.

2.5.2.6.2 The effectiveness of operational slack in the SCSM context

In the SCSM context, SCSM compliance creates a disruption to the even flow of suppliers' operations. Suppliers are forced to develop multi-criteria in their operations

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(Cruz, 2009). It is necessary to implement environmental and social elements in operations in addition to the ordinary supplying criteria required by buyers (e.g., costs, quality, flexibility, and delivery), which substantially changes the manufacturing processes and schedules.

In line with the propositions of the theory of VUB and previous studies (Hendricks et al., 2009; Kovach et al., 2015; Wood et al., 2017), this research maintains that strategic buffering mechanisms in the form of operational slack can mitigate the disruption to suppliers' operations caused by SCSM compliance. Operational slack provides suppliers with the operational flexibility to allocate the necessary resources for absorbing the imposed costs of SCSM compliance. The cash flow through continuous sales to buyers supported by operational slack ensures rolling capital in existing and future operations. Suppliers, hence, are able to better cater to multiple competitive priorities (e.g., high environmental performance and flexibility) simultaneously without sacrificing financial performance.

There are three major forms of operational slack that effectively mitigate negative financial performance in the face of a disruption to the even flow of firms' operations: capacity slack, inventory slack, and supply chain slack² (Hendricks et al., 2009; Kovach et al., 2015). Surplus capacity in the form of flexible machinery may strengthen suppliers' ability to maintain the constant production of routine business and to update operations according to SCSM commitments. Inventory reserves, from raw materials to finished goods, reduce the production lead time and ensure continuous supply to various customers. There is broad consensus that higher levels of inventory slack buffer a firm from adverse conditions (Azadegan et al., 2013; Wood et al., 2017). Supply chain slack is estimated by the cash-to-cash cycle (Kovach et al., 2015), indicating the period between when suppliers pay their next tier suppliers and receive payment from their buyers. A high level of supply chain slack shows a positive cash flow in suppliers' supply chain operations, which may provide a buffer for the SCSM investment. Therefore, it is hypothesized,

(S)H6a. The suppliers with a higher level of capacity slack will experience a less negative abnormal return to buyers' SCSM announcements.

² The theory of VUB suggests forward load (i.e., lead time buffer) is also a form of buffering mechanism. Due to the constraint of secondary data used, forward load is not included in this research. Section 6.3 discuss this limitation for future research.

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(S)H6b. The suppliers with a higher level of inventory slack will experience a less negative abnormal return to buyers' SCSM announcements.

(S)H6c. The suppliers with a higher level of supply chain slack will experience a less negative abnormal return to buyers' SCSM announcements.

2.5.2.7 Financial slack

The buffering mechanisms discussed in the theory of VUB focus on operational slack (i.e., forward load, inventory, capacity). This research extends the theory of VUB by including financial slack as a form of buffering mechanism which mitigates suppliers' negative financial performance.

The slack may also be related to financial factors in firms, for example, working capital, borrowing capacity, or cash reserves (Bourgeois & Singh, 1983; Voss et al., 2008), which refer to the firms' 'financial slack' (Daniel et al., 2004). Prior studies have acknowledged the buffering effect of financial slack on business risks (Bourgeois & Singh, 1983; Bromiley, 1991). The meta-analysis by Daniel et al. (2004) found firms' financial slack is positively related to financial performance.

Financial slack provides additional resources for buffering suppliers' negative financial performance in SCSM compliance. Tan and Peng (2003) discussed that financial slack is unabsorbed in operational activities and easy to redeploy. Financial slack is more generic and therefore a relatively less rare resource, which can be generated from external sources in relatively short order (Voss et al., 2008). As discussed earlier (see section 2.5.2.1), SCSM compliance increases suppliers' operational complexity. Therefore, when a buyer imposes SCSM, the concern is whether the supplier has quick access to additional financial resources to provide a buffer to maintain operational competence. A low level of financial slack indicates that there is reduced availability of capital resources, which will constrain the choices a supplier has while investing in making the changes required to comply with the buyers' requirements. In contrast, if a supplier has a high level of financial slack, they will be more flexible in how they approach implementation changes required to comply with SCSM.

Firms' leverage is used to measure the financial slack in this research. A firm's leverage indicates the ratio of total debt to total assets and is often used to evaluate firms' borrowing capacity (Daniel et al., 2004). A low level of leverage indicates a high level of financial slack, which "consists of future resources that can be generated from the markets

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by raising additional debt or equity capital”(Cheng & Kesner, 1997, p. 2). A low level of leverage is found to be an effective form of financial slack relating to financial performance (Daniel et al., 2004).

The use of leverage as the alternative form of financial slack in this research complements the studies of Voss et al. (2008) and Wood et al. (2017). In both studies, the buffering effect of financial slack was tested using different measures (i.e., inventory-adjusted working capital and cash reserves) when a disruption to the even flow of operations occurred (i.e., toy recalls and product exploration and exploitation). However, both studies found an insignificant effect of financial slack. Wood et al. (2017) called for future research to use an alternative form of financial slack to further test the mitigating effect. This research answers that call by using leverage as the form of financial slack and provides additional evidence on the effect.

Buyers' SCSM creates a disruption to suppliers' operations due to the additional requirements on environmental and social performance. A high level of suppliers' leverage reduces the financial slack that suppliers may deploy to maintain operational competence. Thus, it is hypothesized,

(S)H7. The suppliers with a high level of leverage (a low level of financial slack) will experience a more negative abnormal return to buyers' SCSM announcements.

2.5.2.8 The interaction between financial slack and supplier's dependence on buyer

Financial slack is generic and discretionary resources, which can be generated internally via multiple means or from many external sources in relatively short order (Voss et al., 2008). While the discretionary nature enables firms to deploy financial slack easily and quickly, financial slack (e.g., low leverage) may also represent the firms' underinvestment and inefficient use of these unabsorbed resources to expand the firms' current routines and thus create opportunity costs (Mishina et al., 2004). Therefore, the benefits of financial slack may be offset by these opportunity costs.

Some studies have found that the mitigating effect of financial slack is not strong unless additional disruptive conditions increase the requirement of buffering resources. Voss et al. (2008) found that financial slack alone is not significantly effective in supporting product exploration and exploitation, but the interaction effect of financial slack with a high level of environmental threat (i.e., an additional disruptive condition) is

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significant in reducing business risks in product exploration and exploitation. Similar results were found by Mishina et al. (2004) who studied firms' pursuit of sales growth. The authors found financial slack alone does not have a significant effect in upholding sales growth, but financial slack has as a significant buffering effect when the sales growth is pursued additionally through product expansion (i.e., developing new products for an existing market). These previous studies indicate that the buffering effect of financial slack is conditional. The additional disruptive conditions trigger the necessity of the buffer by using financial slack.

In this research, the interaction effect of financial slack and supplier's dependence on buyer is tested to capture the effectiveness of financial slack under additional disruptive conditions. A high level of dependence on a buyer indicates that the transaction with the buyer takes a greater percentage of a supplier's overall business. The supplier, thus, has a greater need to comply with the buyer's SCSM to ensure continuous sales, which increases the supplier's transaction costs and creates additional disruption to the even flow of operations. The main concern is likely to be the availability of capital provided by financial slack to support the suppliers' constant operations. The mitigating effect of financial slack in SCSM at a high level of dependence on buyers may outweigh the potential opportunity costs of holding the additional capital.

A high level of leverage under a high level of a supplier's dependence on buyer shows the supplier's incapability from the perspective of financial resources in its SCSM compliance, which is likely to substantially increase the negativity of financial performance. Therefore, it is hypothesized,

(S)H8. Where there is a high level of supplier's dependency on buyer (SDB), the suppliers that have a high level of leverage (a low level of financial slack) will experience a more negative abnormal return to buyers' SCSM announcements.

2.5.2.9 Summary of the hypotheses in supplier analysis

This section finishes the hypothesis development about suppliers' financial performance. A summary of the hypotheses is given in

Table 2.2. The present research hypothesizes that suppliers have negative financial performance when they comply with their buyers' SCSM. However, the suppliers' financial performance is influenced by supply chain power, operational and financial slack, governance mechanisms, group SCSM, and SCSM dimensions. Additionally,

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financial slack and supplier's dependence on buyer may interactively influence the financial performance.

The next section uses the concept of the green bullwhip effect to provide a comparative analysis between paired buyers' and suppliers' financial performance.

Table 2.2 Summary of the Hypotheses in Supplier Analysis

Hypothesis	Hypothesis number	Predicted sign	Section number
Suppliers' financial performance when they are required to comply with their buyers' SCSM	(S)H1	Negative	2.5.2.1
The factors that influence suppliers' financial performance when they comply with buyers' SCSM			
Hypothesis	Hypothesis number	Predicted sign	Section number
Supplier's dependence on buyer (the measure of supply chain power)	(S)H2a	Negative	2.5.2.2
Buyer's dependence on supplier (the measure of supply chain power)	(S)H2b	Positive	2.5.2.2
Relationship length (the measure of supply chain power)	(S)H2c	Negative	2.5.2.2.3
sSCSM (SCSM dimension)	(S)H3	Positive	2.5.2.3
Third-party certification (governance mechanisms)	(S)H4	Negative	2.5.2.4
Group SCSM	(S)H5	Negative	2.5.2.5
Capacity slack (the measure of operational slack)	(S)H6a	Positive	2.5.2.6
Inventory slack (the measure of operational slack)	(S)H6b	Positive	2.5.2.6
Supply chain slack (the measure of operational slack)	(S)H6c	Positive	2.5.2.6
Leverage (the measure of financial slack)*	(S)H7	Negative	2.5.2.7
The interaction term of leverage (the measure of financial slack) and supplier's dependence on buyer	(S)H8	Negative	2.5.2.8
Note*: Financial slack is measured by leverage. A high level of leverage indicates a low level of financial slack, leading to negative financial performance for suppliers in SCSM.			

2.5.3 Different financial performance of buyers and their suppliers in SCSM in link with the green bullwhip effect

The 'green bullwhip effect' refers to the bullwhip effect from the perspective of environmental requirements transferred in supply chains. The green bullwhip effect suggests that buyers transfer environmental requirements to their suppliers with more

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stringent practices and a compressed timeline than what is actually required by downstream stakeholders (Lee et al., 2014). In this research, the interest is in the financial consequences of the green bullwhip effect. The present research predicts the financial performance of suppliers is more negative than that of their buyers, as the green bullwhip effect from financial performance perspective indicates buyers' shift of the costs to their suppliers.

2.5.3.1 The classic bullwhip effect

The classic bullwhip effect is introduced as the background before moving on to the discussion of the green bullwhip effect. The classic bullwhip effect refers to the phenomenon that “the orders to the supplier tend to have large variance than sales to the buyers (i.e., demand distortion), and the distortion propagates upstream in an amplified form (i.e., variance amplification)” (Lee et al., 1997a, p. 546). This phenomenon is costly to firms because it causes excessive inventories, poor product forecasts, insufficient or excessive capacities, poor customer service, and uncertain production planning (Lee et al., 1997a). Four causes of the bullwhip effect are the distortion of information, increasing batch size to reduce the setup costs, logistics delay, and rationing gaming (Lee et al., 1997a, 1997b). Rationing gaming is the primary cause of the classic bullwhip effect and highly relevant to SCSM (Lee et al., 2014), indicating that the bullwhip effect is an outcome of strategic interaction among supply chain partners. Bounded rationality creates risks and uncertainty in buyers' coordination of their supply chains (e.g., the possible delivery delay from suppliers). Buyers attempt to build a buffer to reduce risks and uncertainty by amplifying the order information to their suppliers (Croson et al., 2013).

2.5.3.2 The green bullwhip effect

Following the discussion of the classic bullwhip effect, Lee et al. (2014) used case studies to develop the concept of the ‘green bullwhip effect’. The green bullwhip effect supports that the requirements of environmental performance by upstream suppliers are effectively transferred from downstream stakeholders by buyers using supply chain power, as discussed in section 2.3.2. However, the environmental performance required by buyers of their suppliers do not need to match the requirements demanded by downstream stakeholders. Buyers attempt to distort the information to their suppliers, where the requirements of environmental performance are more stringent and compressed

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in the timeline than what is actually demanded by downstream stakeholders. Support for the green bullwhip effect is provided by the study of Seles et al. (2016) who investigated a wider supply chain and a different industry.

The main cause of the green bullwhip effect is the rationing gaming by buyers, which builds a buffer to reduce buyers' business risks and costs (Lee et al., 2014). Suppliers are required to invest substantial resources and develop sufficient capabilities to meet the environmental performance expected by buyers (Giunipero et al., 2012). The improvement of environmental performance takes time and depends on suppliers' capabilities and managerial motivations (Hoejmose & Adrien-Kirby, 2012). There is a high level of uncertainty on whether suppliers' environmental performance can be improved within the time frame and conditions as required by buyers' downstream stakeholders. The uncertainty increases buyers' supply chain sustainability risk and associated costs. In order to reduce the uncertainty, buyers impose more rigorous compliance in a compressed timeline on their suppliers, which creates a buffer to the potential delay or low commitment that suppliers may have. The buffer can facilitate buyers to meet their downstream stakeholders' demands on environmental performance, and reduce the costs associated with supply chain sustainability risks.

From the perspective of environmental performance, Lee et al. (2014) discussed that the green bullwhip effect results in a positive change in supply chains. The green bullwhip effect speeds up and expands the adoption of environmental practices in supply chains. Spill-over benefits are created by the green bullwhip effect, which improves supply chain environmental performance.

2.5.3.3 The financial consequence of the green bullwhip effect

The present research investigates the financial performance in line with the green bullwhip effect, including both the environmental and social dimensions of SCSM. The green bullwhip effect in relation to the environmental dimension of SCSM was originally found by Lee et al. (2014). Lee et al. (2016) further applied their own finding of the green bullwhip effect in the context of both the environmental and social dimensions, providing support for the use of the green bullwhip effect in the social dimension of SCSM. The present research follows Lee's studies to discuss the financial consequence of the green bullwhip effect in the SCSM context, where both environmental and social dimensions of SCSM are covered.

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From the financial performance perspective, the green bullwhip effect indicates buyers shift of their SCSM costs to their suppliers, suggesting more negative financial performance for suppliers than their buyers in SCSM. As discussed in section 2.5.3.2, the main cause of the green bullwhip effect is the intention of buyers to build a buffer to reduce the uncertainty in suppliers' SCSM compliance. The buffer reduces buyers' two kinds of transaction costs in SCSM. First, a higher and earlier scale of sustainability requirements reduces the costs that buyers might have in terms of suppliers' opportunism. Sustainability performance at the supplier level is process-based (Foerstl et al., 2015), and is, therefore, commonly hidden in suppliers' operations (Tachizawa & Wong, 2015). This increases buyers' bounded rationality and suppliers' opportunism by violating the pre-agreed environmental and social conditions. Suppliers' opportunism increases buyers' costs of supply chain sustainability risk. A higher and earlier scale of sustainability requirement ensures a certain level of supplier sustainability performance, and thus buffers the costs of suppliers' opportunism that buyers may have.

Second, buyers can reduce their costs in the negotiation of SCSM compliance with suppliers. Buyers distort the information of sustainability requirements to their suppliers. The highly rigorous requirements in a compressed timeline amplify the urgency of the demand from downstream stakeholders. Buyers have a favorable position in negotiation with their suppliers over SCSM compliance, which reduces the necessity to provide an incentive to suppliers (i.e., negotiation costs) (Adobor & McMullen, 2014).

The reduction in buyers' transaction costs is attributed to increased supplier compliance costs. From the perspective of suppliers, the variety of overly rigorous practices imposed by buyers forces suppliers to overinvest in improving sustainability performance. Upstream suppliers are expected to have substantial costs in responding to the green bullwhip effect (Seles et al., 2016). The green bullwhip effect is caused by buyers' providing their suppliers with distorted information concerning SCSM, which reduces the buyers' SCSM transaction costs but increases suppliers' compliance costs. From a financial performance perspective, the green bullwhip effect indicates buyers' shift of their SCSM costs to their suppliers by using distorted information. Therefore, in this research, the financial performance of suppliers is predicted to be more negative than that of their buyers in SCSM.

By using survey-based research, Schmidt et al. (2017) applied the green bullwhip effect in the investigation of the financial performance of firms in different supply chain positions. Contrary to the predictions, the authors found the firms in downstream supply

Chapter 2 Literature Review

chains (i.e., OEM, distributor/retailer) had worse financial performance than those in upstream supply chains (component and raw material supplier). Schmidt et al. (2017) named their finding the ‘supply chain paradox’.

The possible reason for the supply chain paradox is that Schmidt et al. (2017) focused on generic supply chain positions rather than paired supply chain partners (buyers and their paired suppliers in the same supply chain). As noted in the methodology section in the study of Schmidt et al. (2017, pp. 9, 12), “A total 750 randomly selected companies from German-speaking Europe were contacted [...]. Informants were asked to choose their business units’ position within the supply chain.” Thus, it is likely that these component and raw material suppliers may not have been the suppliers working in the same supply chains as these OEM, distributors, and retailers (i.e., buyers). However, the green bullwhip effect is consistently found between paired supply chain partners, because the closed partnership can facilitate buyers to effectively transfer the amplified sustainability requirements to their suppliers, as demonstrated in the studies of Lee et al. (2014) and Seles et al. (2016).

The present research utilizes the sample of buyers and their paired suppliers working in the same supply chains. The analysis is grounded on this paired partnership and is likely to reveal the performance difference between buyers and suppliers in line with the green bullwhip effect. It is, therefore, hypothesized that,

(BS)H1. *Suppliers will experience a more negative abnormal return than their buyers in response to buyers’ SCSM announcements.*

2.6 Chapter conclusion

The literature has largely moved the discussion on sustainability to the supply chain context, with increasing understanding of the contribution of supply chain partners to overall sustainability performance. Drawing on the concepts of sustainability and SCM, SCSM has been developed. The procurement/purchasing perspective of SCSM has been largely discussed in the literature, where downstream buyers mandate their immediate suppliers to improve environmental and social performance.

Developed from stakeholder theory and RDT, stakeholder pressure on SCSM as a systematic approach is transferred from downstream at the point of sales through buyers’ mandates to upstream suppliers (Hall, 2000).

Chapter 2 Literature Review

It remains uncertain if buyers' financial performance increases with the adoption of SCSM. This research hypothesized buyers' negative financial performance from the view of the increased transaction costs and the disruption to the even flow of buyers' operations. Moreover, the five factors that are predicted to influence buyers' financial performance when they adopt SCSM focus on the nature of SCSM (e.g., SCSM dimensions) and firm-specific characteristics (e.g., supplier relationship management).

There is a lack of studies on suppliers' financial performance when they are required to comply with their buyers' SCSM. Using the theory of SEF, suppliers' compliance and implementation costs have been discussed, and thus negative financial performance for the suppliers that comply with SCSM is predicted in this research. Moreover, seven factors are predicted to influence suppliers' financial performance in SCSM. These factors focus on the nature of SCSM (e.g., SCSM dimensions) from suppliers' perspective and suppliers' capabilities and resources such as operational slack in connection with the theory of VUB.

The green bullwhip effect suggests that in transferring downstream stakeholders' demand for sustainability to their suppliers, buyers impose more rigorous SCSM practices and a shorter timeline of compliance on their suppliers than what is actually demanded by downstream stakeholders. This research adopts the green bullwhip effect and discusses the more negative financial performance that suppliers may experience than do their buyers in SCSM, suggesting buyers' shift of the costs of SCSM to their suppliers.

Event study methodology is used in this research to test these hypotheses. In contrast to the dominant use of perceptual data in the literature, the concrete and objective financial performance data used in event study methodology avoids the social desirability bias and ensures robustness of the research findings.

The underlying reasoning for the methodology and detailed research methods and steps will be described in the next chapter.

Chapter 3. Methodology

In the preceding chapter, the review of SCSM literature identified the research gaps and formulated research objectives and questions. The impact of SCSM was hypothesized to be negative on buyers' and suppliers' financial performance; the different SCSM attributes (e.g., group SCSM) and firm-specific characteristics (e.g., operational slack) were discussed to influence the negativity of financial performance.

This chapter illustrates how these research questions were investigated. Figure 3.1 shows an overview of this chapter. Based on positivist thinking, event study methodology is utilized in this research. Event study methodology uses the change of stock returns in response to an SCSM announcement (i.e., abnormal returns) as the measure of financial performance. The different SCSM attributes and firm-specific characteristics can be tested in cross-sectional regression models as independent variables in relation to the change of stock returns.

The sample data for buyers and suppliers were collected and tested by using different methods. While standard data collection methods in event study methodology were used for the buyer sample, the methods for 'related firms' were adopted for the supplier sample. Due to the nature of the sample, portfolio cumulative abnormal returns were used to test suppliers' financial performance, and standard estimation methods were applied for analyzing buyers' financial performance. The hypothesized variables were constructed to enable the tests in cross-sectional regression models. The difference in estimated abnormal returns for buyers and suppliers was tested by using paired sample t-test to show the difference in financial performance, which is discussed at the end of this chapter.

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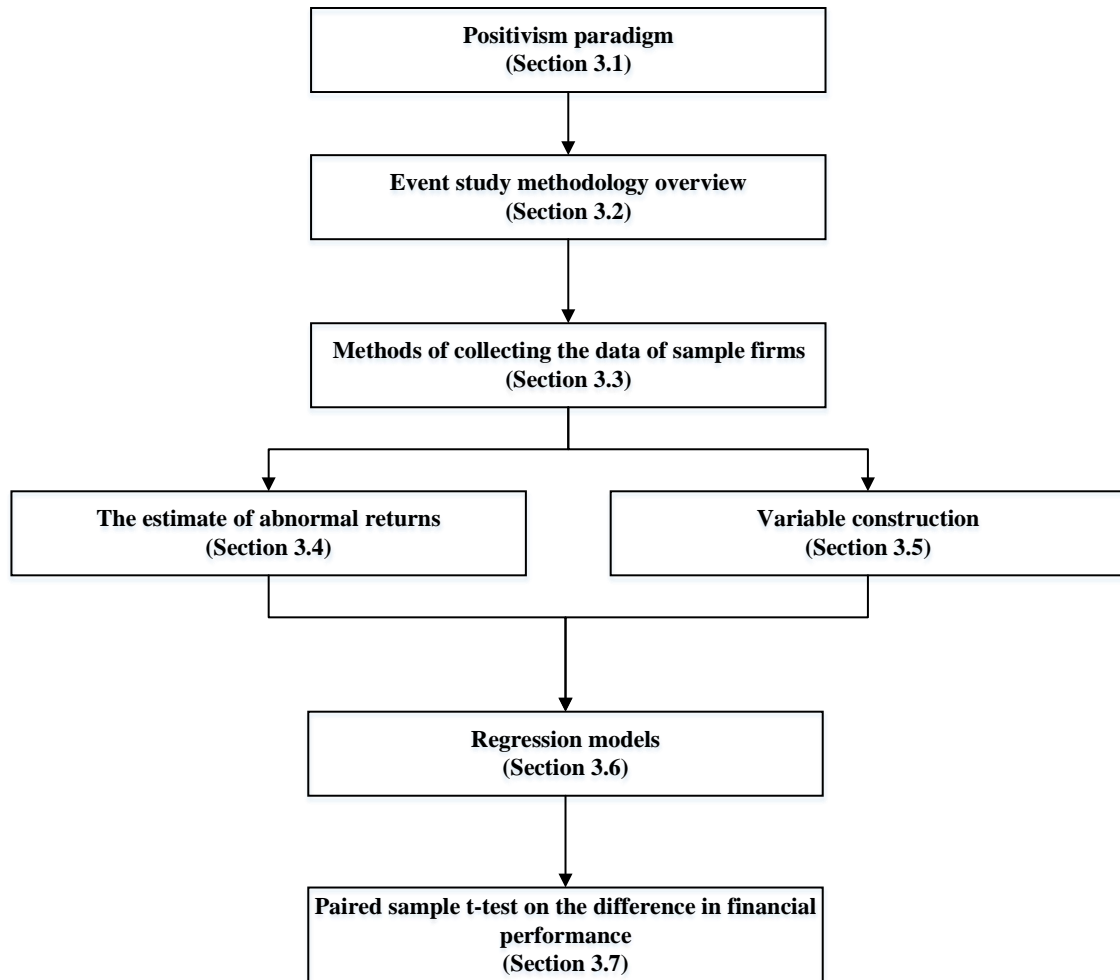


Figure 3.1 Structure of Methodology Chapter

3.1 Philosophical paradigm

Researchers typically start with a real-life issue that needs to be addressed, a problem that needs to be solved, and a question that needs to be answered, as discussed in Chapter 2 in this research. Subsequently, methodology and methods are considered to investigate the specific research questions. Thus, the research design is always driven by the research questions that the researchers want to answer (Crotty, 1998). Philosophy literature states that the choice of methodology and methods is influenced by ontological and epistemological stances, which is embedded and institutionalized in people's common research schools (Gray, 2014). The congruent decisions made in each of these elements create a paradigm in research (Collis & Hussey, 2003). Therefore, it is necessary to demonstrate the philosophical paradigm in the present research to justify the methodology and methods used for investigating the research questions.

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A paradigm is a systematic set of beliefs, together with their accompanying methods (Lincoln & Guba, 1985). The four key elements are illustrated in the far left column of Table 3.1. Ontology deals with the nature of reality. Epistemology is concerned with the nature of knowledge and justification, in particular, the relationship between researchers and research objects. Ontology and epistemology tend to emerge together as the philosophical stance on the nature of reality and determine the methodology and methods, which are the ways researchers gain knowledge of the world (Steenhuis & Bruijn, 2006). Table 3.1 also provides two paradigms according to the different elements. The present research utilizes a positivist paradigm as discussed in the sections below.

Table 3.1 Research Paradigm (adapted from Collis and Hussey [2003] and Gray [2014])

Element	Positivist paradigm	Interpretivist paradigm
Ontology	Reality is singular and objective	Reality is subjective and multiple as seen by participants in a study
Epistemology	Researchers are independent of what is being researched	Researchers interact with what is being researched
Methodology	Experimental/manipulative; verification of hypotheses; chiefly quantitative and deductive approach	Hermeneutical/dialectical; chiefly qualitative and inductive approach
Method	Operationalizing concepts so that the concepts can be measured; using a large sample from which to generalize to the population; statistical tests	Using small samples researched in depth or over time; interview

3.1.1 Ontology

Ontology is the fundamental base of all paradigms. It is the study of the nature being, existence, or reality (Crotty, 1998). In other words, ontology answers if people believe “real” reality exists and if and how it can be elucidated. The objectives of this research are to investigate the impact of firms’ SCSM on financial performance and provide firms with strategies to manage SCSM with the minimum financial loss. Thus, the present research posits a cause-effect relationship of the “true” reality which can be elucidated

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through empirical inquiry (Gray, 2014). Moreover, the present research intends to provide the findings with a high level of generalizability, which suggests the belief of a singular, objective, and stable external reality. Consequently, the assumption of world reality utilizing a time- and context-free generalization puts this research's ontological stance in the positivist paradigm, as shown in Table 3.1.

3.1.2 Epistemology

Epistemology refers to the validity and legitimacy of knowledge and involves an examination of the relationship between researchers and research object (Collis & Hussey, 2003; Gray, 2014). The epistemological stance must be consistent with the previously declared ontological stance (Grant & Giddings, 2002). Therefore, the epistemological stance taken in this research is "objective and detached observation" (Guba & Lincoln, 1994, p. 110), which indicates the observations of the financial consequence of the firms' SCSM must not be influenced by the researcher; the researcher must also not be influenced by the observations. Hence, the validity and legitimacy of the findings in the present research can be ensured.

3.1.3 Positivist paradigm

The ontological and epistemological stances of the researcher result in the positivist paradigm that is applied in the present research. Such a paradigm is characterized by an objectivist view of organizations (Guba & Lincoln, 1994). In this perspective, the reality is stable and singular; there is a pre-existing pattern or order to the facts (Grant & Giddings, 2002). Therefore, a 'cause-effect' relationship can be established to study the facts in social science. By resting on this causal relationship, the search for the effects of those factors provides facts or evidence. Moreover, these facts or evidence are intended to be generalized to a large population, because the objective observations and measures owing to the stable reality avoid the bias of facts created by the researchers. Thus, the facts hold true across samples. The combined facts and evidence in causal relationships create a specific 'body of knowledge' (Grant & Giddings, 2002).

Positivists generate knowledge by deductive reasoning, where hypotheses are developed to confirm, refute, or modify the principle (Gray, 2014). These hypotheses

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contain two or more concepts of the principle that attempts to be explained in the causal relationships. Since empirical observation or experiment is used to test these hypotheses, the operationalization of these concepts is important in deductive reasoning, which defines a way in which these concepts can be observed to confirm that they have occurred (Gray, 2014).

Through the review of the existing literature in Chapter 2, there exists a theoretical framework to help the researcher understand the nature of SCSM and to develop and hypothesize the causal relationships between SCSM related attributes and firms' financial performance. The tests on these relationships provide empirical evidence on the theories applied in the SCSM context. Moreover, the concepts in these hypothesized relationships can be measured through operational indicators. Conclusively, the positivist paradigm is used in the research, which defines the appropriate methodology and methods needed to examine the research questions in this research.

Event study methodology is in line with a positivist paradigm (Coutts et al., 1994). Event study methodology is used to investigate the stock returns in response to SCSM announcements, which represents the cause (i.e., SCSM announcements) and the effect (i.e., stock returns). The stock returns are the objective measure of firms' financial performance. Statistical and econometric techniques are employed to give the result an aura of credibility (Coutts et al., 1994); the moderating factors can be hypothesized and tested against the stock returns. These characteristics reflect the nature of a quantitative method with deductive reasoning. Given the fit to the positivist paradigm, event study methodology was chosen to achieve the three research objectives explicated in Chapter 1. Next, the details of this methodology will be introduced.

3.2 Event study methodology

The purpose of an event study is to examine the behavior of firms' stock returns around corporate events (Kothari & Warner, 2007). Event studies isolate the incremental impact of a corporate event (i.e., announcement) on stock returns; the component of stock returns due to firm-specific events is adjusted for market factors, and these adjusted returns are referred as to 'abnormal returns' (Hendricks & Singhal, 1996). The magnitude of abnormal returns at the time of an event provides a measure of the impact of this type of event on firms' financial performance (Kothari & Warner, 2007). Subsequently,

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researchers may relate the abnormal returns to firm characteristics in cross-sectional regression analysis, where the most important attributes for explaining the variation of abnormal returns across firms can be explored (Fisher-Vanden & Thorburn, 2011; McWilliams & Siegel, 1997).

Event study has been extensively used in operations and supply chain research (e.g., Hendricks et al., 2009; Jacobs & Singhal, 2017; Wood & Wang, 2018; Wood et al., 2017). The operations and supply chain management practices (e.g., operations and production changes, forecasting and planning, inventory and capacity management) are positively/negatively related to firms' operational competence, which results in the increase/decrease of the direct financial metrics (e.g., cash flow) and intangible assets (e.g., credibility). In turn, these changes in financial metrics and intangible assets flow to improved/deteriorated stock returns. There are several important steps in the causality incorporated by the measure of stock returns (Wood & Wang, 2018). Therefore, the value of the equity of a firm is the estimate of the overall impact of these operations and supply chain management practices on firms.

Besides the usefulness in operations and supply chain research, event study methodology provides advantages in SCSM research over the use of other methodologies to answer the research questions in this research.

3.2.1 Advantages of event study methodology in SCSM research

There is a large methodological gap in the SCSM literature, where survey-based research and case study are dominant (Ashby et al., 2012). While the use of two methodologies in SCSM research is likely to create specific bias, event study methodology may provide advantages in correspondence to the focus of this research.

First, case study as an inductive approach puts more focuses on theory developing and diffusion of sustainability discourses rather than a practical application (Ashby et al., 2012). Case study is a valuable tool for the generation of theories (Eisenhardt, 1989). However, case studies have a limitation to provide explicit practical outputs such as models or tools associated with the implementation of SCSM practices (Ashby et al., 2012). SCSM is a fundamentally practical discipline and based on "real world" supply chain situations; research needs to explicitly translate sustainability theories into

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practices. Further, case study is criticized as merely illustrating the successful stories of SCSM (López-Gamero et al., 2010; Seuring & Müller, 2008) within a niche population (van Beurden & Gössling, 2008).

The focus of this research is on theory testing rather than theory developing. Therefore, event study methodology is more fitting to this research than case study. Event study methodology is a deductive approach which uses statistical tests to assess the developed hypotheses. The impacts of SCSM and the related aspects identified by using the measure of stock returns provide managers with explicit evidence of what the best SCSM implementation tools are regarding firms' financial benefits. Moreover, event study methodology often utilizes a large sample to provide generalized outcomes. The data (e.g., announcements and stock prices) used in event study methodology are available from public sources; the objectiveness of these public data reduces the bias of selecting any single dimension in the research.

Second, survey-based research is criticized for not addressing the social desirability bias in SCSM research (Carter & Easton, 2011; Mullainathan & Bertrand, 2001; Walker et al., 2012). Social desirability bias refers to “the tendency of study participants to provide answers and share perspectives that they believe will be viewed favorably by the research” (Carter & Easton, 2011, p. 56). Survey-based research commonly uses perceptual measures on either firms' SCSM or financial performance, where respondents are often asked their views on sustainability operations through either a questionnaire or interview. However, respondents are often compelled to give a positive impression of their own and their organization's activities; the results may show a stronger effect size than exists (Walker et al., 2012; Wood & Wang, 2018), because respondents want to avoid looking bad in the research relating to sustainability issues (Mullainathan & Bertrand, 2001). The subjective nature of questioning in survey-based research makes social desirability bias inevitable in the investigation of sustainability issues. Nonetheless, there is a large majority of survey research which has not addressed bias in the findings (Carter & Easton, 2011). This bias reflects the discussion on the epistemological stance of this research (section 3.1.2.). The closeness of researchers to the researched in survey-based research with regard to SCSM issues creates a problem in terms of the objectiveness of the observations, and thus threatens the validity and legitimacy of the findings.

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The secondary data used in event study methodology helps this research overcome social desirability bias. Stock returns provide an unbiased measurement of financial performance. The objective data does not suffer from a positive self-evaluation bias, thus avoiding social desirability bias (Dam & Petkova, 2014).

Moreover, stock returns are a measure encompassing intangible assets (Hendricks et al., 2017). Intangible assets (e.g., reputation, stakeholder legitimacy) are discussed as the main benefits to firms adopting SCSM (Busse, 2016; Golicic & Smith, 2013). Investors incorporate these intangible assets if any in their evaluation of firms' future cash flows, and thus, stock returns contain the changes of these intangible assets (Jacobs & Singhal, 2017; Jacobs et al., 2010). Hence, the holistic estimate of SCSM policies including firms' intangible assets may be explored by using event study methodology (Dam & Petkova, 2014).

Finally, public policy decision-making is the interest of studies on firms' SCSM issues; however, it has been difficult for researchers to research this area because of the problems involved in measuring the impact of managerial decisions (McWilliams & Siegel, 1997). Event study methodology can posit a relationship between the parties involved in SCSM issues and solve the difficulty of measures. Because firms' SCSM decisions involve the relationship with shareholders (for profit enhancement) and society (for the benefits to other stakeholders), the impact of SCSM decisions measured by stock returns may directly reflect the relationship (McWilliams & Siegel, 1997).

Event study methodology has a clear fit for the focus of this research and avoids social desirability bias common in SCSM research. While case study and survey-based research are currently dominant in SCSM research (Ashby et al., 2012; Touboulic & Walker, 2015), the present research expects to explore the SCSM-firm performance link from a different methodological perspective. By using event study methodology, the findings of this research provide a meaningful comparison with different methodological perspectives by using case study and survey-based research for the triangulation of reliability and validity (Carter & Easton, 2011).

The results from event study methodology can only be considered valid with three assumptions. The next sections discuss these assumptions.

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3.2.2 The assumptions in event study methodology

Three assumptions in event study methodology are the efficient market hypothesis, the unanticipated nature of the event being examined, and no confounding events biasing the abnormal returns.

3.2.2.1 Efficient market hypothesis

The first assumption underpinning event study is the efficient market hypothesis. It asserts that stock prices will respond rapidly to the information contained in public announcements and that the market's response will include the capitalization of future costs and benefits associated with this event (Hendricks, Singhal, & Wiedman, 1995). This hypothesis highlights the two crucial sources of data in an event study: stock returns and public announcements. Given the rationality of the marketplace, a measure of the financial impact of an event (announcement) can be constructed using observed stock returns (MacKinlay, 1997).

According to the scale of rationality in stock markets, Fama (1970) categorized three forms of market efficiency: weak, semi-strong, and strong. A weak market efficiency indicates that the information subset of interest is just past stock price (or return) histories, where the stock market movement is random. A semi-strong market efficiency asserts that stock prices reflect all the relevant information that is publicly available. A strong market efficiency asserts that information that is known to any participant is reflected in stock prices (Cohen & Frazzini, 2008). Strong market efficiency is believed to be a poor description of reality (Fama, 1970). In most event studies, semi-strong efficient markets are commonly accepted, as the stock market fluctuation can be tracked by public announcements.

The U.S. stock markets are justified in having semi-strong market efficiency and are often used in event studies (Hendricks & Singhal, 2005, 2008a, 2009). Other stock markets commonly applied in event study methodology are European, Japanese, Korean, and Taiwan stock markets (Campbell, Cowan, & Salotti, 2010; Hendricks et al., 2017; Jacobs & Singhal, 2017; Park, 2004). The present research uses the data (e.g., announcements and stock returns) from these stock markets to ensure an efficient market hypothesis.

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3.2.2.2 Unanticipated events

The second assumption of event study methodology is ‘unanticipated events’. The events are the ‘announcements’ made by public firms to release new pertinent information to the public. Unanticipated events indicate these announcements are not available to investors until the announcement date. Investors, therefore, can immediately absorb the information in the announcements and interpret it through their collective actions, price, and their assumptions concerning stock returns for the firms (Wood & Wang, 2018). The dates of unanticipated events can ascertain the accuracy of observations on stock returns relating to the announcements of interest.

To ensure unanticipated events, the present research followed the literature (e.g., Eroglu, Kurt, & Elwakil, 2016; Jacobs et al., 2010) by drawing the announcement sample from major business sources in the Factiva database. These business sources include PR Newswire, Business Wire, Wall Street Journal, Dow Jones Newswire, Financial Times, Nikkei News (Japanese Market), ENP Newswire (European Markets), and Maeli Business News (South Korean Market). The announcements collected from these major business sources were most likely the earliest available to the markets. Thus, the observations of daily stock returns on the announcement date may capture the genuine impact of the events.

However, under some circumstances, an event may be anticipated, or information might otherwise find its way to the market before the formal announcement date, which is an ‘information leakage’. An event might also be visible to investors later than formal announcement date; which is an ‘information delay’ (Wood & Wang, 2018). Commonly, a short-term ‘event window’ is set to capture the overall stock returns to the announcements if there is information leakage or delay (Kothari & Warner, 2007). The window should be as small as practical to capture the unanticipated event while acknowledging the possibility that an event has been anticipated before the formal announcement date, or the impact of the event is delayed in the market after announcement date (McWilliams & Siegel, 1997).

In this research, the announcement sample was collected from multiple business sources and various source countries (e.g., Japan, U.S., Germany). In order to cover the different time zones across countries/stock exchanges, a three-day event window was used to incorporate the overall stock returns. This event window is commonly used in

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event studies to correct for information leakage and delay (Fisher-Vanden & Thorburn, 2011; Klassen & McLaughlin, 1996; Kothari & Warner, 2007). The announcement day is defined as ‘day 0’. The trading day immediately prior to the announcement day is ‘day -1’ and the day immediately following the announcement day is ‘day 1’. The three-day event window in this research is (-1, 1).

3.2.2.3 Confounding events

The third assumption is that other events have been isolated from the event of interest. Other contemporaneous announcements made by the public firms within the event window (i.e., [-1,1] in this research) have a confounding effect on stock returns, which are, however, unrelated to the events of interest (i.e., SCSM relevant announcements). Thus, the observations in the sample (i.e., the public firms) must be excluded if confounding events are identified in the same event windows.

In this research, confounding events (e.g., earnings announcements, dividend declaration, top management change, merger/acquisition) (Jacobs & Singhal, 2017) were searched in Factiva, and if any of these announcements fell in the three-day event window of the observations in the sample, the observations were excluded. In total, 16 observations in the analysis of buyers and 120 observations in the analysis of suppliers were excluded by using this approach.

By holding three assumptions, the sample data were collected with the methods discussed in the next sections.

3.3 Sample collection methods

The general description of sample data collection methods in an event study with relevance to this research is illustrated in Figure 3.2. While the buyer sample was generally collected following these standard methods, the supplier sample was collected using the method of ‘related firms’, which requires additional processes to the flow in Figure 3.2. In the next sections, each of these steps will be introduced in detail to validate the data in the analysis.

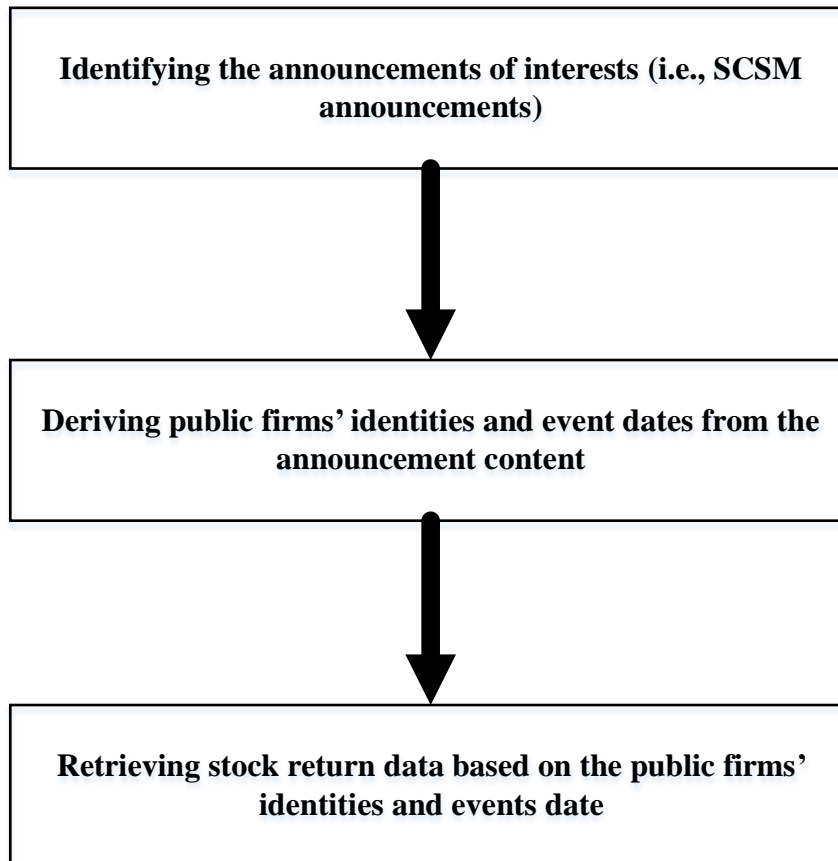


Figure 3.2 Sample Data Collection Flow in a Standard Event Study

3.3.1 SCSM announcement

The interest of this research is to test the firm performance of buyers and their suppliers when buyers require their suppliers to comply with SCSM. Therefore, the announcements must clearly indicate the commitments of announcing firms (i.e., buyers) to audit, evaluate, assess, or develop their suppliers' sustainability performance.

By using the Factiva database, a preliminary search was first conducted to identify the ten most relevant announcements. Then, the full search strings (as shown in Table 3.2) were developed by thoroughly analyzing ten most relevant announcements. Factiva search syntaxes (e.g., hlp) and Dow Jones Intelligent Indexing (e.g., ccsr) were used to improve the search quality.³

³ See, <https://www.mzk.cz/sites/mzk.cz/files/souboryMZK/pdf/dj-factivacom-insideout-guide.pdf>

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Table 3.2 Search Strings in Factiva

(hlp=(suppl* or procur* or purchas* or sourc* or supply chain\$1 or material* or vendor* or contractor* or upstream* or ingredient* or first-tier or service provider\$1 or value chain\$1 or supply base) Near15 (standard* or practic* or scorecard or polic* or guideline* or compl* or program* or certif* or accredit* or survey* or code of conduct or responsib* or conduct* or third party or glossar* or expect* or perform* or platform* or principle* or project* or report* or index or authori* or commit* or manag* or requir* or inspect* or monitor* or verif* or evaluat* or measur* or rat* or assess* or request* or audit* or code* or ISO or international standard organi?ation or ISO 14001 or SA 8000 or iso14000 or sa8000 or status or improv* or system* or scrutin* or engag* or goal* or achiev* or disclo* or initiative* or data or manner* or behavior* or condition* or score* or gaug* or regulat* or implement* or govern* or analy* or screen* or credential\$1 or challeng*) near15 (ISO 14001 or SA 8000 or iso14000 or sa8000 or emission* or emit* or carbon or green* or environment* or social* or societ* or climate or ethic* or ecolog* or clean* or waste or sustain* or eco-friendly or recycl* or CSR or corporate social responsibility or GHG or greenhouse gas or carbon disclosure project or CDP or environmental protection or well-being or conservat* or human rights or transparen* or supplier list\$1 or labor or labour or workplace or toxic release inventory or pollut*)) OR (ns=ccsr and ns=(cscm and gsust))

The search on SCSM announcements was restricted to the period 1990 to 2016. The start of the period makes it possible to identify the impact of the Brundtland-report⁴, when the concern of ‘sustainable development’ began to rise in the international community (Seuring & Müller, 2008). An example of an SCSM announcement is provided in Figure 3.3.

⁴ See “Our Common Future”, <http://www.un-documents.net/our-common-future.pdf>

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Figure 3.3 An Example of SCSM Announcement (the highlighted portions indicate the clear requirement from the buyer for its suppliers' compliance with SCSM)

3.3.2 Firms' identity and event dates

Two primary pieces of information required from the announcements are event dates and firms' identity.

The event dates are clear in the announcement as circled in the left upper corner of Figure 3.3. The event date for this announcement was 21st September 1999.

To derive firms' identity from the announcements, two different methods were used to collect buyer data and supplier data. While the standard data collection process was applied to create the sample of buyers, the methods in the event studies of 'related firms' were used to collect the supplier data. In order to clarify these two samples and methods, two samples are introduced in separate sections.

3.3.2.1 The sample of buyers

The buyer data were straightforward as in the standard event study. The information in the rectangle in Figure 3.3 shows that the firm that announced SCSM to their suppliers was Ford Motor Company (NYSE: F); therefore, Ford Motor Company was the identified buyer from this announcement. Hence, in the analysis of buyers, one observation is Ford Motor Company's stock return on 21st September 1999. The announcements articles from Factiva provided a clear identity of buyers (e.g., firm name, stock ticker).

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The candidates in the sample of buyers must follow criteria in line with the literature (Brown et al., 2009; Fee & Thomas, 2004).

- Buyers (i.e., announcing firms) must be public firms, where the daily stock returns are available.

- Buyers' Standard Industrial Classification (SIC) code is not 6000-6999, as this range covers the firms in the financial industry. The firms in the financial industry may be influenced by external factors (e.g., regulations) which may affect the nature of bargaining between buyers and suppliers, and estimated abnormal returns may not reveal the natural impact of SCSM announcements.

By using these methods and criteria, there were 308 observations in the final sample of buyers.

3.3.2.2 The sample of suppliers

The sample of suppliers was collected by using the methods applied in the event studies of 'related firms' (Brown et al., 2009; Cheng & Eshleman, 2014; Cohen & Frazzini, 2008; Fee & Thomas, 2004; Hertz et al., 2008; Oliveira, Kadapakkam, & Beyhaghi, 2017; Pandit, Wasley, & Zach, 2011; Zhu, 2014). The study on related firms indicates that the focus of these sorts of event studies is not on announcing firms, but rather on the firms related to the announcing firms (i.e., suppliers in this research).

A brief description of the methods used to collect supplier data in this research is as follows: after identifying the announcing firms' identities (e.g., buyers' names) from the announcements, the suppliers which reported the announcing firms as significant customers (i.e., buyers) were collected as the sample of suppliers in this part of study. For example, as shown in Figure 3.3, Ford Motor Company is the buyer and requires ISO 14001 certification from its suppliers. The suppliers of Ford Motor Company were identified by using the approach introduced below; all identified Ford Motor Company's suppliers are included in the supplier sample for this announcement. Figure 3.4 gives an overview of the steps used to derive the supplier sample, as discussed in detail in the next section.

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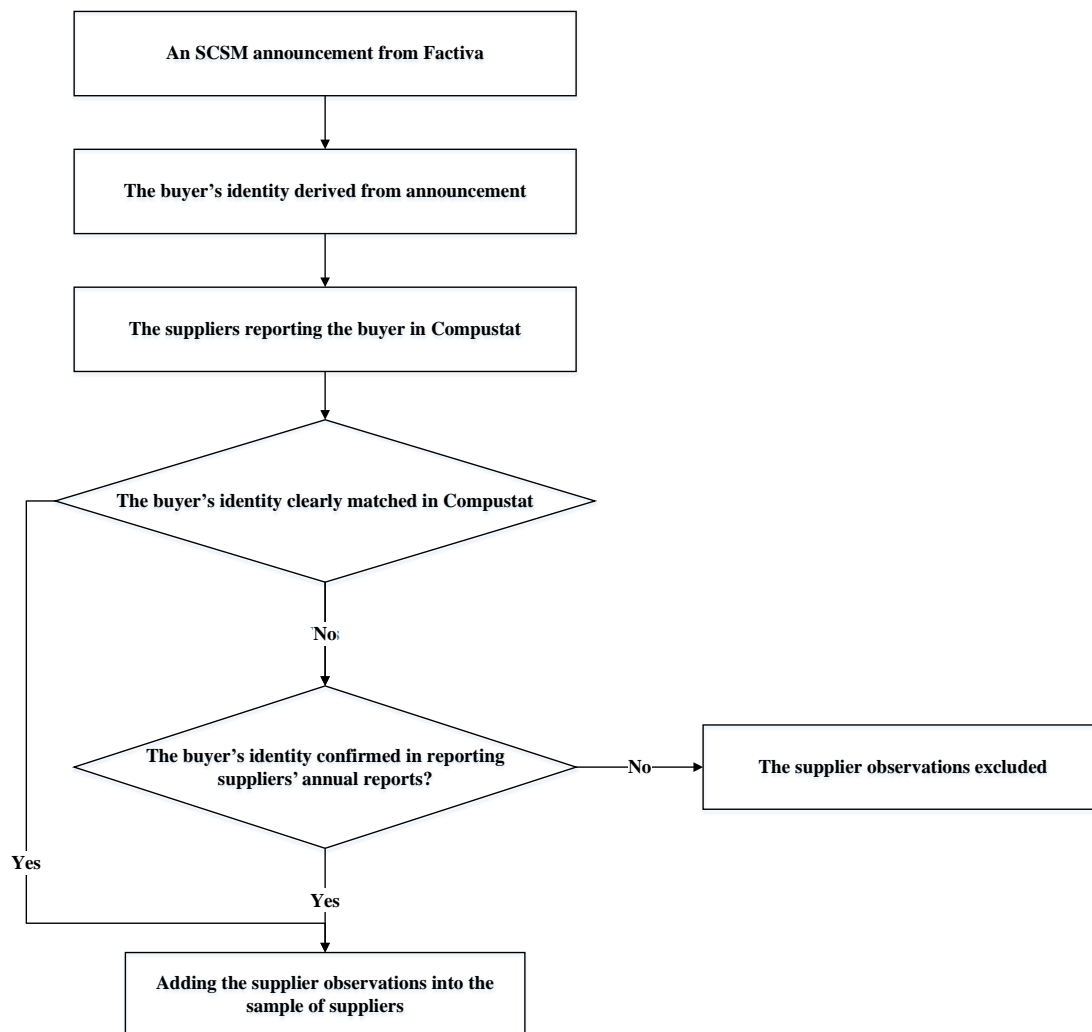


Figure 3.4 Flow Chart for Supplier Sample Data Collection

The U.S. accounting regulations FASB No.14 (before 1998) and SFAS No.131 (after 1998) require public firms (i.e., suppliers in this study) to disclose the identity of customers (i.e., buyers or announcing firms) representing more than 10% of total reported sales in a single fiscal year; these buyers are defined as significant buyers (Fee & Thomas, 2004). The significant economic link (i.e., more than 10% of suppliers' annual sales) between firms ensures that the announcement made by buyers will have a meaningful impact on suppliers' operations and financial performance; the public documentation of this link ensures that the stock market will react to the announcement and adjust suppliers' stock returns.

This buyer-supplier information is contained in the Compustat Segment File. This file is oriented based on the information provided by reporting firms (i.e., suppliers). While the suppliers' identifiers (e.g., firm name, Ticker, GVkey, CUSIP, and CIK codes) are

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clearly presented, reported buyers are only identified by firm name. Furthermore, the buyers' names may vary across reporting firms and years and may be listed in an abbreviation. For example, in the fiscal year 2003, Sanmina Corporation reported 'IBM' as a buyer, but in the same fiscal year, Volterra Semiconductor Corporation listed IBM as 'International Business Mach', and Mcdata Corporation named IBM as 'Intl Business Machines Corp'. To rigorously produce the supplier sample from the Compustat Segment File, an algorithm was used, as outlined below, in order to be consistent with the literature (Cohen & Frazzini, 2008; Fee & Thomas, 2004).

3.3.2.2.1 The Algorithm identifying the supplier data from Compustat segment file

The algorithm outlined here avoids mismatched supplier data and is based on Fee and Thomas (2004).

The reported buyers' names were first matched according to the order and number of letters of announcing firms' names. In the case that an almost certain match could be established, the supplier data (e.g., identifiers and the percentage of sales to the buyers) were collected from the file. For instance, most of the suppliers reported Ford Motor Company as 'Ford MTR'.

Second, if uncertainty in the match existed, an examination was conducted in annual reports (10-k form) of the supplier reporting the ambiguous buyer's name in SEC EDGAR filing based on the CIK code⁵. Unless the annual report clearly described the same buyer's identity as that of the announcing firm, the supplier was excluded from the sample. For example, the initial search on the announcing firm 'Sprint Nextel' yielded a firm 'Telenav INC' reporting 'Sprint' as its buyer. The annual report of Telenav in the most recent fiscal year ending date prior to the announcement date (i.e., 30th June 2012 in this case) stated that "Revenue related to services provided through Sprint Nextel Corporation, or Sprint, comprised 37%, 42%, and 55% of revenue for fiscal 2012, 2011 and 2010." Consequently, Telenav was included as one of the suppliers for the announcing firm Sprint Nextel.

Third, if an announcing firm is the subsidiary of a public-traded firm, only announcing firms' (i.e., the subsidiary) names were searched in Compustat Segment File, because the

⁵ Central Index Key (CIK) is a number given to a company by the United States Securities and Exchange Commission (SEC) to identify the filings. Compustat Segment File gives a clear CIK number of each reporting firm (i.e., supplier).

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impact of SCSM was likely to be only on the suppliers to the subsidiary rather than the overall suppliers to the parent company. For instance, the announcing firm Pratt & Whitney is a subsidiary of United Technologies. Suppliers who merely reported 'Pratt & Whitney' as buyer were included in the sample of suppliers, and the suppliers reporting 'United Technologies' as the buyer were excluded.

Fourth, if an announcing firm clearly indicated the SCSM announcement was applied to the overall suppliers including the suppliers of its subsidiaries, and the subsidiaries' identities were given in the announcement, the suppliers reporting the subsidiaries were included in the sample. For example, since a Wal-Mart announcement stated, "The new program requires Walmart and Sam's Club beef suppliers to implement controls [...]," the suppliers reporting Wal-Mart and Sam's club respectively as the buyers were both included in the sample.

Finally, few announcing firms specified that their SCSM announcements were applicable to the suppliers in certain industries rather than to all supplying partners, owing to either specific initiatives (e.g., food or consumer products) or issuing experimental initiatives before applying for overall supplies. Hence, it is assumed that their SCSM may influence only suppliers in these industries specified in the announcements. To rigorously identify the supplier sample in the specific industries, a two-step method was applied. First, the two-digit SIC codes were identified according to the information in the announcement which specified the suppliers' industries. The first round search only included the suppliers whose two-digit SIC codes reported in Compustat Segment Files matched the ones identified through announcement content. Second, for each supplier, the annual report (i.e., 10-K form) found by using CIK code in the SEC EDGAR database was examined. The main business segment information in the annual report helped confirm or reject the match. For example, in a Wal-Mart announcement on food safety initiative standards relating to the suppliers of meat, fish, poultry, and ready to eat food, a two-digit SIC code for the food industries (i.e., 20) was defined. Then, in the Compustat Segment File, firms with a two-digit SIC code as 20 who reported Wal-Mart as a buyer were preliminarily selected as the suppliers. Finally, each of these suppliers' 10-K forms was examined to justify the suppliers' main business segment relevant to meat, fish, poultry, and ready to eat foods. One supplier, Tyson Food (SIC code 2011, CIK code 0000100493), reported Wal-Mart as a buyer. The 10-K form disclosed the information

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“Tyson Foods, Inc [...], distribute and market chicken, beef, pork, prepared foods and related allied products [...]” (Tyson Foods, 2007, p. 3). Therefore, Tyson Foods was included in the supplier sample of this announcement. Another supplier, Cott Corporation (SIC code 2086, CIK Code 0000884713), also reported Wal-Mart as a buyer. Nonetheless, the 10-K form revealed the business segment as, “We are one of world’s largest non-alcoholic beverage companies [...]” (Cott Corporation, 2007, p. 5). Hence, Cott Corporation was excluded.

The present research conservatively included supplier data from Compustat Segment File in the supplier sample, though discretion was applied to the match by using references mentioned above. While some reported buyer-supplier links were coded as a possible match, these data were excluded in the final sample. The principle of this research when collecting the supplier sample from Compustat Segment File was to reduce uncertainty by excluding supplier data, as the potential cost of mismatching a buyer-supplier link is greater than the potential cost of failing to match a link (Fee & Thomas, 2004).

3.3.2.2.2 The fiscal year end dates for the supplier data

An important condition in event studies of related firms is that the disclosure of the buyer-supplier link must have been revealed to the markets before the announcements, through which investors can analyze the impact of the announcements based on available economic links between buyers and suppliers. To satisfy this condition, the method suggested by Brown, Fee, and Thomas (2009) was adopted. Figure 3.5 gives an overview of the method as discussed in detail in the next section.

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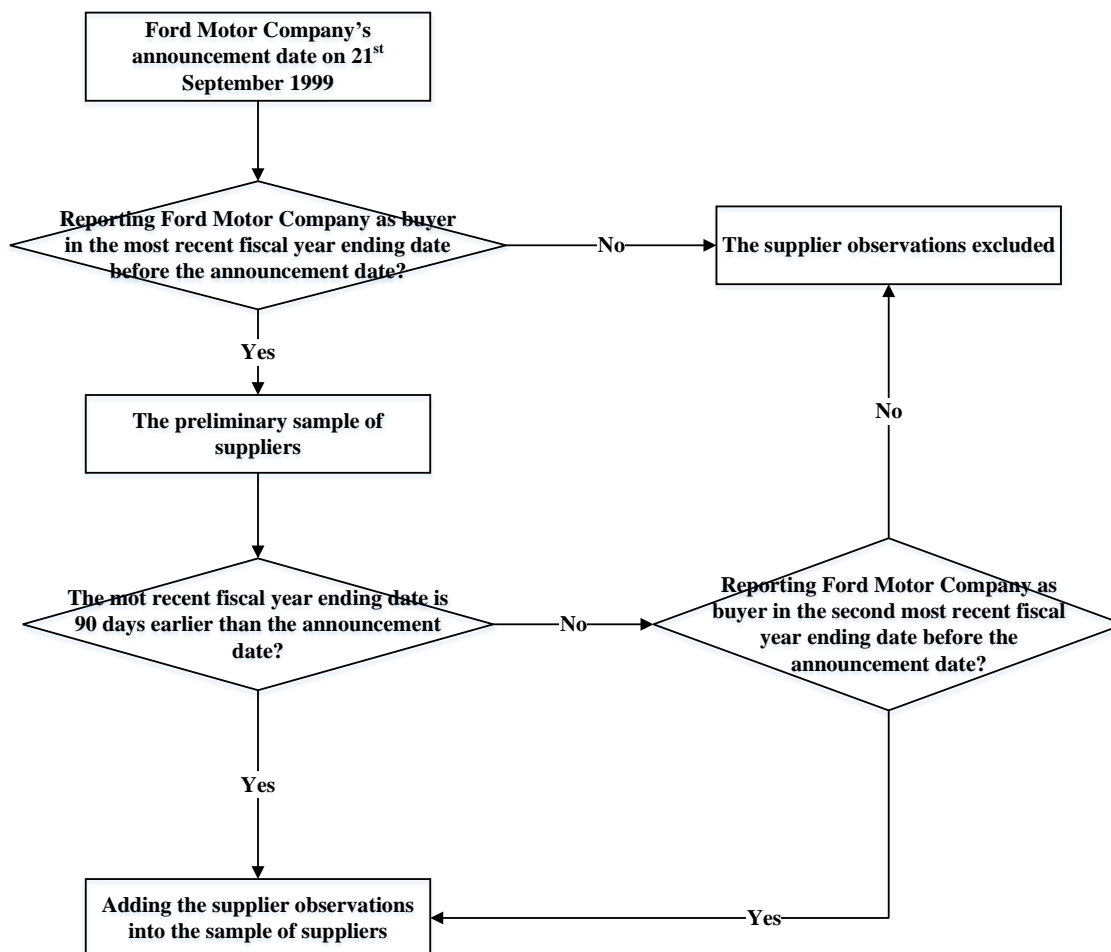


Figure 3.5 Flow Chart for Screening Fiscal Year Ending Dates in Supplier Sample

Suppliers included in the final sample were required to report the announcing firms as buyer in either of the two fiscal year ending dates prior to the announcement dates. A two-step inspection was applied to this method.

First, the suppliers were included in the sample if they reported the announcing firms as buyers in the most recent fiscal year ending dates before the announcement dates, and the most recent fiscal year ending dates were 90 days earlier than the announcement dates. The 90-day criterion was set because of the U.S. Securities and Exchange Commission (SEC) filing rule for public firms. SEC filing rules give public firms a maximum of 90 days to file the financial statements (e.g., annual report) after the fiscal year ending dates. If the most recent fiscal year ending date was not 90 days earlier than the announcement date, the economic link between a buyer and a supplier might not be available to investors. The 90-day criterion avoids bias by allowing “delays in the reporting of financial statements by corporations” (Barber & Lyon, 1997). However, this rule excludes some

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supplier observations whose fiscal year ending dates fell into the 90-day gap while consecutively reporting the announcing firms as buyer with significant percentages of sales over the years.

Second, if a supplier's most recent fiscal year ending date before the announcement date fell in the 90-day gap, but the supplier also reported the buyer in the second most recent fiscal year ending date prior to the announcement date, the supplier's data (e.g., annual sales to the buyer) in the second most recent fiscal year ending date were included in the sample. For example, the Ford Motor Company's announcement was on 21st September 1999. A supplier, 'Sheldahl INC', reported Ford Motor Company as buyer with significant sales in both fiscal year ending dates: 31st August 1998 (the second most recent fiscal year ending date before the announcement date) and 31st August 1999 (the most recent fiscal year ending date before the announcement date). The reported buyer-supplier link on 31st August 1999 was within the 90-day period prior to the announcement date (i.e., 21st September 1999). The data reported by Sheldahl INC on 31st August 1998 were collected in the sample, which ensured that the information of the economic link between Sheldahl INC and Ford Motor Company had been disclosed to investors before the day of Ford Motor's SCSM announcement.

3.3.2.2.3 Additional supplier data

Some of the supplier data were collected by using Factiva search and found directly in the announcements. The methods below were adopted and based on Brown et al. (2009).

A comprehensive search on the Factiva database was also conducted. The method was to search for news reporting of buyer-supplier links in the Factiva database on any dates before the announcement dates and to include the suppliers into the sample.

Moreover, if an announcing firm specified the suppliers' identities in the announcements, only the suppliers mentioned in the announcements were included in order to gain supplier data for this announcement, as it can be reasonably assumed that only these suppliers were significantly affected by the announcing firms' SCSM. The total supplier sample identified through Factiva search and announcement statement was 2% of the overall sample.

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3.3.2.2.4 Additional criteria for supplier data

Consistent with the literature (Brown et al., 2009; Fee & Thomas, 2004), additionally, candidates in the supplier sample were required to meet the following criteria:

- Suppliers must be listed in Center for Research in Securities Prices (CRSP) database, where the daily stock returns data are available.
- Suppliers' SIC code is not 6000-6999 as this range covers the financial industry. The firms in the financial industry may be influenced by external factors (e.g., regulations), which may affect the nature of bargaining between buyers and suppliers, and the estimated abnormal returns may not reveal the natural impact of SCSM announcements.

By using these methods above, 2189 supplier data were derived from 219 announcements.

3.3.3 Methodological validation of event study on related firms in this research

As demonstrated from the methods in collecting supplier data, the analysis of suppliers in this research followed event study methodology on related firms, where the research looked at the act of one company and its announcements and studied the impact of this on its suppliers. In the behavioral finance literature, there is a discussion on the 'limited attention hypothesis' of event study of the related firms (Hirshleifer & Teoh, 2003; Zhu, 2014). However, the limited attention hypothesis is not compelling in this research for the following reasons.

The limited attention hypothesis suggests that investors pay limited attention to the buyer-supplier link when a buyer's announcement tends to be less salient to the buyer-supplier relationship or distracted in its relevance to the suppliers. Therefore, the estimate of abnormal returns of suppliers may be biased (Cheng & Eshleman, 2014).

The limited attention hypothesis is not a compelling hypothesis in the settings of this research. In this research design, buyers' announcements had a direct, explicit, and salient operational and financial impact on the suppliers, where suppliers' commitment to SCSM was clearly stated by their buyers as shown in Figure 3.3. Thus, investors can promptly derive clear information from the announcements and adjust stock prices accordingly. Those studies discussing the limited attention hypothesis, however, have mostly focused

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on the generic covariance between buyers and suppliers, for example, the estimate of suppliers' stock returns associated with buyers' earning announcements (e.g., Cohen & Frazzini, 2008; Zhu, 2014). The buyers' earnings announcements are unlikely to be as salient as SCSM announcements to suppliers' operations. Investors, therefore, may not fully associate the earning announcements with suppliers' future cash flow and adjust suppliers' stock prices promptly.

The literature supports the use of event study methodology in the study of related firms. Brown, Fee, and Thomas (2009) studied the suppliers' short-run abnormal returns when their buyers conducted leverage buyouts. Hertz et al. (2008) investigated the suppliers' short-run stock returns associated with their buyers' bankruptcy filings. Fee and Thomas (2004) examined the suppliers' short-run stock performance in the events of buyers merging. Hendricks, Jacobs, and Singhal (2017) tested the abnormal returns of suppliers, competitors, and buyers associated with the supply chain disruption caused by the Great East Japan Earthquake of 2011. The present research adopted the methods given in the literature to analyze the suppliers' abnormal returns.

Firms' daily stock prices/returns on the event dates are influenced by SCSM announcements and market factors. Thus, a technique must be used to isolate the stock return component that results from SCSM-specific announcements by adjusting them for market factors. The technique is the multiple models in event study methodology to estimate the abnormal returns associated with the SCSM announcements. The next section introduces these models.

3.4 The estimate of abnormal returns

There are multiple models in event study methodology (e.g., the market model and the Fama-French-Momentum-model) to estimate abnormal returns associated with announcements. Each of these models adjusts the stock returns associated with the specific announcements by a different set of factors. In order to provide a sensitivity test which avoids an estimate of abnormal returns to SCSM announcements by choice of model, the three most used models were used in this research in line with the literature (Hendricks et al., 2017; Jacobs & Singhal, 2017; Kothari & Warner, 2007; MacKinlay, 1997; McWilliams & Siegel, 1997).

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3.4.1 Market model

The market model posits a linear relationship between the actual returns on a stock and the market's return as in equation (1):

$$AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}), \quad (1)$$

where AR_{it} is the estimated abnormal return for firm i on day t ; R_{it} is the actual return of stock i on day t ; R_{mt} is the market return on day t ; α_i is the intercept of the relationship for stock i ; β_i is the slope of the relationship for stock i with respect to the market return; the term $\beta_i R_{mt}$ is the portion of the rate of return on a market portfolio to stock; using ordinary least squares (OLS) regression, α_i and β_i are estimated over an estimation window. The estimation window was set as below.

In estimating buyers' abnormal returns, the market return (i.e., R_{mt}) was the local index of each firm (e.g., Topix for Japanese firms, Kospi for Korean firms). α_i and β_i were estimated over an estimation window of 120 trading days ending 10 days before the announcement date. In buyer sample, firms are listed in multiple stock exchanges across nations. The trading days are different across stock exchanges. A 120-day estimation window ensured sufficient data for each firm in the sample of this research. A 120-day estimation window is statistically sound (Hendricks & Singhal, 2003) and ensured sufficient data to estimate the parameters in the market model as used in prior research (Wood et al., 2017; Zhao et al., 2013).

In estimating suppliers' abnormal returns, the market return was the CRSP value-weighted index because all sample firms were U.S. public firms, as used by Hendricks et al. (2009). Also, by using a single market index across firms, the length of firms' trading days was the same, and thus, a longer estimation window was allowed to estimate α_i and β_i , which was more likely to capture and reflect the normal returns experienced by the firms (Wood & Wang, 2018). The estimation window was 200 trading days ending 10 days prior to the announcement date in the estimate of suppliers' abnormal returns, in line with the event studies investigating U.S. firms (Hendricks et al., 2009; Jacobs et al., 2010; Mitra & Singhal, 2008).

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3.4.1.1 Aggregation of abnormal returns

To aggregate the abnormal returns across firms and event window (i.e., [-1, 1]), two different methods were used for buyer and supplier analysis due to the nature of the samples. The next sections introduce the methods.

3.4.1.1.1 Buyers' cumulative abnormal returns (CAR)

The standard methods for aggregating the abnormal returns across firms was used in the buyer analysis.

The mean abnormal return across firms at day t was estimated as:

$$\overline{AR}_t = \frac{1}{N} \sum_{i=1}^N AR_{it}, \quad (2)$$

where N is number of firms in the sample.

The cumulative abnormal return (CAR) was estimated by aggregating the mean abnormal returns in the event windows (-1,1):

$$CAR(-1,1) = \sum_{t=-1}^1 \overline{AR}_t, \quad (3)$$

3.4.1.1.2 Suppliers' portfolio cumulative abnormal returns

In the analysis of suppliers, portfolio CARs were used to avoid 'calendar time clustering bias'. The nature of the announcements and the supplier sample was that multiple supplies were collected over a single announcement on the same calendar date (i.e., event date), known as 'calendar time clustering' bias (Brown & Warner, 1980) leading to an underestimation of the standard deviation of the abnormal returns and an over-rejection of the null hypothesis where mean abnormal return is zero (Hendricks et al., 2017; MacKinlay, 1997).

To avoid this bias, portfolio CARs were used. The mean of equally weighted portfolio CAR is estimated in a three-step process (Brown et al., 2009; Fee & Thomas, 2004). First, the individual CAR in the event window (-1, 1) for each observation in a single announcement was estimated as in equation (4).

$$CAR(-1,1)_{ai} = \sum_{t=-1}^1 AR_{ait}, \quad (4)$$

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where $CAR_{(-1,1)_{ai}}$ is CAR of observation i from announcement a in the event window $(-1, 1)$; t is event day; AR_{ait} is the abnormal return of observation i from announcement a on day t .

Second, an equally weighted portfolio CAR by each announcement (covering multiple observations) was calculated as equation (5):

$$PCAR_a = \frac{1}{N} \sum_{i=1}^N CAR_{ai}, \quad (5)$$

where $PCAR_a$ is the portfolio CAR for announcement a ; CAR_{ai} is CAR of observation i from announcement a in event window $(-1, 1)$; N is number of the observations in announcement a .

Third, the mean of portfolio CARs is the average of all portfolio CARs as in equation (6):

$$\overline{PCAR} = \frac{1}{N} \sum_{a=1}^N PCAR_a, \quad (6)$$

where N is number of announcements in the sample.

Two additional models used were the Fama-French-Momentum model and the market-adjusted model, which provided a sensitivity test on the results estimated by the market model. The event window, estimation window, and aggregation methods were the same as those in the market model.

3.4.2 Fama-French-Momentum model

The Fama-French-Momentum model was developed from the Fama and French (1993) three-factor model, further modified by Carhart (1997) to incorporate the momentum factor. The addition of the momentum factor includes more common factors in stock returns (Carhart, 1997).

The estimates of abnormal returns of the Fama-French-Momentum model is shown in equation (7):

$$AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_1 R_{mt} - \hat{\beta}_2 SMB_t - \hat{\beta}_3 HML_t - \hat{\beta}_4 UMD_t, \quad (7)$$

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where $\hat{\alpha}_i, \hat{\beta}_1, \hat{\beta}_2, \hat{\beta}_3,$ and $\hat{\beta}_4$ are OLS regression estimates of factors used in the model; the expected day t rate of return for stock i is assumed to be a function of the rate of return of market portfolio for day t (R_{mt}); the average returns of portfolios of small capitalization stocks over large capitalization stocks for day t (SMB); the average returns of portfolios of high book-to-market equity stocks over stocks with low book-to-market ratios for day t (HML); and average returns of portfolios of high prior return stocks over stocks with low prior returns for day t (UMD).

In the application of the Fama-French-Momentum model for the estimate of buyers' abnormal returns, the present research followed the approach suggested by Hendricks et al. (2017).

The buyer sample included firms across global stock exchanges (e.g., Korean, Taiwan, and Japanese stock exchanges). The Fama-French-Momentum model requires the data of factors (i.e., SMB, HML, UMD) which, however, are less readily available in Non-U.S./European markets, which could reduce the sample in the analysis for buyers. Hendricks et al. (2017) suggested using the market model and the Fama-French-Momentum model to estimate abnormal returns for only the U.S. firms in the sample, and compare the results estimated by two models. Achieving similar results from the two models applied to U.S. firms only provides confidence in the results estimated by using the market model for the full sample.

In the estimate of suppliers' abnormal returns, all firms were U.S. listed public firms. Thus the data of all factors were readily available, and the Fama-French-Momentum model was fully applied.

3.4.3 Market-adjusted model

The market-adjusted model estimates abnormal returns by subtracting the observed market returns from the actual stock returns, as in equation (8):

$$AR_{it} = R_{it} - R_{mt} , \quad (8)$$

Due to the technical difficulty, the market-adjusted model was used in supplier analysis but not in buyer analysis. The buyer sample contained firms from multiple stock exchanges; thus, the market index (i.e., R_{mt}) was the local index for each firm listed, and different across firms. The statsitics package used for buyer analysis,

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‘Eventstudymetrics’, only allows for running the market model but not for running the market-adjusted model by using multiple market indices. While the CARs determined by the market-adjusted model could be manually estimated, the multiple statistical tests were difficult to use manually. These multiple statistical tests evaluate the significance of the estimate of CARs and ensure the robustness of the finding as discussed in the next section. In summary, in the sensitivity test, the market model and the Fama-French-Momentum model were used in the buyer analysis. The market model, the Fama-French-Momentum model, and the market-adjusted model were used in supplier analysis.

3.4.4 Evaluating the significance of CAR

The statistic tests in event study analysis focus on the mean of the distribution of CARs, where the null hypothesis tests whether the mean CAR is equal to zero (Kothari & Warner, 2007). To ensure that the univariate test on mean CAR is not misspecified, it is common to adopt multiple tests in event study analysis. The present research used the joint tests in line with the literature (Kothari & Warner, 2007; McWilliams & Siegel, 1997; Modi et al., 2015; Wood et al., 2017).

In the test of significance of buyers’ mean CAR, following the statistic tests were used to avoid different external factors influencing the test of significance:

- The Cross-sectional t-test is the standard t-test, where the variance estimator of this statistic is based on the cross-section of CAR over observations;
- The Patell z test (Patell, 1976) corrects the bias of heteroscedastic event window abnormal returns, which is not covered by the cross-sectional t-test;
- The t-BMP test (Boehmer et al., 1991) was developed from the Patell z test. Additionally, the t-BMP test adjusts cross-sectional variance to avoid over rejection on a null hypothesis because of increasing variance around event dates, which provides more robust test results;
- The rank test (Corrado, 1989) was used in addition to these parametric tests above to best address the issue of non-normality.

In the test of significance of suppliers’ abnormal returns, the main focus was to avoid the calendar time clustering bias on the test of significance. The following tests were used:

- The t-BMP test (Boehmer et al., 1991) provides relatively robust test results due to covering multiple adjustments as discussed above;

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- The Time-series Standard Deviation Test (Brown & Warner, 1980) is also called crude dependence adjustment, adjusting for clustering of security returns;
- The Collins-Dent test (Collins & Dent, 1984) adjusts for cross-sectional correlation caused by identical event time and industry concentration;
- The Generalized Least Squares test (Sanders & Robins, 1991) was developed from the Collins-Dent test but additionally adjusts for non-normality of stock returns;

The Collins-Dent test and the Generalized Least Squares test are not applicable to multiple factor models (i.e., the Fama-French-Momentum model in this research).

- The rank test, (Corrado, 1989) as a non-parametric test, was used to avoid the misspecification of these parametric tests above.

While the estimate and test on CARs provided the measure of firms' financial performance relating to SCSM, section 2.5 discussed and hypothesized the variables that influence the scale of the CARs. The next sections illustrate how these variables were constructed in this research.

3.5 Variable construction in the cross-sectional regression analysis

This section introduces how the hypothesized variables in Chapter 2 were constructed. These variables were used as the independent variables in the cross-sectional regression analysis against the CARs as the dependent variable. The variable constructions and definitions in the analysis of buyers and suppliers are introduced in separate sections.

3.5.1 Variable construction and definition in the analysis of buyers

In this section, the measures of five hypothesized variables in the analysis of buyers are introduced. Control variables were also used to decrease the confounding effects on the tested relationships. The control variables will be introduced at the end of this section. All data introduced in this section were collected from DataStream, which provides access to the data across countries/stock exchanges.

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3.5.1.1 Supplier relationship management

The three measures of buyers' SRM developed by Liou and Gao (2011) and Tang and Liou (2010) were used in this research. These are the ratio of COGS to sales, accounts payable turnover, and inventory turnover. These measures were used in this research to ensure the overall effect of the buyers' competence in SRM was captured.

The first measure is the ratio of COGS to sales, which is COGS divided by annual sales by using the data of the most recent year ending dates prior to the announcement dates. A high level of the ratio of COGS to sales indicates more purchasing costs, and thus more negative financial performance of buyers. The predicted sign is negative.

The second measure is accounts payable turnover as in equation (9):

$$\text{Accounts payable turnover} = \frac{COGS_{t,i}}{\frac{1}{2} * (AP_{t,i} + AP_{t-1,i})}, \quad (9)$$

where $COGS_{t,i}$ is the cost of goods sold of buyer i in the most recent fiscal year ending date prior to the announcement date t ; $\frac{1}{2} * (AP_{t,i} + AP_{t-1,i})$ is the average accounts payable between buyer i 's inventory at fiscal year ending date t and $t - 1$. A high level of account payable turnover indicates more financial resources through a preferential payment schedule, and thus less negative financial performance of buyers. The predicted sign is negative.

The third measure is inventory turnover as in equation (10):

$$\text{Inventory turnover} = \frac{COGS_{t,i}}{\frac{1}{2} * (I_{t,i} + I_{t-1,i})}, \quad (10)$$

where t is the most recent fiscal year ending date prior to the announcement date; $\frac{1}{2} * (I_{t,i} + I_{t-1,i})$ is the average inventory between buyer i 's inventory at fiscal year ending date t and $t - 1$. A high level of inventory turnover indicates high inventory efficiency, and thus less negative buyer financial performance. The predicted sign is positive.

3.5.1.2 Growth prospects

Market to book ratio was used to measure buyers' growth prospects. The ratio is market value of equity over book value of equity (Bose & Pal, 2012; Hendricks &

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Singhal, 2003; Zsidisin et al., 2015). The market value is the stock price at ten days before the announcement date times the number of ordinary shares on issues; the book value is the data at the most recent fiscal year ending dates before the announcement dates. A high market to book ratio indicates high growth prospects of buyers which are more vulnerable to the disruption of SCSM in operations, and thus more negative financial performance. The predicted sign is negative.

3.5.1.3 Third-party certification

This research identified buyers' SCSM with the use of third-party certification according to the concept of market-based governance mechanisms in the literature (Gimenez & Tachizawa, 2012; Hoejmosse & Adrien-Kirby, 2012). According to the announcement content, a dummy variable was set to 1 if a buyer required its suppliers' SCSM compliance with a certification (e.g., ISO 14001 or SA 8000) or to be certified by any third-party organization (e.g., Carbon Disclosure Project or Forest Stewardship Council). Figure 3.6 gives an example of the announcement with the requirement of third-party certification. Third-party certification increases the credibility of buyers' SCSM efforts due to its rigorous procedures and reduces buyers' monitoring costs; therefore, the negative impact of SCSM on financial performance is decreased. The predicted sign is positive.

WSJ: Wal-Mart Plans To Cut Greenhouse-Gas Emissions By 2015

By Miguel Bustillo
Of THE WALL STREET JOURNAL
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25 February 2010
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DJ
English
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Wal-Mart Stores Inc. (WMT) said it plans to cut 20 million metric tons of greenhouse-gas emissions by 2015.

However, Wal-Mart will make its suppliers do the dirty work of reducing their carbon footprints, rather than focusing on the retailer's 8,400 stores world-wide.

The pledge, equivalent to taking more than 3.8 million cars off the road by the company's estimate, comes after Wal-Mart last year unveiled a plan to reduce the overall environmental impact of products it sells.

Wal-Mart stated that it will now select the product it sells in part by judging whether manufacturers are on board with its green initiatives, suggesting that those who are not will have an increasingly hard time getting products on shelves. But company executives downplayed any friction Thursday, arguing that the goals could be achieved without burdening business partners.

"Reducing carbon in the life cycle of our products will often mean reducing energy use," Chief Executive Mike Duke said in a webcast with Fred Krupp, head of the Environmental Defense Fund, which helped develop the plan. "That will mean greater efficiency, and with the rising cost of energy, lower costs, making our business stronger."

(This story and related background material will be available on The Wall Street Journal Web site, WSJ.com.)

Wal-Mart didn't disclose its total carbon footprint and conceded that the reductions would not dramatically curtail its overall contribution to the heat-trapping gases that many scientists have linked to climate change.

Instead, the company estimated that, if achieved, the cuts would erase the impact that the company's growth would have added to its carbon footprint, as well as reduce emissions by an additional 50%.

The 20 million metric tons represents the amount of greenhouse gases the products would release over their entire life. To check whether reduction claims are legitimate, Wal-Mart said it is asking measuring expert ClearCarbon Inc. and auditor PricewaterhouseCoopers LLC to verify the claims.

Figure 3.6 An Example of SCSM Announcement That Requires Third-Party Certification (the component marked out highlights the requirement for a third-party audit)

3.5.1.4 Group SCSM

Group SCSM is the approach that buyers collaborate in a group to mandate their suppliers' SCSM compliance. A binary variable was created to code 1 for the buyer which participates in an SCSM group. Figure 3.7 gives an example of a group SCSM announcement. Group SCSM increases buyers' bargaining power, creates economies of scale and scope in their SCSM mandates, provides organizational learning, and improves reputation. Hence, buyers that engage in group SCSM have less negative financial performance. The predicted sign is positive.

DOWJONES | Newswires

WSJ: Corporate Group To Pressure Suppliers On Environment

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By Jane Spencer
OF THE WALL STREET JOURNAL

HONG KONG (Dow Jones)--A group of multinational companies is embarking on a campaign to encourage their suppliers to report greenhouse-gas emissions, pressuring thousands of vendors and factories to show they are taking steps to battle climate change.

At least six of the world's largest companies, including Procter & Gamble Co. (PG), Unilever PLC (UL), Tesco PLC (TSCDY) and Nestlé SA (NSRGY), will announce Tuesday that they are banding together to press their suppliers to release data about their carbon emissions and climate-change-mitigation strategies. The move affects plants churning out everything from T-shirts to cocoa beans to razors.

The effort comes amid growing concern that stricter climate-change legislation could radically drive up costs for businesses. Many U.S. companies are now betting that such legislation, which could include taxes or caps on emitting greenhouse gases, is inevitable in the next several years.

Figure 3.7 An Example of Group SCSM Announcement (the component marked out highlights the group of buyers that mandate suppliers' SCSM compliance together.)

3.5.1.5 Social dimension of SCSM (sSCSM)

This research identified the sSCSM from the announcement content based on the social sustainability measures given by Gimenez and Tachizawa, (2012), Hoejmoose and Adrien-Kirby (2012), and Miemczyk, Johnsen, and Macquet (2012). A binary variable was coded 1 if the buyer required its suppliers' commitment to diversity, safety, human rights, labor conditions, or equal pay. Figure 3.8 gives an example of sSCSM announcement. sSCSM creates less operational complexity for buyers, and thus less negative financial performance. The predicted sign is positive.

NIKKEI

Toppan to press suppliers on labor conditions

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TOKYO -- Toppan Printing will call on its roughly 3,000 key suppliers to conform to guidelines regarding worker rights and labor conditions, amid heightened scrutiny among U.S. and European business partners.

The Japanese company revised its procurement standards and designated human rights, labor conditions, the environment and anti-corruption as four main areas. For labor conditions, in addition to existing rules banning forced and child labor, the firm will require suppliers to pay the minimum wage or higher, keep wage ledgers for all workers, and take other steps.

Toppan plans to hold a briefing for suppliers and conduct surveys to check compliance. Its staff will conduct on-site inspections of problematic suppliers and urge them to make improvements, and transactions may be terminated with poorly performing companies. It will also introduce a system that allows suppliers to report problems at Toppan.

Toppan sees the need to beef up its corporate social responsibility to increase dealings with U.S. and European firms. It aims to have overseas markets account for 20% or more of worldwide revenue by fiscal 2015, up at least 5 percentage points from fiscal 2012.

(Nikkei)

Figure 3.8 An Example of sSCSM Announcement (the component marked out highlights the social dimension of SCSM [i.e., workers' rights and labor conditions] required by the buyer in the announcement.)

3.5.1.6 Control variables in buyer analysis

Industry, country, and year effect were controlled in the analysis of buyers. The industry control was Fama-French 48 industry classification (Fama & French, 1997), where each observation was assigned to one of 48 industry dummies according to a four-digit SIC code. Industries with a sample size below ten were removed to avoid singularity in the analysis.

The announcement data were collected over 26 years from 1990 to 2016. There may have been significant changes in business, society, and legislation with regard to sustainability over the period. The control on year effect ensured the unbiased results on the tests of the variables of interest. The year effect was measured by the number of the year from the first announcement (i.e., 1990) to the year of the given announcement.

The buyers' countries were grouped according to the regions in which the buyers' primary stock was traded. Three regions were created (i.e., Europe, North American, and Asia), and coded by dummy variables.

The ratio of COGS to total sales accommodates the measure of firm size. No additional control on firm size was used for the analysis of buyers.

3.5.2 Variable construction and definition in the analysis of suppliers

This section outlines the construction and definitions of these hypothesized variables in the analysis of suppliers. The control variables are introduced at the end of this section. Most of the accounting data introduced in this section were collected from Compustat, which provides access to the data of U.S. public firms. Only buyers' cost of goods sold was collected from DataStream, which is explained in section 3.5.2.2.

3.5.2.1 The supplier's dependence on buyer

The measure of the supplier's dependence on buyer as suggested by Cheng and Eshleman (2014) and Pandit et al. (2011) was used as in equation (11) :

$$SDB_{ci} = \frac{S_{ci}}{S_i}, \quad (11)$$

where SDB_{ci} is the ratio of supplier i 's dependence on buyer c ; S_{ci} is the sales of supplier i to buyer c in the most recent or the second most recent (discussed in section 3.3.2.2.2) fiscal year ending date before the announcement date; S_i is supplier i 's total sales at the same fiscal year ending date. A high level of dependence on buyer indicates suppliers' high asset-specific investment and thus high transaction costs. Therefore, suppliers may have more negative financial performance. The predicted sign is negative.

3.5.2.2 The buyer's dependence on supplier

The measure suggested by Cheng and Eshleman (2014) and Pandit et al. (2011) was used to estimate the buyer's dependence on supplier as in equation (12):

$$BDS_{ci} = \frac{S_{ci}}{COG_c}, \quad (12)$$

where BDS_{ci} is the the ratio of buyer c 's dependence on supplier i ; S_{ci} is the sales of supplier i to buyer c ; COG_c is the cost of goods sold of buyer c ; The data were at the most recent or the second most recent (discussed in section 3.3.2.2.2) fiscal year ending date before the announcement date. A high level of buyer's dependence reduces buyers'

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opportunism and motivates buyers' supplier development. Thus, the suppliers can have less negative financial performance. The predicted sign is positive.

The data of cost of goods sold of buyers (i.e., COG_c) was collected from the DataStream database. The buyers (i.e., announcing firms) were from multiple countries/stock exchanges, and DataStream has more abundant data for international firms than Compustat. The value of the cost of goods sold of non-U.S. public firms was converted to U.S. dollars using the currency exchange rate at the most recent fiscal year ending date before the announcement date. However, the data of suppliers' sales to buyers (i.e., S_{ci}) were only available in Compustat database. To avoid the potential bias of data collection from two databases, a manual inspection was conducted to match the cost of goods sold data reported by U.S. firms which were available in both databases. It was found that the only difference is that Compustat reports the data using a unit of 1 million U.S. dollars, but DataStream reports using the unit of 1 thousand U.S. dollars. Therefore, the cost of goods sold data for all buyers collected from DataStream were converted to the unit of 1 million in the calculation of the buyer's dependence on supplier. Except for the difference in unit, the same value of the cost of goods sold of U.S. firms was observed across Compustat and DataStream. Hence, it was unlikely that a bias would be created by using the cost of goods sold data from DataStream.

3.5.2.3 Relationship length

The relationship length indicates the number of years that a single supplier reports significant sales to the same buyer. By using Compustat Segment File, the buyer-supplier relationship years for each supplier in the sample was counted. As a long-term relationship with buyers increases suppliers' switching costs and hold-up costs, suppliers, therefore, have more negative financial performance. The predicted sign is negative.

3.5.2.4 Social dimension of SCSM (sSCSM)

To investigate the impact of sSCSM on suppliers, a dummy variable was created according to the announcement content, based on social sustainability measures identified in the literature (Gimenez & Tachizawa, 2012; Hojmosse & Adrien-Kirby, 2012; Miemczyk et al., 2012).

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It was coded 1 for a sSCSM announcement if the suppliers were required to commit to improving diversity, safety, human rights, labor conditions, or equal pay. It was coded 0 if otherwise. Because the compliance with sSCSM creates less operational complexity, generates better quality performance, and requires fewer capital costs, suppliers can have a less negative financial performance. The predicted sign is positive.

3.5.2.5 Third-party certification

This research identified buyers' SCSM requiring suppliers' compliance with third-party certification based on the announcement content, according to the market-based governance mechanism in the literature (Gimenez & Tachizawa, 2012; Hoejmosse & Adrien-Kirby, 2012). A binary measure was used as an indicator of third-party certification. It was coded 1 for a third-party certified SCSM compliance if the suppliers were required to measure and certify their commitments through a third-party organization (e.g., ISO 14001 certifiers, Carbon Disclosure Project, Forest Stewardship Council). A third-party certification requires suppliers' radical commitments and adds registration and consulting costs. Therefore suppliers have more negative financial performance. The predict sign is negative.

3.5.2.6 Group SCSM

A binary variable was created for the approach of group SCSM, where it was coded 1 for the supplier whose buyer collaborates with other firms to require SCSM compliance, and 0 otherwise. Group SCSM increases buyers' bargaining power and expertise to create overly stringent SCSM conditions, thus increasing suppliers' costs of compliance. The predicted sign is negative.

3.5.2.7 Operational slack

Consistent with existing literature (Azadegan et al., 2013; Hendricks et al., 2009; Kovach et al., 2015), three forms of operational slack were used: capacity slack, inventory slack, and supply chain slack.

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3.5.2.7.1 Capacity slack

The capacity slack was measured as the ratio of property, plant, and equipment to annual sales as in equation (13):

$$CK_i = \frac{PPE_i}{S_i}, \quad (13)$$

where CK_i is the capacity slack for supplier i ; PPE_i is property, plant, and equipment of supplier i ; S_i is the net sales of supplier i . All data were in the most recent fiscal year ending date prior to the announcement date. A higher ratio of PPE to sales indicates lower utilization of capacity, and therefore, higher capacity slack to buffer the suppliers' negative financial performance. The predicted sign of capacity slack is positive.

3.5.2.7.2 Inventory slack

The inventory slack was measured by using the days of inventory, and this was calculated as:

$$DI_{t,i} = \frac{\frac{1}{2} * (I_{t,i} + I_{t-1,i})}{COGS_{t,i}} * 365, \quad (14)$$

where $DI_{t,i}$ is days of inventory for supplier i in the most recent fiscal year ending date before the announcement date t ; $COGS_{t,i}$ is the cost of goods sold of supplier i ; $I_{t,i}$ is the inventory of supplier i at fiscal year t ; $I_{t-1,i}$ is the inventory of supplier i at fiscal year $t - 1$; $\frac{1}{2} * (I_{t,i} + I_{t-1,i})$ is the average inventory. A longer inventory holding period (i.e., more inventory days) indicates a greater inventory slack to reduce the suppliers' negative financial performance. The predicted sign of inventory slack is positive.

3.5.2.7.3 Supply chain slack

Supply chain slack was measured by using cash-to-cash cycle (CTC):

$$CTC_i = \text{days of accounts receivable} + \text{days of inventory} - \text{days of accounts payable}, \quad (15)$$

where

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$$\text{days of accounts receivable} = \frac{\frac{1}{2} * (ARE_{t,i} + ARE_{t-1,i})}{S_{t,i}} * 365, \quad (16)$$

where $ARE_{t,i}$ is accounts receivable of supplier i in the most recent fiscal year ending date t ; $ARE_{t-1,i}$ is accounts receivable of supplier i at $t - 1$; $S_{t,i}$ is annual sales of supplier i ;

moreover,

$$\text{days of accounts payable} = \frac{\frac{1}{2} * (AP_{t,i} + AP_{t-1,i})}{COGS_{t,i}} * 365, \quad (17)$$

where $AP_{t,i}$ is accounts payable of supplier i in the most recent fiscal year ending date t ; $AP_{t-1,i}$ is accounts payable of supplier i at $t - 1$; $COGS_{t,i}$ is the cost of goods sold of supplier i . A longer cash-to-cash cycle indicates the low level of leanness of the supply chain, thus there is more supply chain slack to decrease suppliers' negative financial performance. Thus the predicted sign is positive.

In all three forms of operational slack, the industry-adjusted measures were adopted. The suppliers' sample included firms across industries. The specific industry attributes may create bias in the estimate of overall operational slack on abnormal returns. Therefore, following the approach by Hendricks et al. (2009), the industry-adjusted operational slack was used in the regression analysis.

In the estimation of capacity and inventory slack, industry mean slack for each supplier was calculated, where the industry mean was estimated by industry peers whose three-digit SIC codes were the same as each sample supplier. Each sample supplier was excluded in the estimate of industry means. Then, the supplier's industry-adjusted capacity and inventory slack were estimated by taking the difference between the sample supplier's slack data and industry mean slack data, and dividing the difference by industry mean slack data.

In the estimation of the industry-adjusted supply chain slack, the difference between the sample supplier's cash-to-cash cycle and industry mean cash-to-cash cycle was used. Unlike the measures of capacity and inventory slack, the difference was not further divided by industry mean, because the negative values in the divisor (i.e., industry mean) may create bias in the calculation.

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With some of the three-digit SIC codes, the industry peer sample size was small (e.g., two firms only), which is likely to bias the estimate of industry mean operational slack. Thus, the observations were excluded in the analysis where the industry peer sample size was below the 10th percentile of overall industry sample. Conservatively, the present research did not expand the industry peer sample size by using two-digit SIC codes, because these would include the firms in less relevant industries to the sample suppliers and undermine the industry-adjusted power.

3.5.2.8 Financial slack

Financial slack was measured by leverage. Leverage was estimated by total debt to total asset as in equation (18) (Oliveira, Kadapakkam, & Beyhaghi, 2017):

$$Leverage_i = \frac{DLC_i + DLTT_i}{AT_i}, \quad (18)$$

where DLC_i is the debt in current liability (i.e., the short-term debt) of supplier i ; $DLTT_i$ is the long-term debt of supplier i ; AT_i is the book value of assets of supplier i . All data were in the most recent fiscal year ending date before the announcement date. A high leverage ratio indicates a low level of financial slack to suppliers to reduce suppliers' negative financial performance. The predicted sign is negative.

3.5.2.9 Control variables in supplier analysis

The industry and year effects were controlled in the regression analyses for suppliers. The industry control was applied by using the Fama-French 48 industry classification (Fama & French, 1997) which assigned the suppliers in the sample to 48 industries according to a four-digit SIC code. This approach improved the power of industry control as it covered a large range of specific industries.

The announcement data were collected between 1990 and 2016. In those 26 years, there may have been changes in legislation and stakeholder pressure on firms' sustainability. Thus, year effect was controlled in the regression analysis. The year effect was measured by taking the number of years from the first announcement year in the sample (i.e., 1990) to the year of given announcement.

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The firm size was not included as a control variable in the analysis of suppliers. The reason is twofold. First, supply chain factors are more important explanatory variables than firm size in the study of related firms (i.e., suppliers). In this part of the analysis, the focus was on the related firms' (i.e., suppliers') abnormal returns associated with the SCSM announcements rather than the announcing firms (i.e., buyers). In the event study of the related firms, supply chain factors (e.g., buyer-supplier dependence and relationship length) were likely to replace the firm size as the most influential explanatory variable, because investors refer to these supply chain factors to evaluate the impact of the announcements on the related firms (Pandit et al., 2011). Deitz et al. (2009) used similar event study analysis to study the impact of buyers' supply chain technology mandates on suppliers' stock returns, and they found that suppliers' firm size as measured by total asset has no significant effect on suppliers' CAR, which gives empirical evidence that firm size has little explanatory power in the related firms analysis.

Second, the measures of the variables of interest in this research (i.e., the supplier's dependence on buyer and leverage [financial slack]) accommodate the components of measures for firm size. The supplier's dependence on buyer was measured by the supplier's sales to the buyer divided by the supplier's total sale; the supplier's leverage was measured by the ratio of total debt to total assets. These measures include the components of common measures on firm size (i.e., total sales, total assets). An additional test on firm size may undermine the explanatory power of the statistical analyses, which may explain that the event studies on related firms (Brown et al., 2009; Cheng & Eshleman, 2014; Fee & Thomas, 2004; Hertz et al., 2008; Pandit et al., 2011) commonly exclude firm size in their analyses. Consequently, in line with the literature (Cheng & Eshleman, 2014; Hertz et al., 2008; Pandit et al., 2011), multiple supply chain variables were used, and firm size was excluded in the analysis.

3.6 Regression models

The constructs of these hypothesized variables and control variables were tested in regressions against the individual CARs. The individual CARs estimated by the market model were used across regression models. The market model provides the superiority of model specification and adjustment for systemic risk (Hendricks & Singhal, 2008b; Ni et al., 2016; Thirumalai & Sinha, 2011), while other models (e.g., Fama-French-

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Momentum) lack a sound economic rationale when including others factors (e.g., firms' size) than the market factor (Kothari & Warner, 2007). Also, as shown later in Chapter 4, the estimated CARs by market model, in general, have similar mean and median values and are supported by the results of other models.

Hierarchical multiple regression models were used to group the variables with similar attributes, which made it possible to determine the specific impact of these variables on the dependent variable and test the overarching effect of a group of variables. Additionally, the hierarchical approach allows documenting the proportion of variation that dependent variables in each model can explain as a group, and thus analyze the explanatory power across models (Jaccard et al., 2006). Model diagnostics were conducted to avoid potential bias in regression analysis. While OLS regression was used in buyer analysis, robust regression was used in supplier analysis to avoid the bias of influential observations on the estimated coefficients and significance (Cohen et al., 2003). In the next sections, these models and diagnostics are presented for buyer and supplier analysis separately.

3.6.1 Regression models for buyer analysis

Four models were used to test the hypotheses in the analysis of buyers. All models were run with OLS regression. Model 1 includes all control variables as in equation (19).

$$CAR_i = \beta_0 + \beta_1 Year + \sum \beta_j X_i + \sum \beta_k Z_i + \varepsilon_i, \quad (19)$$

where Year is the difference of the first year in the announcement sample to the given announcement year. X_i is industry fixed effect; Z_i is region fixed effect. ε_i is the error term.

Model 2 focuses on the effect of growth prospects while controlling all variables in model 1. The equation (20) shows model 1:

$$CAR_i = \beta_0 + \beta_1 GP_i + \beta_2 Year + \sum \beta_j X_i + \sum \beta_k Z_i + \varepsilon_i, \quad (20)$$

where GP_i is buyers' growth prospects measured by using the book to market ratio.

Model 3 tests multiple SCSM governances in addition to the variables from prior models as in equation (21).

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$$CAR_i = \beta_0 + \beta_1 sSCSM_i + \beta_2 Third_Party_Cert_i + \beta_3 Group_i + \beta_4 GP_i + \beta_5 year_i + \sum \beta_j X_i + \sum \beta_k Z_i + \varepsilon_i, \quad (21)$$

where $sSCSM_i$ is a dummy set to 1 if a buyer requires its suppliers' compliance with the social dimension of SCSM; $Third_Party_Cert$ is a binary variable equal to 1 when a buyer demands its suppliers' compliance certified by a third party; $Group_i$ is a dummy variable coded 1 if a buyer collaborates with other firms in a group to manage its suppliers' SCSM compliance. All other variables are the same as in model 2.

Model 4 presents the full model including three measures for SRM and all other variables in prior models. The equation (22) shows the model 4.

$$CAR_i = \beta_0 + \beta_1 \left(\frac{COGS_i}{sales_i} \right) + \beta_2 APT_i + \beta_3 IT_i + \beta_4 sSCSM_i + \beta_5 Third_Party_Cert_i + \beta_6 Group_i + \beta_7 year_i + \sum \beta_j X_i + \sum \beta_k Z_i + \varepsilon_i, \quad (22)$$

where $\frac{COGS_i}{sales_i}$ is the ratio of COGS to sales; APT is accounts payable turnover; IT is inventory turnover. These three variables were used in the test for the buyers' supplier relationship management. Other variables are the same as in the prior models.

3.6.2 Model diagnostics in the analysis of buyers

Linear models fit using OLS makes assumptions about the structure of the data. If these assumptions are violated, the estimates may misrepresent the data. The model diagnostics suggested by Fox and Weisberg (2010) was used in this research to test if these assumptions were met. OLS regression was conducted in the regression analysis for buyers based on the diagnostics in this section.

The influential observations may substantially change the fit in the regression models. The hat-values were used to detect influential observations. The hat-value measures the distance of each observation to "the center of the regressor space, taking account of the correlation pattern among the regressors" (i.e., independent variables) (Fox & Weisberg, 2010, p. 247), where the observations over three times the average hat-value are cause for concern (Fox & Weisberg, 2010). No observation over three times the average hat-value

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was found in the dataset for buyer analysis. Thus, there was no concern on the influential observations. Next, heteroscedasticity and autocorrelation were tested using the Breusch-Pagan test (Breusch & Pagan, 1979) and the Durbin-Watson test (Durbin & Watson, 1950). The tests indicated a level of heteroscedasticity (BP= 36.148, p-value= 0.01012) and autocorrelation (DW= 1.7602, p-value= 0.01027) in the dataset. Therefore, robust standard errors with heteroscedasticity and an autocorrelation consistent (HAC) estimator (Zeileis, 2004) were used in buyer analysis. The variance inflation factor (VIF) across independent variables was below three, providing evidence of no concern with multicollinearity (Cohen, Cohen, West, & Aiken, 2003). These diagnostics and adjustments ensured that the estimates by OLS regression did not misrepresent the data in this research.

3.6.3 Regression model for the analysis of suppliers

The CARs used in the regression models were suppliers' individual CARs rather than portfolio CARs. In the test of suppliers' abnormal returns associated with SCSM announcements, portfolio CARs were used (219 portfolios) to avoid calendar time clustering bias (see section 3.4.1.1.2). However, in the regression analysis, suppliers' individual CARs (2189 observations) were used as the dependent variable. Each supplier's CAR as a single observation in the cross-sectional tests enabled the exploration of the firm-specific components that make the CARs different (Fee & Thomas, 2004).

Four regression models were used to group the different aspects in the analysis. Robust regression was conducted across models. Model 1 tests the effect of supply chain power on suppliers' financial performance as in equation (23):

$$CAR_i = \beta_0 + \beta_1 SDB_i + \beta_2 BDS_i + \beta_3 Rel_length_i + \sum \beta_j X_i + \varepsilon_i, \quad (23)$$

where SDB_i is the supplier's dependence on buyer; BDS_i is the buyer's dependence on supplier; Rel_length_i is the relationship length between supplier and buyer; X_i is the industry fixed effect; ε_i is the error term.

Model 2 focuses on the effect of the nature of SCSM on suppliers' financial performance as in equation (24). The variables in model 1 remain in the model. Additionally, the year effect is controlled.

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$$\begin{aligned}
 CAR_i = & \beta_0 + \beta_1 SDB_i + \beta_2 BDS_i + \beta_3 Rel_Year_i + \\
 & \beta_4 sSCSM_i + \beta_5 Third_Party_Cert_i + \beta_6 Group_i + \beta_7 Year_i + \\
 & \sum \beta_j X_i + \varepsilon_i,
 \end{aligned} \quad (24)$$

where $sSCSM_i$ is a dummy set to 1 if the supplier must comply with the social dimension of SCSM (e.g., workplace safety); $Third_Party_Cert_i$ is a dummy variable equal to 1 when the supplier must verify SCSM compliance through a third-party organization; $Group_i$ is the binary variable equal to 1 if the supplier is mandated by the buyers that using the group SCSM approach; $Year_i$ is the difference of the first year in the announcement sample to the given announcement year. The year effect was controlled in this model for the potential changes in legislation and stakeholder pressure on sustainability issues over years. All other terms are the same as in model 1.

Model 3 tests the supplier's slack resources in addition to the variables tested in the previous two models. The equation (25) shows model 3:

$$\begin{aligned}
 CAR_i = & \beta_0 + \beta_1 SDB_i + \beta_2 BDS_i + \beta_3 Rel_Year_i + \\
 & \beta_4 sSCSM_i + \beta_5 Third_Party_Cert_i + \beta_6 Group_i + \\
 & \beta_7 Year_i + \beta_8 Capacity_Slack_i + \beta_9 Inventory_Slack_i + \\
 & \beta_{10} Supply_Chain_Slack_i + \beta_{11} Leverage_i + \sum \beta_j X_i + \varepsilon_i,
 \end{aligned} \quad (25)$$

where $Capacity_Slack_i$, $Inventory_Slack_i$, and $Supply_Chain_Slack_i$ are the industry-adjusted capacity, inventory, and supply chain slack respectively; $Leverage$ is the measure of financial slack; a high level leverage indicates a low level of financial slack.

The interaction term between financial slack and the supplier's dependence on buyer is tested in model 4 as in equation (26), including all variables in the last models:

$$\begin{aligned}
 CAR_i = & \beta_0 + \beta_1 SDB_i + \beta_2 BDS_i + \beta_3 Rel_Year_i + \\
 & \beta_4 sSCSM_i + \beta_5 Third_Party_Cert_i + \beta_6 Group_i + \beta_7 Year_i + \\
 & + \beta_8 Capacity_Slack_i + \beta_9 Inventory_Slack_i + \\
 & \beta_{10} Supply_Chain_Slack_i + \beta_{11} LR_i + \beta_{12} (Leverage_i * \\
 & SDC_i) + \sum \beta_j X_i + \varepsilon_i,
 \end{aligned} \quad (26)$$

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where $Leverage_i * SDC_i$ is the interaction term of leverage and the supplier's dependence on buyer. Leverage is the measure of financial slack; a high level leverage indicates a low level of financial slack. Both leverage and SDC were centered in the calculation of the interaction term to avoid multicollinearity in the regression analysis. All other terms are the same as in previous models.

3.6.4 Model diagnostics in the analysis of suppliers

An important assumption of OLS regression is the absence of influential observations in data, as the linear model fit by least squares can be significantly biased by these influential observations, which leads to misrepresentation of the estimated coefficients and standard errors. The methods suggested by Fox and Weisberg (2010) were followed to diagnose the regression models. The hat-values were estimated to detect influential observations. There were observations found in the dataset that had hat-values over three times the average hat-value, and thus there were influential observations, which raised the concern of possible bias by using OLS regression.

Multiple methods were used to control these influential observations. A further diagnosis found that these observations were not caused by data entry error, and data transformation did not remove the effect of these influential observations. The dataset was trimmed by removing the observations below the first and above the 99th percentiles as following Barber and Lyon (1996); however, there were still observations that had over three times the average hat-value.

The present research did not choose to remove these influential observations in the regression analysis. Discarding these observations may have decreased the sample size and created an additional bias in the estimation. Moreover, the inclusion of outlying influential observations, while minimizing the influence scale in the analysis, may result in valuable insights, as these outlying observations are no longer outliers but are accounted for by the models (Johnson, 2002).

Robust regression was used in supplier analysis. Robust regression is an alternative to OLS regression when there are influential observations in datasets. Weighted least squares were used in robust regression, which minimizes the weight given to outlying

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observations in the calculation of regression coefficients (Cohen et al., 2003); thus, the process effectively ensures the reliability of the estimated coefficients (Wright & London, 2009).

Cohen et al. (2003) suggested that robust regression should only reduce statistical power a small amount in comparison with OLS regression when influential observations are absent. OLS regression was also performed in supplier analysis to compare with robust regression (Appendix A shows the OLS regression results for supplier analysis, demonstrating that results by OLS regression have substantial differences from those by robust regression). In general, OLS regression showed higher coefficients of the hypothesized variables and additional statistical significance than robust regression. The differences supported the belief that in the presence of influential observations, the present research should conservatively use robust regression to ensure the reliability of the findings.

Moreover, the buyer dataset provides an opportunity to detect a similar performance between OLS and robust regression. There was no influential observation detected in buyer dataset; thus, the estimated coefficients and significance of OLS and robust regression should only have a small scale of difference. Robust regression by using the buyer dataset was run, as shown in Appendix B. The results were almost the same as those reported by using OLS regression. These results validated the use of OLS regression in the buyer analysis.

These trial tests provide evidence that reporting the results by using robust regression for supplier analysis is likely to provide reliable findings in this research. Hence, robust regression was used in the supplier analysis. Furthermore, the values of VIF were all below three, providing evidence of low multicollinearity (Cohen et al., 2003).

3.7 Paired sample t-test on the difference in financial performance between buyers and suppliers

It is hypothesized that the financial performance of suppliers is more negative than that of buyers as discussed in link with the green bullwhip effect (see section 2.5.3). The green bullwhip effect is found on the buyers and their paired suppliers working on the same

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supply chains (S.-Y. Lee et al., 2014; Seles et al., 2016). The methods below were used to ensure the consistency with the literature.

The subsamples of buyers and suppliers were used in the analysis to ensure buyers were matched only with their paired-trading suppliers. It was required that the suppliers are the paired trading partners of the buyers in the same supply chains; thus, the amplified SCSM demand may effectively pass from buyers to their suppliers in link with the green bullwhip effect. Therefore, subsamples for buyers and suppliers were created where buyer and supplier were required to be generated from the same announcements. In the buyer subsample, those firms whose suppliers could not be found by using the methods outlined in section 3.3.2.2 were removed. In the supplier subsample, those firms whose buyers were non-public firms were removed. The subsample of buyers was generated from 180 announcements which subsequently identified 1690 suppliers.

The subsamples contained only buyers and their direct trading suppliers working on the same supply chains, thus enabling the use of a paired sample t-test in the analysis of the performance difference. A paired sample t-test compares the mean difference of the samples when those means have come from the same entities (i.e., SCSM announcements in this research) (Field, 2013). The buyers' and suppliers' financial performance are the CARs estimated by the market model. Suppliers' portfolio CARs (i.e., 180 portfolio CARs) were used to run the paired sample t-test.

3.8 Chapter conclusion

This chapter introduced the event study methodology used in this research to test the firms' financial performance. The objective measure of financial performance avoids social desirability bias and improves the robustness of the findings of this research.

Different methods were used for the supplier and buyer samples. The supplier sample was collected using the methods for related firms in event study methodology. Due to the nature of the sample, the portfolio CARs were used to estimate the suppliers' financial performance to avoid calendar time clustering bias. Standard event study methods for the buyer sample were adopted.

The hypothesized and control variables were constructed for the buyer and supplier analysis. These variables were used in the regression model against the estimated individual CARs to test the developed hypotheses in the literature review chapter. While

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OLS regression was used in buyer analysis, robust regression was used in supplier analysis for avoiding potential bias caused by influential observations.

Subsamples were used in the test of the performance difference between the buyers and suppliers. The difference between the buyers' and suppliers' CARs was tested by using a paired sample t-test.

In the next chapter, the descriptive statistics and test results based on the methods will be presented and discussed.

Chapter 4. Results

This chapter reports descriptive statistics of collected sample data and the test results by using the event study methodology and cross-sectional regression analysis. The descriptive statistics showed the characteristics of the sample data. The test results addressed the scale and significance of the hypothesized variables.

The descriptive statistics and test results are presented in separate sections for buyers and suppliers, as different samples were collected and used. Figure 4.1 gives the structure of this chapter.

Chapter 4 Results

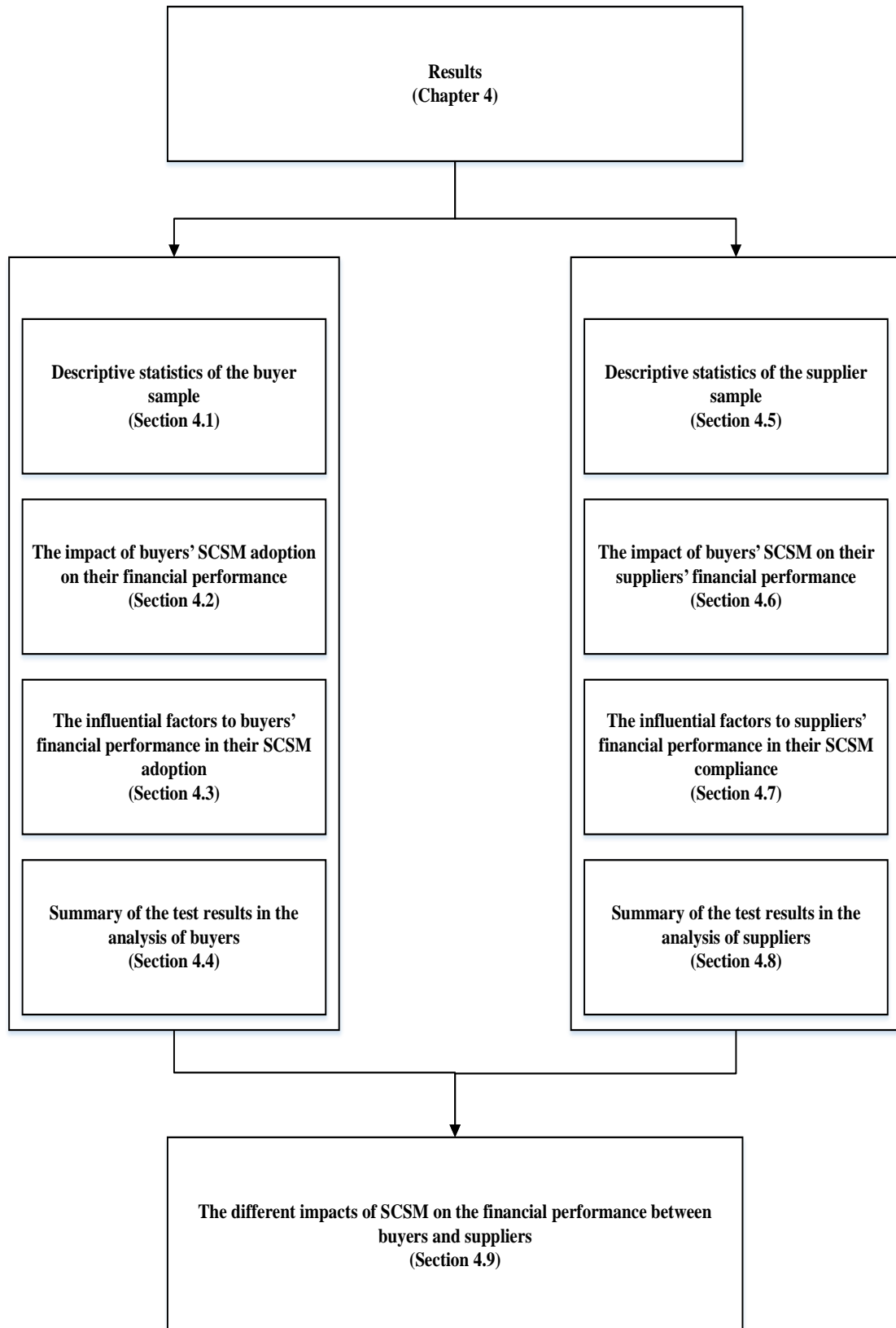


Figure 4.1 Structure of Results Chapter

4.1 Descriptive statistics of buyer sample

This section presents the characteristics of buyer sample. The focus is to demonstrate the distribution of the data of constructed variables as well as the announcement sample.

In total, 308 announcements were identified. The announcement sample in this research is larger than the similar study of Dam and Petkova (2014) (i.e., 66 announcements). The large announcement sample improves the power of statistical tests in this research.

Table 4.1 Panel A gives the selected financial characteristics for buyers derived from these 308 announcements. Net sales and cost of goods sold show the firm size of the buyer sample. The mean (median) values of net sales and cost of goods sold are US\$ 59,850 (US\$ 18,916) and US\$ 41,500 (US\$ 11,525) million respectively. The firm size of the sample firms is consistent with the study of Dam and Petkova (2014).

The mean (median) value of the market to book ratio is 3.15 (2.43), indicating the growth prospects for the sample firms. The mean (median) value of the ratio of COGS to sales is 0.61 (0.65); the mean (median) value of inventory turnover is 13.79 (6.71); the mean (median) value of accounts payable turnover is 7.81 (6.84). These are three measures for buyers' SRM. In comparison with the data in the study of Tang and Liou (2010), the sample firms in this research show, on average, a high level of competence in SRM. The standard deviation of inventory turnover is relatively large (i.e., 23.79). Therefore, the data of inventory turnover was transformed to logarithm in the regression analysis to mitigate the outliers.

Table 4.1 Panel B demonstrates the frequencies of categorical variables in the buyer sample. In 18% of announcements, the buyers required their suppliers to improve the performance of social dimension of SCSM (i.e., sSCSM), which is consistent with the literature that sSCSM is less emphasized (Touboulic & Walker, 2015). In 33% of announcements, the buyers demanded third-party certification in suppliers' SCSM compliance. In total, 43 % of announcements were coded as group SCSM, where buyers collaborated in groups to adopt SCSM.

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Table 4.1 Descriptive Statistics for Buyer Sample

Panel A: Selected financial characteristics for buyers (N=308)	Mean	Median	SD
Net Sales (in unit of million)	59,850	18,916	96,792
Cost of Goods Sold (in unit of million)	41,500	11,525	71,949
Market to Book Ratio (i.e., growth prospects)	3.15	2.43	3.56
The ratio of COGS to Sales	0.61	0.65	0.18
Inventory Turnover	13.79	6.71	23.79
Accounts Payable Turnover	7.81	6.84	4.85
Panel B: Frequency Statistics for buyers (N=308)	n	%	
sSCSM	56	18	
Third-Party Certification	101	33	
Group SCSM	132	43	

Figure 4.2 shows the year distribution of the 308 announcements. Most of the SCSM announcements were after 2003, which is consistent with the literature that business raised awareness of sustainability issues since the beginning of the 21st century (Carter & Easton, 2011; Carter & Rogers, 2008).

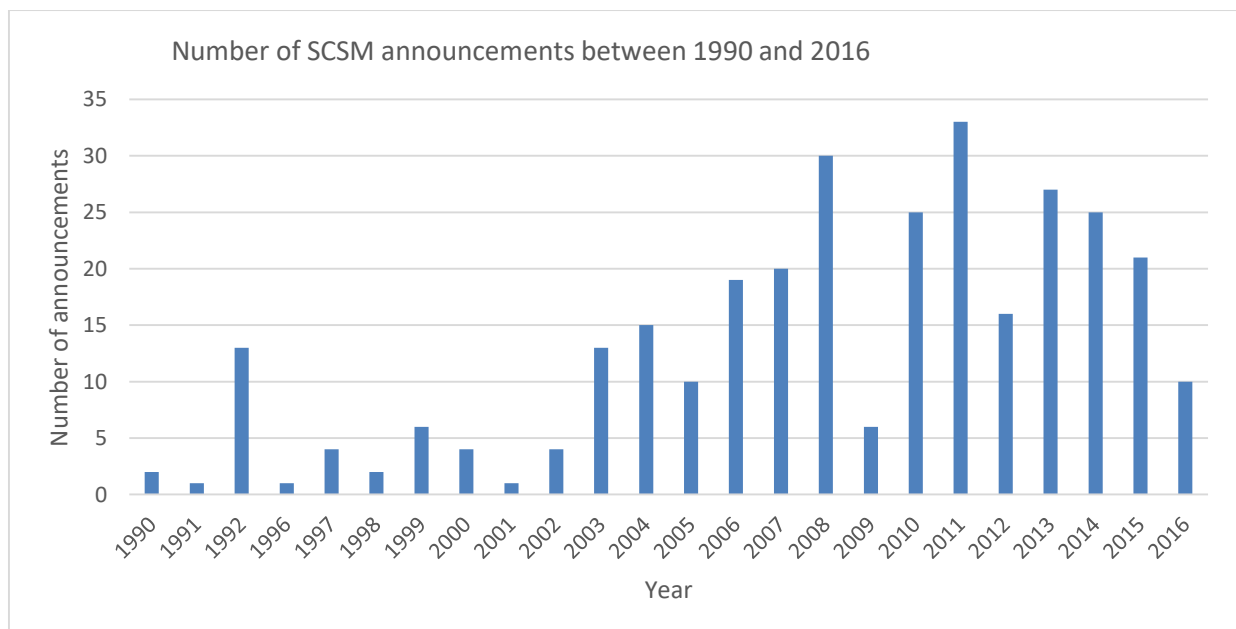


Figure 4.2 Year Distribution of SCSM Announcements (buyer sample)

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Figure 4.3 illustrates the industry composition of the buyer sample based on the Fama-French 48 industry classification (Fama & French, 1997). The top four industries are retailers, automotive, utility, and meals (e.g., McDonald's). In total, 20% of announcements were made by retailers which operate close to the point of sales in the downstream supply chains, and, thus, have high stakeholder pressure to adopt SCSM (Hall, 2000; Schmidt et al., 2017).

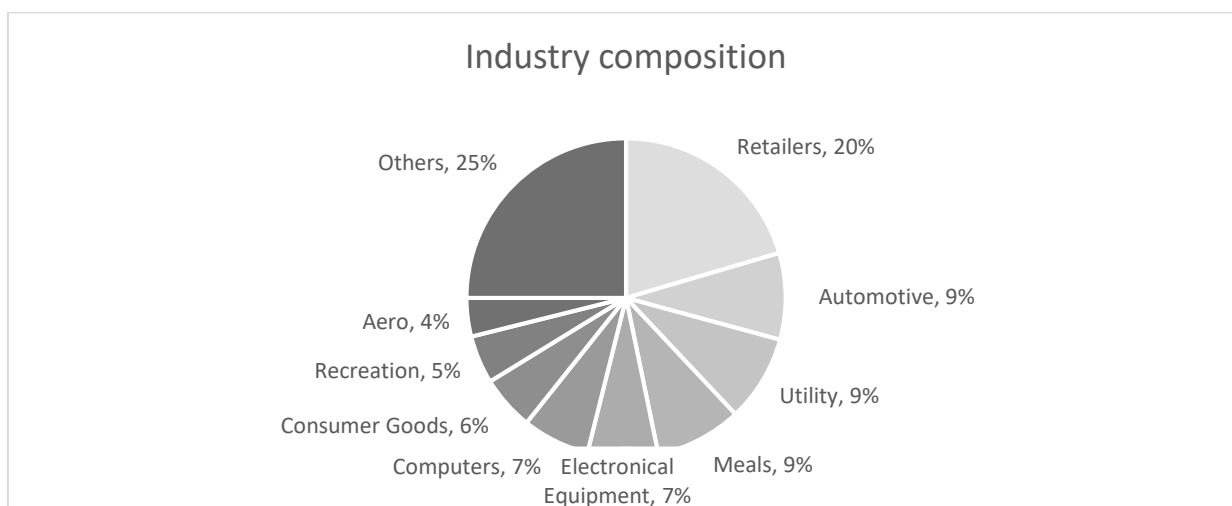


Figure 4.3 Industry Composition of Buyer Sample (using Fama-French 48 industry classification)

Figure 4.4 presents the regional distribution in the buyer sample according to the geographic locations of primary stock exchanges. Over half of the announcements (68%) were made by the firms from North American, while Asian and European firms equally make 16% of announcements. The percentage 0.32% in Figure 4.4 represents one announcement made by Woolworths Holding Limited listed on the Johannesburg Stock Exchange.

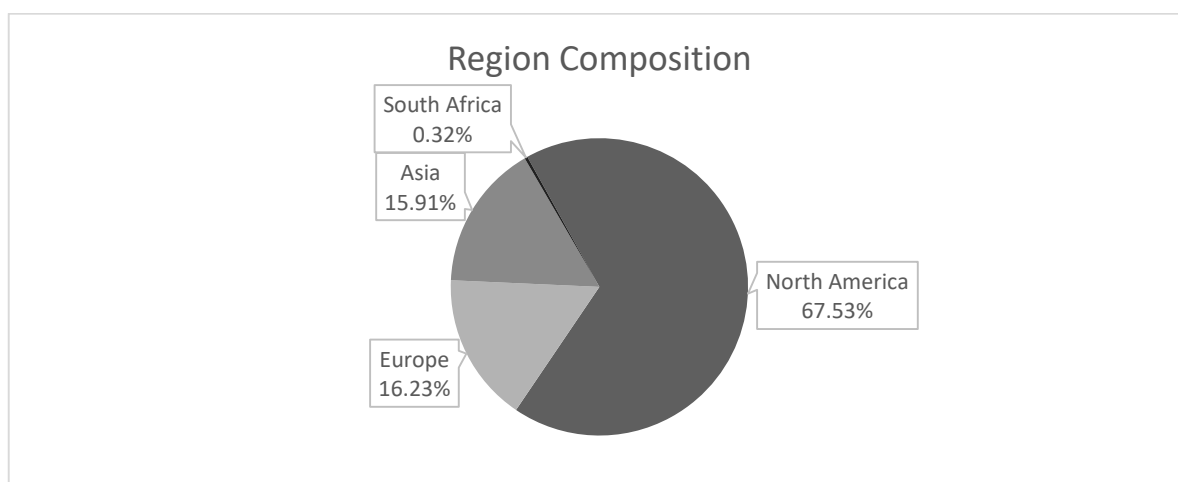


Figure 4.4 Region Composition of Buyer Sample

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Table 4.2 reports the Pearson correlation matrix of the variables used in the regression analysis for the buyer sample. Inventory turnover was logarithm-transformed. The VIF values for all variables are lower than three, indicating low multicollinearity (Cohen et al., 2003).

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Table 4.2 Correlation Matrix of the Variables Used in Buyer Analysis

	1	2	3	4	5	6	7	8	9
	CAR	Group SCSM	sSCSM	Third Party Certification	Year	Growth Prospects	Accounts Payable Turnover	The ratio of COGS to Sales	Inventory Turnover
1	1								
2	0.0598 (0.2953)	1							
3	0.0640 (0.2630)	-0.2041*** (0.0003)	1						
4	0.0296 (0.6052)	-0.2416*** (0.0000)	-0.0245 (0.6691)	1					
5	-0.0180 (0.7525)	-0.0183 (0.7489)	0.0806 (0.1581)	0.0787 (0.1680)	1				
6	-0.0791 (0.1705)	-0.0234 (0.6860)	0.0808 (0.1614)	0.0937 (0.1040)	-0.0158 (0.7845)	1			
7	-0.0135 (0.8156)	-0.1985*** (0.0005)	0.2727*** (0.0000)	0.0450 (0.4357)	-0.0557 (0.3351)	0.0972 (0.0935)	1		
8	0.0222 (0.6999)	-0.1277** (0.0260)	0.0204 (0.7238)	0.0366 (0.5246)	0.0551 (0.3387)	-0.0789 (0.1724)	0.3037*** (0.0000)	1	
9	-0.0202 (0.7287)	-0.1254** (0.0304)	0.2542*** (0.0000)	-0.0294 (0.6127)	-0.0332 (0.5683)	0.1993*** (0.0006)	0.3173*** (0.0000)	0.1640*** (0.0046)	1
Mean	-0.0022	0.4286	0.1818	0.3279	19.2078	3.1464	7.8105	0.6138	0.8968
SD	0.0216	0.4957	0.3863	0.4702	5.895	3.5637	4.8505	0.1763	0.3732

Note: ** and *** denote the significance at 0.05 and 0.01 level (two-tailed tests) respectively. p-values are in parentheses. CAR is the buyer's cumulative abnormal return in the event window (-1,1) estimated by using the market model. Inventory turnover is transformed with a logarithm to mitigate the outliers.

4.2 The impact of buyers' SCSM adoption on their financial performance

The impact of buyers' SCSM adoption on their financial performance was measured by CARs in the event window (-1,1). Multiple parametric tests and rank tests (section 3.4.4) were used to test the null hypothesis that the mean CAR is equal to zero, indicating there is no impact of SCSM adoption on buyers' financial performance.

Table 4.3 provides the results of mean CAR and test significance. The first row indicates the test results by using the full sample. The mean (median) CAR is -0.22% (-0.24%) estimated by using the market model. In total, 54% out of 308 announcements have negative CARs. The multiple test statistics show the two-tailed significance of mean CAR. Both Patell z and t-BMP tests indicate the significance of the mean CAR at 5% level. The mean CAR is significant at 10% level in Cross-sectional t-test. The significance of negative mean CAR is supported by rank test, as a non-parametric test, at 10% level. These results support the hypothesis (B)H1, which indicates that SCSM adoption creates a negative effect on buyers' financial performance.

The Fama-French-Momentum model was used to confirm the results were not biased by the choice of model. As the data of factors in the Fama-French-Momentum model are not readily available for parts of the sample firms (e.g., Korean, Taiwan), the methods suggested by Hendricks et al. (2017) were used, where the U.S. sample firms were used to compare the results between the market model and the Fama-French-Momentum model (section 3.4.2).

The second and third rows in Table 4.3 show the test results by using only U.S. sample firms. The sample size was reduced to 205 (67% of the full sample). The mean (median) CARs are -0.34% (-0.29%) by using the market model and -0.55% (-0.31%) by using the Fama-French-Momentum model respectively. Although the mean CAR estimated by the Fama-French-Momentum model is slightly more negative than that estimated by the market model, the figures show the consistently negative CAR across the two models. The percentage of negative CAR is 54% for the market model and 57% for the Fama-French-Momentum model. The parametric tests (i.e., Cross-sectional t-test, Patell z test, and t-BMP test) indicate the minimum two-tailed significant at 5% level for mean CAR across two models. The non-parametric rank test supports the test results at a minimum 5% level of two-tailed significance. The consistency on the negativity and significance of

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mean CAR across two models confirms that the finding of negative buyers' financial performance is unlikely to be biased by choice of model.

Next, the cross-sectional regression analysis was used to test the effect of influential factors (e.g., growth prospects and sSCSM) on buyers' CARs. The present research conservatively used the individual CARs estimated by the market model in the full sample as the dependent variable in the regression analysis. The CARs estimated by the market model have the lowest difference between mean (-0.22%) and median values (-0.24%), and the lowest negativity on mean value across the three rows shown in Table 4.3. Also, the market model provides superiority in model specification and adjustment for system risk (MacKinlay, 1997), which has been widely used to conduct regression analysis (Hendricks & Singhal, 2008b; Ni et al., 2016; Thirumalai & Sinha, 2011; Wood et al., 2017). Thus, the use of market model estimated CARs avoided unexpected bias in the analyses of this research.

The larger scale of negativity by using the U.S. sample (i.e., -0.34%) than by using the full sample (i.e., -0.22%) indicates the necessary control on the country/region effect. In this research, the regional effect was controlled in the regression analysis. In the next section, the test results of the regression analysis will be discussed.

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Table 4.3 Buyers' CAR in the Event Window (-1, 1)

Model	N	Mean/Median CAR	% negative	Cross-sectional t-test	Patell z test	t- BMP test	Rank Test
Market Model (Full Sample)	308	-0.0022/-0.0024	54%	-1.7745*	-1.9665**	-2.2172**	-1.7837*
Market Model (U.S. Firms Only)	205	-0.0034/-0.00294	54%	-2.3359**	-2.3589**	-2.7495***	-2.0161**
Fama-French-Momentum Model (U.S. Firms Only)	205	-0.0055/-0.00312	57%	-3.3657***	-2.6153***	-3.2883***	-2.6892***

Note: The symbols *, **, and *** denote statistical significance at the 0.1, 0.05, and 0.01 levels, respectively, using two-tailed tests; details of the statistical tests used are in section 3.4.4.

4.3 The influential factors to buyers' financial performance in their SCSM adoption

OLS regression was used to test the influential factors as independent variables against CARs as the dependent variable. Table 4.4 shows the results of the regressions using robust standard errors (corrected for heteroscedasticity and autocorrelation) (section number 3.6.2). Model 1 includes all control variables. Model 2 presents the effect of growth prospects. Model 3 focuses on the governances of SCSM. Model 4 is the full model testing the three measures of SRM in addition to all variables in prior models. The hierarchical multiple regression allows testing the effects of certain predictors independent of the influence of other variables (Jaccard et al., 2006).

Model 1 shows the test results of control variables for the industry, region, and year effect. With regard to the effect of industry on buyers' financial performance, there is no large difference across industries except in electronic equipment, where the coefficient is negative and statistically significant at 5% level (one tail). Regarding the country/region effect, the coefficients of both European and North American firms are statistically insignificant. The coefficient of year effect is not significantly different from zero.

The test results from model 2 show the coefficient of growth prospects is negative and significant at 5% level (one tail). The result supports the hypothesis (B)H3, providing the evidence that buyers with higher growth prospect have more negative financial performance.

Multiple governance mechanisms were tested in model 3. The coefficient of sSCSM is positive at 5% significant level (one tail), which supports hypothesis (B)H6 and indicates that the buyers have less negative financial performance when they require their suppliers to improve the social dimension of SCSM (e.g., improving labor conditions). The coefficient of third-party certification is not significantly different from zero. Hence, hypothesis (B)H4 is not supported, which infers that buyers have no significantly different financial performance when they use third-party certification as the SCSM governance mechanism than others (e.g., code of conduct). The coefficient of group SCSM is positive and significant at 10% level (one tail). (B)H5 is supported, which indicates that the buyers have less negative financial performance if they partner with peers in groups to adopt SCSM.

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Model 4 tests the effect of SRM. Three measures of SRM were used. Surprisingly, the coefficients of the ratio of COGS to sales, accounts payable turnover, and inventory turnover are not significantly different from zero. Therefore, hypotheses (B)H2a, (B)H2b, and (B)H2c, are not supported, indicating the buyers' SRM is not significantly related to the financial performance in their SCSM adoption. The coefficients of growth prospects, sSCSM, and group SCSM are consistently significant in model 4, indicating the robustness of the prior test results. The coefficients and significance levels of control variables are consistent across models, showing the test results are constant with regard to the effects of year and region. Only firms in the electronic equipment industry have more negative financial performance while there is no such effect on the firms in other industries.

The hierarchical regression approach allows documenting the proportion of variation in dependent variables that independent variables as a group can account for over and above the covariates (Jaccard et al., 2006). The changes of R^2 values reflect the difference of the proportion of variation across models that the grouped independent variables explain. The F statistic provides a significance test on the changes. In Table 4.4, the R^2 values are incrementally increased from 3% in model 1 to 7% in model 3, and marginally significant for model 3. The results indicate that the explanatory power of model 3 is significantly larger than model 1, showing the importance of including the effect of growth prospects and factors of governances in the model. However, the R^2 value in model 4 is merely increased by 0.13% from that in model 3, and the F statistic is not significantly different from zero. The result shows the three measures of SRM do not have a significant effect explaining the variation of financial performance above or beyond growth prospects and SCSM governance.

Additional analyses were conducted to further understand why model 4 appeared to have little explanatory power. The VIF values of all variables in model 4 are below three, indicating no multicollinearity concern. The plot of residuals versus fitted values shows that there is no non-linear relationship between the independent variables and the dependent variable (Figure C.1 in Appendix C). Therefore, there is no issue of multicollinearity or non-linearity leading to the reduced explanatory power in model 4. The exclusion of statistical reasoning suggests theoretical causes of the changes in R^2 values and F statistic for model 4. The possible explanation is the low applicability of

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SRM, as a traditional SCM strategy, for SCSM. The details will be discussed in section 5.1.6.

Table 4.4 OLS Regression Results for the Analysis of Buyers

Independent Variables	Model 1 (Control variables)	Model 2 (Growth Prospects)	Model 3 (Governance)	Model 4 (SRM)
Intercept	0.0037 (0.0066)	0.0073 (0.0069)	0.0040 (0.0071)	0.0058 (0.0086)
Consumer Goods	-0.0018 (0.0045)	-0.0020 (0.0046)	-0.0008 (0.0051)	-0.0016 (0.0052)
Autos	0.0035 (0.0051)	0.0040 (0.0051)	0.0042 (0.0055)	0.0045 (0.0059)
Computers	-0.0009 (0.0051)	-0.0010 (0.0051)	-0.0007 (0.0050)	-0.0001 (0.0061)
Recreation	-0.0020 (0.0089)	-0.0031 (0.0089)	-0.0019 (0.0090)	-0.0019 (0.0090)
Electronic Equipment	-0.0105** (0.0062)	-0.0122** (0.0061)	-0.0128** (0.0062)	-0.0124** (0.0063)
Aero	0.0093 (0.0081)	0.0077 (0.0078)	0.0075 (0.0078)	0.0075 (0.0080)
Utility	-0.0030 (0.0058)	-0.0056 (0.0061)	-0.0064 (0.0069)	-0.0073 (0.0076)
Retailers	-0.0004 (0.0042)	-0.0018 (0.0043)	-0.0016 (0.0044)	-0.0009 (0.0042)
Meals	0.0020 (0.0052)	0.0012 (0.0056)	0.0001 (0.0053)	-0.0021 (0.0075)
European Firms	-0.0052 (0.0046)	-0.0044 (0.0046)	-0.0069* (0.0050)	-0.0063 (0.0051)
North American Firms	-0.0058* (0.0042)	-0.0037 (0.0042)	-0.0043 (0.0042)	-0.0044 (0.0075)
Year in sample	-0.00003 (0.0003)	-0.0001 (0.0003)	-0.0001 (0.0003)	-0.0001 (0.0003)
Growth Prospects		-0.0008** (0.0004)	-0.0008** (0.0004)	-0.0009** (0.0004)
sSCSM			0.0063** (0.0031)	0.0047* (0.0032)
Third-Party Certification			0.0031 (0.0031)	0.0037 (0.0032)
Group SCSM			0.0057* (0.0035)	0.0055* (0.0036)
The ratio of COGS to Sales				-0.0011 (0.0094)
Accounts Payable Turnover				-0.0001 (0.0005)
Inventory Turnover				-0.0006 (0.0054)
N	308	300	300	290
F	0.9081	1.1976	1.3983*	1.1455
R ²	0.0356	0.0516	0.0733	0.0746

Note: Significance levels (one-tailed tests): * 0.1 level, ** 0.05 level. Robust standard errors are reported in parentheses and corrected for heteroscedasticity and autocorrelation.

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4.4 Summary of the test results in the analysis of buyers

Table 4.5 summarizes all test results in the buyer analysis. There are four main findings. The buyers' financial performance was found negative when they adopt SCSM. The negative financial performance is more severe if the buyers have a high level of growth prospects. However, the joint adoption with other firms by using group SCSM approach can reduce the negative financial performance, and the mandate of the social dimension of SCSM (i.e., sSCSM) on suppliers can also decrease the negative financial performance.

Table 4.5 Test Results of the Hypotheses for Buyer Analysis

Hypothesis	Hypothesis number	Predicted sign	Section number	Result
Buyers' financial performance when they adopt SCSM	<i>(B)H1</i>	Negative	2.5.1.1	Supported
The factors that influence buyers' financial performance when they adopt SCSM				
Hypothesis	Hypothesis number	Predicted sign	Section number	Result
The ratio of COGS to sales (the measure of supplier relationship management)	<i>(B)H2a</i>	Negative	2.5.1.2	Not supported
Accounts payable turnover (the measure of supplier relationship management)	<i>(B)H2b</i>	Negative	2.5.1.2	Not supported
Inventory turnover (the measure of supplier relationship management)	<i>(B)H2c</i>	Positive	2.5.1.2	Not supported
Growth prospect	<i>(B)H3</i>	Negative	2.5.1.3	Supported
Third-party certification (governance mechanisms)	<i>(B)H4</i>	Positive	2.5.1.4	Not supported
Group SCSM	<i>(B)H5</i>	Positive	2.5.1.5	Supported
sSCSM (SCSM dimensions)	<i>(B)H6</i>	Positive	2.5.1.6	Supported

4.5 Descriptive statistics of the supplier sample

This section presents the characteristics of supplier sample. The aim is to demonstrate the supplier observations generated from the announcement sample and the distribution of the data of constructed variables in the supplier analysis.

In total, 219 SCSM announcements were found to be able to generate 2189 supplier observations. Table 4.6 presents the descriptive statistics for the supplier sample. Panel A shows the statistics of selected financial characteristics.

Suppliers were found to be small in size and highly dependent on buyers. The mean (median) values of net sales and total assets are US\$ 4,586 (US\$680) and US\$ 5,561 (US\$734) million respectively. Recalling that in the buyer sample, the mean (median) values of net sales are US\$ 59,850 (US\$ 18,916), indicating that buyers found in this research are larger in firm size than suppliers. The mean (median) ratio of supplier's dependence on buyer is 0.20 (0.17), and the mean (median) ratio of buyer's dependence on supplier is 0.02 (0.0009), which indicates that buyers found in this research have higher supply chain power than suppliers. The attribute that buyers are large in firm size and high in power is consistent with the findings of the SCSM studies (Hall, 2000; Seuring & Müller, 2008; Touboulic et al., 2014; Touboulic & Walker, 2015), and validates the discussion in section 2.3.2, where the supply chain power in favor of buyers enables them to transfer SCSM pressure from downstream stakeholders to upstream suppliers. The standard deviation of the ratio of buyer's dependence on supplier is high (0.48); therefore, logarithm form of the measure was used in the regression analysis to avoid the bias of outliers.

Moreover, the suppliers were found to have a strong economic link with their buyers. The ratio of the supplier's dependence on buyer is high (0.20), indicating that these suppliers have a great percentage of their overall business (i.e., 20%) with the buyers that mandate SCSM. The mean (median) relationship length is 7 (5) years, supporting the significant and long-term relationships between the suppliers and their buyers. These figures suggest a strong economic bond of the suppliers with their buyers in the sample of this research. Therefore, the buyers' SCSM announcements have a salient impact on suppliers' operations, thus their financial performance, which validated the use of the event study methodology on related firms (section 3.3.3) in this research.

Compared with industry peers, the sample suppliers were found to have leanness in operations regarding capacity, inventory, and supply chain slack (i.e., cash-to-cash cycle).

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The mean (median) values of industry-adjusted capacity slack, inventory slack, and supply chain slack are -0.38 (-0.62), -0.23 (-0.41), and -0.72 (-12.26) respectively. The standard deviation of supply chain slack is high (86.23), and thus was transformed by using cube root (to accommodate the negative values) to reduce the bias of outliers. Financial slack was measured by leverage. The mean (median) value of leverage is 0.26 (0.23).

Panel B demonstrates the frequencies of categorical variables in the sample. Similar to the finding in the literature (Hoejmose & Adrien-Kirby, 2012; Touboulic & Walker, 2015; Walker et al., 2012), there are few suppliers (i.e., 14%) in the sample that are required by their buyers to comply with the social dimension of SCSM (i.e., sSCSM). In total, 17% of suppliers must achieve third-party certification required by their buyers. There are 34% of suppliers whose buyers jointly mandate SCSM with others by using group SCSM approach.

Panel C illustrates the average supplier sample per announcement. Out of a sample of 219 announcements (i.e., 219 portfolios in the estimate of portfolio CARs), there are on average ten suppliers per announcement. The biggest announcement portfolio is composed of 98 suppliers (e.g., Wal-Mart's announcement), and there is one supplier in the smallest portfolio.

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Table 4.6 Descriptive Statistics for Supplier Sample

Panel A: Selected financial characteristics for suppliers (N= 2189)	Mean	Median	SD
Net Sales (in unit of million)	4,586	680	12,737
Total Asset (in unit of million)	5,561	734	31,009
The ratio of the Supplier's Dependence on Buyer	0.20	0.17	0.15
The ratio of the Buyer's Dependence on Supplier	0.02	0.00 ¹	0.48
Relationship Length (in year)	7	5	6
Leverage ²	0.26	0.23	0.21
Capacity Slack	-0.38	-0.62	2.54
Inventory Slack	-0.23	-0.41	1.12
Supply Chain Slack (i.e., Cash-to-Cash Cycle)	-0.72	-12.26	86.83

Panel B: Frequency statistics for suppliers (N=2189)	N	%
sSCSM	322	15
Third-Party Certification	392	18
Group SCSM	746	34

Panel C: Frequency statistics for announcements (N=219)	Mean	Max	Min
Supplier sample per announcement	10	98	1

Note: 1. The four-digit figure is 0.0009. 2. Leverage is the measure of financial slack; a low level of leverage indicates a high level of financial slack.

Figure 4.5 shows the year distribution of SCSM announcements used in supplier sample. The year distribution is consistent with the literature that SCSM is predominant in the 21st century (Carter & Easton, 2011).

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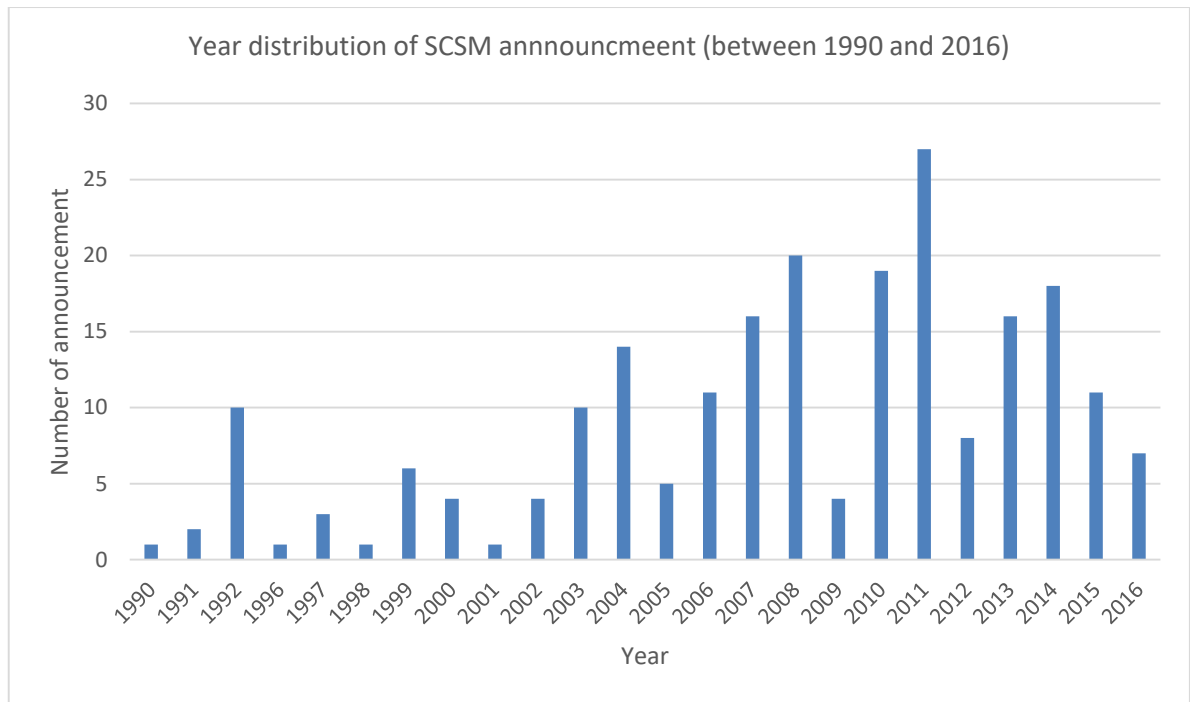


Figure 4.5 Year Distribution of SCSM Announcements (supplier sample)

Table 4.7 demonstrates the industry composition of supplier sample. The top five industries are electronic equipment, business services, automotive, food products, and computers. Recalling that the top industry in the buyer sample is retailers, the industry compositions in the samples indicate that buyers which mandate SCSM mainly operate in the downstream supply chains, while suppliers mostly operate in the upstream supply chains, according to the classification by Schmidt et al. (2017). Interestingly, automotive, electronic equipment, and computer sectors overlap in the buyer and supplier samples. These firms comply with their buyers' SCSM and require their suppliers' SCSM compliance, which illustrates the transfer of SCSM in the supply chains.

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Table 4.7 Industry Composition of Supplier Sample

	N	%		N	%
Electronic Equipment	265	12.11%	Construction Material	37	1.69%
Business Service	217	9.91%	Petroleum and Natural Gas	35	1.60%
Automobiles	206	9.41%	Rubber and Plastic Products	34	1.55%
Food Products	186	8.50%	Candy and Soda	33	1.51%
Computers	148	6.76%	Communication	30	1.37%
Consumer Goods	99	4.52%	Retailer	28	1.28%
Recreation	87	3.97%	Medical Equipment	25	1.14%
Apparel	69	3.15%	Printing and Publishing	21	0.96%
Machinery	68	3.11%	Steel Work	20	0.91%
Measuring and Control Equipment	66	3.02%	Construction	19	0.87%
Business Supplies	63	2.88%	Textile	18	0.82%
Wholesale	61	2.79%	Agriculture	17	0.78%
Transportation	47	2.15%	Defence	16	0.73%
Chemicals	44	2.01%	Fabricated Products	15	0.69%
Aircraft	44	2.01%	Personal Service	13	0.59%
Pharmaceutical Products	42	1.92%	Utility	12	0.55%
Electrical Equipment	42	1.92%	Shipping Containers	11	0.50%

Note: The industry samples were created by using Fama-French 48 industry classification (Fama & French, 1997). The industry samples containing less than ten suppliers were removed to avoid the bias of singularity in the analysis.

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Table 4.8 Correlation Matrix for the Variables used in Supplier Analysis

	1	2	3	4	5	6	7	8	9	10	11	12
	CAR	SDB	BDS	Relationship Length	Leverage	sSCSM	Third-party Certification	Group SCSSM	Year	Capacity Slack	Inventory Slack	Supply Chain Slack
1	1											
2	0.0048 (0.8431)	1										
3	0.0333 (0.2050)	0.0462 (0.0789)	1									
4	-0.0170 (0.4298)	0.1727** (0.0000)	0.1313** (0.0000)	1								
5	-0.0117 (0.6127)	-0.0101 (0.6997)	0.0315 (0.2689)	-0.0297 (0.2025)	1							
6	0.0111 (0.6030)	0.0583* (0.0159)	0.0849** (0.0012)	0.1014** (0.0000)	-0.0273 (0.2362)	1						
7	-0.0224 (0.2940)	-0.0389 (0.1078)	0.0609* (0.0204)	-0.0108 (0.6161)	0.0412 (0.0740)	-0.0964** (0.0000)	1					
8	-0.0685** (0.0014)	-0.0637** (0.0084)	0.0789** (0.0027)	-0.1598** (0.0000)	-0.0925** (0.0001)	-0.1925** (0.0000)	-0.1121** (0.0000)	1				
9	0.0205 (0.3370)	0.0160 (0.5075)	0.0869** (0.0009)	0.2272** (0.0000)	-0.0556* (0.0159)	0.1260** (0.0000)	-0.0709** (0.0009)	-0.0841** (0.0001)	1			
10	0.0098 (0.6647)	0.0060 (0.8130)	0.0891** (0.0012)	-0.0140 (0.5369)	0.0203 (0.4054)	0.0027 (0.9034)	0.0404 (0.0726)	0.0079 (0.7268)	0.0271 (0.2282)	1		
11	0.0378 (0.1073)	0.0529* (0.0448)	-0.1113** (0.0001)	0.0012 (0.9590)	0.0037 (0.8834)	0.0628** (0.0074)	-0.0335 (0.1531)	-0.0981** (0.0000)	0.0443 (0.0593)	0.0488* (0.0398)	1	
12	0.0539* (0.0234)	0.0190 (0.4759)	-0.2422** (0.0000)	0.0267 (0.2672)	0.0040 (0.8754)	0.1192** (0.0000)	-0.0532* (0.0253)	-0.1611** (0.0000)	0.0110 (0.6443)	-0.0427 (0.0758)	0.5712** (0.0000)	1
Mean	-0.0036	0.2029	-2.9758	6.8538	0.2554	0.1471	0.1791	0.3408	18.3997	-0.3753	-0.226	-0.5557
SD	0.0518	0.1495	0.8698	5.7548	0.2067	0.3543	0.3835	0.474	5.2875	2.5429	1.1171	3.431

Note: ** and *** denote the significance at 0.05 and 0.01 level (two-tailed tests) respectively. *p*-values are in parentheses. CAR is suppliers' individual cumulative abnormal return in even window (-1,1) estimated using the market model. SDB is the supplier's dependence on buyer. BDS is the buyer's dependence on supplier transformed in logarithm form to mitigate the outliers. Supply chain slack is measured by cash-to-cash cycle transformed with a cube root to accommodate the outliers. Leverage is the measure of financial slack.

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Table 4.8 presents the Pearson correlation between the variables used in the cross-sectional regression analysis for the supplier analysis. The measure of the buyer's dependence on supplier (BDS) was in logarithm form, and the industry-adjusted supply chain slack (i.e., cash-to-cash cycle) was transformed with a cube root. The correlation between independent variables highlighted the importance of including them in the models to test the hypotheses. The VIF across the variables is lower than 3, indicating low multicollinearity (Cohen et al., 2003).

4.6 The impact of buyers' SCSM on their suppliers' financial performance

Suppliers' equally weighted portfolio CARs in the event window (-1,1) were used to test the impact of buyers' SCSM on suppliers' financial performance. Table 4.9 shows results by using 219 portfolios estimated by using the market model, the Fama-French-Momentum model, and the market-adjusted model.

The mean CAR is -0.53%, -0.54%, and -0.45% estimated by the three models respectively, and the median CAR is -0.55%, -0.44%, and -0.49% respectively. There are more portfolios with negative abnormal returns across three models. The parametric tests (i.e., t-BMP test, Time-series Standard Deviation test, Generalized Least Squares test, and Collins-Dent test) in the market model and Fama-French-Momentum model show the strong significance of the mean CAR at minimum 5% level (two-tail). Except for the Time-series Standard Deviation test, all other parametric tests in the market-adjusted model indicate the significance at a minimum 5% level (two tail). Rank test, as a non-parametric test, shows the two-tailed significance at 5% level across three models. Therefore, it can be concluded that hypothesis (S)H1 is supported, indicating that suppliers have negative financial performance when they are required to comply with their buyers' SCSM.

Because of the consistency of the mean CARs estimated across models and the superiority of model specification and adjustment for systematic risk in the market model (Hendricks & Singhal, 2008b; Ni et al., 2016), the market-model-estimated CARs were used in subsequent cross-sectional regression analysis.

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Table 4.9 Suppliers' Portfolio CARs in the Event Window (-1,1)

Model	N	Mean/Median CAR	% Negative	t-BMP Test	Time-series Standard Deviation Test	Generalized Least Squares Test	Collins- Dent Test	Rank Test
Market Model	219	-0.53%/-0.55%	62%	-3.237***	-1.993**	-2.818***	-3.399****	-2.359**
Fama-French- Momentum Model	219	-0.54%/-0.44%	58%	-3.081***	-2.077**	NA	NA	-2.102**
Market-Adjusted Model	219	-0.45%/-0.49%	58%	-2.906***	-1.615	-2.531**	-3.244***	-2.109**

Note: The mean/median CAR was estimated by using 219 equal-weighted portfolio CARs. The symbols **, ***, and **** denote statistical significance at the 0.05, 0.01, and 0.001 levels, respectively, using two-tailed tests. Generalized Least Square test and Collins-Dent test are not applicable to the multi-factor models (i.e., Fama-French-Momentum Model).

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The event window (-1, 1) was used to estimate the suppliers' portfolio CARs. The reason is that the sample contains announcements made by international companies (e.g., based in Japan, Europe, and the U.S.). The use of a three-day event window (-1, 1) can incorporate a more complete stock market reaction to the SCSM announcements, because there are time difference across global stock exchanges and the delay due to processing the information of related firms. The event window (-1,1) is the most commonly used in sustainability-related research (e.g., Fisher-Vanden and Thorburn [2011]; Klassen and McLaughlin [1996]), providing a balance between as a short window as practical and being sufficiently long to support the involvement of multinational corporations and global stock exchanges.

Statistical evidence also justifies the use of the three-day event window (-1,1). Table 4.10 shows the test results of estimated mean CARs by the Market model on individual days and multiple event windows. The mean CAR on day 0 is not significantly different from zero across multiple statistical tests. Only the mean CAR at the event window (-1, 1) is significant at a minimum 5% level across all statistical tests (two tail). Thus, the use of the event window (-1, 1) leads to rationally and statistically sound estimation of CARs in the supplier analysis.

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Table 4.10 Results of Suppliers' Mean Portfolio CAR on Individual Days and Multiple Event Windows

Event Day (s)	N	Mean portfolio CAR	% Negative	t-BMP test	Time-series Standard Deviation Test	Generalized Least Squares Test	Collins-Dent Test	Rank Test
-5	219	-0.21%	54%	-0.818	-1.349	-0.683	-0.020	-0.135
-4	219	0.11%	54%	0.333	0.730	0.279	-0.339	0.181
-3	219	-0.42%	59%	-2.252**	-2.696***	-1.832	-1.649	-1.795
-2	219	-0.11%	54%	-0.539	-0.714	-0.404	-0.454	-0.634
-1	219	-0.25%	54%	-2.042**	-1.632	-1.686	-1.742	-1.234
0	219	0.02%	55%	-0.814	0.120	-0.714	-1.867	-0.281
1	219	-0.30%	62%	-3.060***	-1.940	-2.634***	-2.486**	-2.532**
(-1,+1)	219	-0.53%	62%	-3.237***	-1.993**	-2.818***	-3.399****	-2.359**
(-1,0)	219	-0.23%	58%	-2.099**	-1.069	-1.779	-2.670***	-1.071
(0,+1)	219	-0.28%	60%	-2.574**	-1.287	-2.299**	-2.992***	-1.989**
(-2,+2)	219	-0.38%	57%	-1.838	-1.095	-1.392	-2.111**	-1.855
(-5,+5)	219	-0.77%	58%	-1.277	-1.507	-0.968	-0.919	-1.226

Note: The symbols **, ***, and **** denote statistical significance at 0.05, 0.01, and 0.001 levels, respectively, using two-tailed tests. The portfolio CARs were estimated by using the market model. The market index is the CRSP value-weighted index.

4.7 The influential factors to suppliers' financial performance in their SCSM compliance

The individual CARs (i.e., 2189 observations) rather than portfolio CARs (i.e., 219 portfolios) were used in the cross-sectional regression analysis. Each supplier's CAR as a single observation in the cross-sectional tests enabled to explore the firm-specific components that make the CARs different (Fee & Thomas, 2004). Robust regression was used to test the influential factors as the independent variables against suppliers' CARs as the dependent variable (discussed in section 3.6.4).

These influential factors were grouped into four models according to the attributes. The dependent variable across the four models is the suppliers' individual CARs estimated by using the market model. There were missing data in the regression analysis, which leads to 1448 observations in Model 1 and 2, and 1023 observations in Model 2 and 3. Table 4.11 provides details of the test results. The test results of each model will be discussed in detail in the next sections.

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Table 4.11 Robust Regression Results for the Analysis of Suppliers

Independent Variables	Model 1	Model 2	Model 3	Model 4
	Coefficient	Coefficient	Coefficient	Coefficient
Intercept	0.0070* (0.0050)	0.0050 (0.0060)	0.0140** (0.0080)	0.0150** (0.0070)
Supplier's dependence on buyer (SDB)	0.008 (0.0080)	0.0090 (0.0080)	-0.0091 (0.0090)	-0.0104 (0.0090)
Buyer's dependence on supplier (BDS)	0.0033*** (0.0010)	0.0035*** (0.0010)	0.0043*** (0.0010)	0.0044*** (0.0010)
Relationship year	-0.0004*** (0.0002)	-0.0010*** (0.0002)	-0.0004** (0.0002)	-0.0004** (0.0002)
Social SCSM		0.0020 (0.0030)	0.0040 (0.0040)	0.0030 (0.0040)
Third Party Certification		-0.0020 (0.0020)	-0.0020 (0.0030)	-0.0020 (0.0030)
Group SCSM		-0.0044** (0.0020)	-0.0020 (0.0030)	-0.0010 (0.0030)
Year in sample		0.0002 (0.0002)	0.0001 (0.0003)	0.0001 (0.0003)
Capacity Slack			0.0018 (0.0020)	0.0023 (0.0020)
Inventory Slack			0.0050** (0.0030)	0.0049** (0.0030)
Cash-to-Cash-Cycle (C2C)			0.0002 (0.0005)	0.0002 (0.0005)
Supplier's leverage (LR)			-0.0044 (0.0050)	-0.0037 (0.0050)
Supplier's leverage * Supplier's dependence on buyer				-0.1900*** (0.0480)
Control for Industry effect	Yes	Yes	Yes	Yes
N	1448	1448	1023	1023

Note:*, ** and *** denotes the significance at 0.1, 0.05 and 0.01 level (one-tailed tests) respectively. Standard errors are reported in parentheses. We choose not to report R2 values, because the iterative reweighting on observations in robust regression gives R2 little statistic inference, see details in Willett and Singer (1988).

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4.7.1 Supply chain power

Model 1 provides the tests of the effect of supply chain power on the suppliers' financial performance in their SCSM compliance, while the industry effect is controlled. The coefficient of the supplier's dependence on buyer (SDB) is not significantly different from zero. The hypothesis (S)H2a is not supported. The buyer's dependence on supplier (BDS) is positively related to suppliers' CARs, which is significant at 0.01 level (one-tailed test). It reveals that suppliers' negative financial performance decreases with high buyer's dependence. Hence hypothesis (S)H2b is supported. The coefficient of relationship length is negative and significant at 0.01 level (one-tailed test) with the inference that the suppliers' negative financial performance is more severe when the suppliers have a long-term relationship with the buyers. The hypothesis (S)H2c is supported. These results in model 1 partially support that the supply chain power is an important factor in estimating the impact of buyers' SCSM on suppliers' financial performance.

4.7.2 The nature of SCSM

Model 2 tests the impact of the nature of SCSM on suppliers' financial performance controlling supply chain power, industry effect, and how the impact may change over time (the year in the sample). Consistent with model 1, the coefficients of BDS and relationship length are significantly related to the suppliers' CARs. The coefficient of sSCSM is positive as predicted. However, the coefficient is not significantly different from zero, which infers that social dimension of SCSM (e.g., improving labor conditions) produces no distinct impact on suppliers' financial performance relative to the environmental dimension of SCSM (e.g., controlling carbon emission). Hence, the hypothesis (S)H3 is not supported. Although the coefficient of third-party certification is negative as predicted, the coefficient is insignificantly different from zero. The result suggests that the SCSM compliance by third-party certification does not lead to different suppliers' financial performance than by other governance mechanisms (e.g., code of conduct). The hypothesis (S)H4 is not supported. The coefficient of group SCSM is negatively related to the suppliers' CARs and statistically significant at 0.05 level (one tail). Thus, hypothesis (S)H5 is supported, where the suppliers have more negative financial performance when their buyers use group SCSM approach. Additionally, the

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coefficient of year effect is not significantly different from zero, which indicates the consistent scale of suppliers' negative financial performance over time. In general, the tests in model 2 support that group SCSM has an economic significance on estimating suppliers' financial performance.

4.7.3 Operational and financial slack

Model 3 tests the buffering effects of suppliers' operational and financial slack on their negative financial performance. Capacity, inventory, and supply chain slack were used as the forms of operational slack. The coefficients of capacity slack and supply chain slack are not significantly different from zero. Thus, (S)H6a and (S)H6c are not supported. The coefficient of inventory slack is positive and statistically significant at 0.05% level (one tail). Therefore, the hypothesis (S)H6b is supported, indicating that the suppliers that have higher inventory slack have less negative financial performance in their SCSM compliance. Group SCSM which showed a significantly negative effect in model 2 is not statistically significant in model 3, where operational slack is included. The coefficient of group SCSM is less negative in model 3 than that in model 2. The result of group SCSM provides additional evidence of the buffering effect of operational slack on suppliers' negative financial performance in their SCSM compliance. The results in model 3 uphold the operational slack as an important source to cushion the suppliers' SCSM costs. Nonetheless, in the choice of the form of operational slack, inventory is the effective force. Leverage was used to measure the financial slack, where a low level of leverage indicates a high level of financial slack. While the coefficient of leverage is negative, the coefficient is not statistically different from zero. Thus hypothesis (S)H7 is not supported, suggesting financial slack alone is not related to suppliers' financial performance in their SCSM compliance.

4.7.4 The interaction between financial slack and the supplier's dependence on buyer

Model 4 tests the interaction effect of financial slack and supplier's dependence on buyer, including all variables in the last three models. Figure 4.6 shows the interaction plot. The dashed line indicates that a high level of leverage (i.e., a low level of financial slack) and dependence on buyer lead to a more negative suppliers' CAR (i.e., more

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negative financial performance). The strong negative and statistically significant coefficient of the interaction term provides evidence to support hypothesis (S)H8. Additionally, model 4 illustrates the consistency of the tested variables. The coefficient of the buyer's dependence on supplier is positive and statistically significant. The coefficient of relationship length is significantly negative. The coefficient of inventory slack is significantly positive. Group SCSM is the only variable that becomes insignificant in model 4.

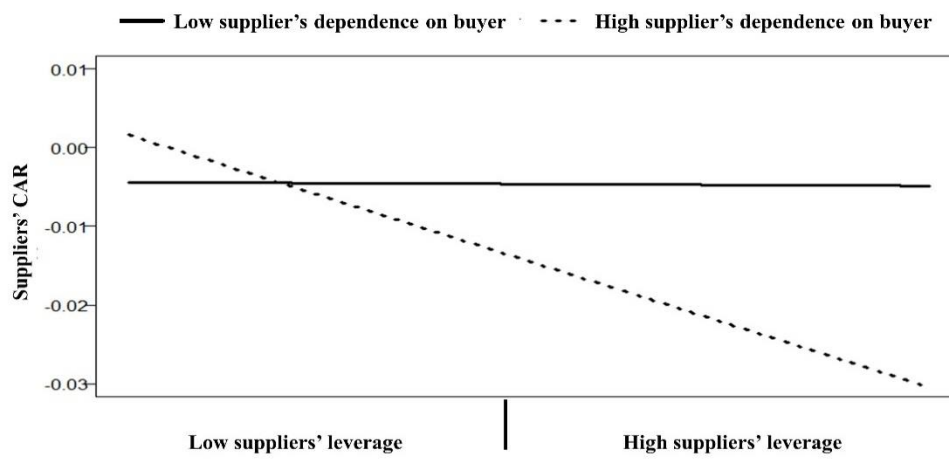


Figure 4.6 Interaction Plot for the Effect of Financial Slack under a High Level of Supplier's Dependence on Buyer on the Financial Performance for Suppliers

4.8 Summary of the test results in the analysis of suppliers

Table 4.12 summarizes all the test results in the supplier analysis. There are five main findings. The suppliers' financial performance was found to be negative when they are required to comply with buyers' SCSM. While a long-term relationship increases the severity of the negative financial performance, a high level of the buyer's dependence on supplier reduces the scale of negativity. Group SCSM creates a more negative impact on suppliers' financial performance. The suppliers with high inventory slack were found to have less negative financial performance. Finally, the negative financial performance is more serious when suppliers have a high level of leverage (a low level of financial slack) and dependence on their buyers.

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Table 4.12 Test Results of the Hypotheses for Supplier Analysis

Hypothesis	Hypothesis number	Predicted sign	Section number	Result
Suppliers' financial performance when they are required to comply with their buyers' SCSM	(S)H1	Negative	2.5.2.1	Supported
The factors that influence suppliers' financial performance when they comply with buyers' SCSM				
Hypothesis	Hypothesis number	Predicted sign	Section number	Result
The supplier's dependence on buyer (the measure of supply chain power)	(S)H2a	Negative	2.5.2.2	Not Supported
The buyer's dependence on supplier (the measure of supply chain power)	(S)H2b	Positive	2.5.2.2	Supported
Relationship length (the measure of supply chain power)	(S)H2c	Negative	2.5.2.2.3	Supported
sSCSM (SCSM dimension)	(S)H3	Positive	2.5.2.3	Not Supported
Third-party certification (governance mechanisms)	(S)H4	Negative	2.5.2.4	Not Supported
Group SCSM	(S)H5	Negative	2.5.2.5	Supported
Capacity slack (the measure of operational slack)	(S)H6a	Positive	2.5.2.6	Not Supported
Inventory slack (the measure of operational slack)	(S)H6b	Positive	2.5.2.6	Supported
Supply chain slack (the measure of operational slack)	(S)H6c	Positive	2.5.2.6	Not Supported
Leverage (the measure of financial slack)*	(S)H7	Negative	2.5.2.7	Not Supported
The interaction term of leverage (the measure of financial slack) and the supplier's dependence on buyer	(S)H8	Negative	2.5.2.8	Supported
Note *: Financial slack is measured by leverage. A high level of leverage indicates a low level of financial slack.				

4.9 The different impacts of SCSM on the financial performance between buyers and their suppliers

It was hypothesized that suppliers have more negative financial performance than buyers (section 2.5.3). A paired sample t-test was used to test the difference on mean CARs between buyer and supplier data. It was required that the buyers and suppliers be generated from the same announcements, which ensures the paired sample means

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(discussed in section 3.7). There were 180 SCSM announcements generating 180 buyer observations and 1690 paired supplier observations. Suppliers' portfolio CARs (i.e., 180 equally weighted portfolio CARs from 1690 individual suppliers' CARs) were used in the analysis of the paired sample t-test. The null hypothesis is that buyers' mean CAR is not greater than suppliers' mean CAR. Table 4.13 presents the results.

Table 4.13 The Result of Paired Sample t-test for the Analysis of the Performance Difference between Buyers and their Suppliers

Mean of the differences between buyers' and their suppliers' CARs	t value	P-value
0.0046	1.5469	0.0618*

Note: * denotes the significance level at 0.1 (a one-tailed test). Suppliers' CARs are 180 portfolio CARs from 1690 individual supplier observations. The null hypothesis is buyers' mean CAR is not greater than suppliers' mean CAR.

Mean of the difference between buyers' and suppliers' CARs is 0.46% tested by using suppliers' portfolio CARs and significant at 10% level. The finding indicates that buyers, on average, have significantly greater CARs than their suppliers. Hence, it provides evidence that buyers have more favorable financial performance in relating to SCSM than their suppliers. The hypothesis (BS)H1 is supported.

4.10 Chapter conclusion

This chapter reported the test results of the hypotheses. The mean CARs for both buyers and suppliers were found significantly negative, indicating that buyers have negative financial performance when they adopt SCSM, and suppliers also have negative financial performance in their SCSM compliance. Moreover, the financial performance of suppliers was found more negative than that of their buyers.

In the cross-sectional regression analysis, the test results showed buyers' negative financial performance can be mitigated by using group SCSM approach and adopt social dimension of SCSM (i.e., sSCSM), while a high level of growth prospects increases buyers' negative financial performance in their SCSM adoption. Supplier relationship management and the use of third-party certification as a governance mechanism are not significantly related to buyers' financial performance.

Suppliers' negative financial performance can be reduced by a high level of the buyer's dependence on supplier and inventory slack. A long relationship length with buyers and

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group SCSM increases the suppliers' negative financial performance in their SCSM compliance. When there is a high level of the supplier's dependence on buyer, the suppliers with low financial slack have more negative financial performance. Capacity and supply chain slack are not significantly related to suppliers' financial performance. The suppliers that comply with the social dimension of SCSM and third-party certification were not found to have significantly different financial performance from others.

Throughout this chapter, the findings have provided empirical evidence in the negative impacts of SCSM on buyers' and their suppliers' financial performance. However, the influential factors were found to mitigate the negative impacts. In the next chapter, the implications of these findings will be discussed.

Chapter 5. Discussion

The concepts discussed in the literature help bridge the hypothesized relationships. The test results in this research provide empirical evidence on the relationships. These results are discussed and compared to the extant literature in this chapter. The contribution of this research is derived by drawing the consistent and contrasting findings with the literature in order to derive both academic and managerial implications.

This chapter is structured to separate the discussion of buyers and suppliers, which helps clarify the different perspectives and corresponds to the sections in the literature review chapter. Figure 5.1 presents an overview of the chapter structure. Section 5.1 will start by discussing buyers' financial performance and subsequently the factors that influence buyers' financial performance. Section 5.2 will provide the implications for society and corporate policies with the findings relating to buyers. Section 5.3 will focus on discussing suppliers' financial performance and subsequently the factors that influence suppliers' financial performance. Section 5.4 will give the implication for society and corporate policies with the results relating to suppliers. Section 5.5 will link to the green bullwhip effect and discuss the more negative financial performance of the suppliers than their buyers. Section 5.6 will provide managerial implication for suppliers to mitigate the more negative financial performance caused by the green bullwhip effect. Section 5.7 will discuss the theoretical contributions of this research, where the extension to stakeholder theory, the green bullwhip effect, TCE, and theory of SEF and VUB will be demonstrated. The synthesis of the discussion on the research findings across buyers and suppliers will be given in section 5.8. A chapter summary will be in section 5.9.

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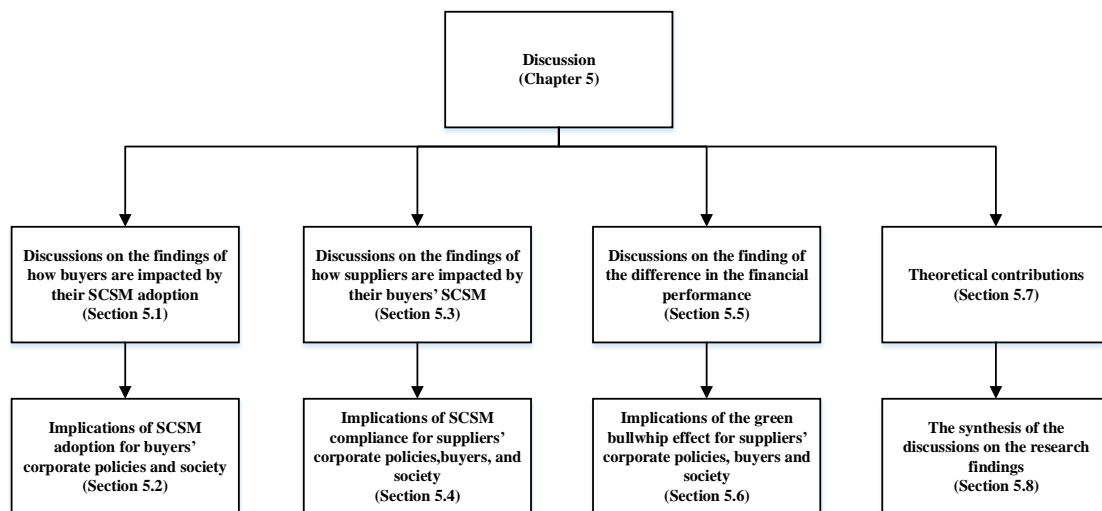


Figure 5.1 Structure of Discussion Chapter

5.1 Discussions on the findings of how buyers are impacted by their SCSM adoption

Negative financial performance was found for the buyers that required their suppliers to comply with SCSM. By using event study methodology and objective measures, this finding complements the SCSM literature which has dominantly used survey-based methods and perceptual measures as discussed in the literature review by Touboulic and Walker (2015). NRBV is commonly used to support the discussion of the benefits associated with SCSM. This finding of buyers' negative financial performance indicates NRBV needs to be developed taking into account the substantial costs relating to SCSM to provide a more complete theory for SCSM. The negative financial performance increases buyers' reluctance to SCSM adoption, and suggests the fragility of the SCSM system in transferring the stakeholder pressure of sustainability to suppliers.

This research explored the factors that influence buyers' negative financial performance. The strategic monitoring and analyzing of these factors can reduce the negative impact of SCSM on buyers' financial performance, which increases buyers' willingness to adopt SCSM and thus means that the effectiveness of the SCSM system in environmental and social performance can be maintained. The adoption of the social dimension of SCSM (i.e., sSCSM) and the collaboration with other buyers by using the group SCSM approach can effectively reduce buyers' negative financial performance. Buyers with high growth prospects need to be particularly cautious when adopting SCSM due to the severely negative financial performance. While SRM and third-party

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certification were found to be insignificant in mitigating the costs of SCSM to buyers, potential reasons for this will be discussed. The next sections provide detailed discussions.

5.1.1 The impact of SCSM adoption on buyers' financial performance

The result indicates that buyers have negative financial performance when they adopt SCSM. In this section, the finding is discussed from three perspectives, the complement to the literature, developing NRBV by taking into account the costs of SCSM, and maintaining the effectiveness of the SCSM system in environmental and social performance.

5.1.1.1 The complement to the literature

The present research complements the literature by using objective measures. Previous studies have predominantly used survey-based methods and perceptual measures when investigating the impact of SCSM on buyers' financial performance. (e.g., Golicic & Smith, 2013; Rao & Holt, 2005; Schmidt et al., 2017; Zhu et al., 2007). However, social desirability bias has rarely been addressed in these previous studies (as discussed in the literature review in Carter and Easton [2011]). Social desirability bias refers to a positive self-evaluation bias when perceptual measures are used to analyze sustainability issues (Walker et al., 2012), which leads to a biased finding of buyers' financial performance. In this research, buyers' abnormal returns associated with SCSM announcements were used in the estimate of the financial performance. The objective measure ensures that the finding in this research does not suffer from social desirability bias. The unbiased result provides empirical evidence that buyers have negative financial performance in contrast to the previous studies using perceptual measures.

The use of event study methodology in this research explored buyers' overall financial performance by including the costs associated with SCSM. There are benefits that buyers may gain by adopting SCSM, which supports the finding of buyers' positive financial performance in several prior studies (Rao & Holt, 2005; Schmidt et al., 2017; Thornton et al., 2013). Buyers may gain reputation and thus sales growth from environmental and socially-conscious consumers (Thornton et al., 2013). Competitive advantages can be acquired by having resources that contain high environmental and social attributes

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(Golicic & Smith, 2013; Schmidt et al., 2017). These prior studies have mainly used perceptual measures and survey-based methods. These prior studies provide valuable insights into operational effects but are unable to offer a clear impact regarding overall financial performance due to the operational perspective in survey-based methods (Dam & Petkova, 2014). In this research, the cost associated with SCSM is discussed, an area that is commonly overlooked in these prior studies. The management of environmental and social performance by SCSM is an additional transaction term to the traditional conception of business (Touboulic & Walker, 2015). Buyers' transaction costs are increased with SCSM adoption; that is, SCSM involves inspections, assessments, and evaluations of suppliers' environmental and social performance, requiring substantial investment (Adobor & McMullen, 2014). SCSM creates a disruption to the even flow of buyers' operations by adding environmental and social standards to the requirements of supplying. The disruption increases coordination and control costs in buyers' management of supply chains (Dam & Petkova, 2014). Also, the disruption increases the risk of a supply chain glitch as demonstrated in business cases (Evans, 2013). The abnormal returns associated with firms' announcements is an encompassing measure (Hendricks et al., 2017), where the costs and benefits associated with SCSM are both included (Dam & Petkova, 2014). The use of abnormal returns as an objective measure in this research ensures that a holistic perspective is captured on benefits and costs in relation to SCSM. Overall financial performance for the buyers adopting SCSM was found to be negative, indicating that the costs associated with SCSM outweigh the potential benefits. There is, therefore, a great business risk to buyers that adopt SCSM.

The relatively large sample and the multiple SCSM initiatives used in this research provide a high level of generalizability for the finding. The finding in this research is consistent with that of Dam and Petkova (2014). However, the authors focused on a single environmental supply chain program (i.e., the Carbon Disclosure project) with a small sample (i.e., 66). In this research, a relatively large sample size (i.e., 308 announcements) and environmental and social dimensions across multiple firms' SCSM initiatives were used. The buyer sample included firms across countries and industries. The result of this research has a relatively high level of generalizability, which is applicable across firms and SCSM programs. The scale of the negativity of mean abnormal return found in this research (i.e., -0.22%) is smaller than that found by Dam and Petkova (2014) (i.e., -0.80% without the adjustment of industry selection bias, but -3.2% with the adjustment for

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industry selection bias¹). The difference in the scale of mean abnormal return indicates some of the specific SCSM programs may have a more negative impact on buyers' financial performance than the overall SCSM analyzed in this research. The negative financial performance found in this research with a relatively large sample size suggests a universal business risk to buyers that adopt SCSM across countries and industries.

The finding of this research contradicts that of Thornton et al. (2013). By using survey-based methods, the authors found that buyers can improve their financial performance by using socially responsible supplier selection. Supplier selection is one of the SCSM practices (section 2.3.4), having orientation toward a selection of suppliers that embrace sustainability principles when conducting normal operations (Thornton et al., 2013). Supplier selection is more likely to be applied as a preliminary mechanism in SCSM and on new suppliers (Zimmer et al., 2016). When applying supplier selection as the only SCSM practice, buyers' engagement is little, and the impact of SCSM on buyers' operations is low (Miemczyk et al., 2012). Because of the low engagement, the SCSM by solely using supplier selection may be buyers' 'window-dressing', where buyers pretend to be concerned with sustainability issues in order to gain reputation without actually managing the supply chain's environmental and social performance (Thornton et al., 2013). Thornton et al. (2013) additionally found buyers' actual investment in sustainability programs is largely not related to the financial performance (seven out of nine performance measures were found insignificant), providing partial support for the concern regarding buyers' window-dressing by using supplier selection. Therefore, buyers' costs as discussed in this research (e.g., additional transaction costs and disruptions to the even flow of operations) are unlikely to be created by using supplier selection as the only SCSM practice. In contrast, in this research, the focus is on comprehensive SCSM practices, where buyers' engagement is required, and these practices are related to buyers' existing operations. Buyers create additional environmental or social criteria for their suppliers for the continuous supply, as well as providing support. Buyers continually evaluate and measure suppliers' environmental/social performance through, for example, on-site inspections (Dow Jones Newswires, 2013; Nikkei Report, 2014). Buyers require suppliers to provide material/

¹ Dam and Petkova (2014) included buyers in their sample that did not publicly announce their environmental supply chain program but reported this in their annual reports (i.e., non-announcing buyers); therefore, these non-announcing buyers are adjusted for industry bias by using the Heckman model. In this research, only the buyers making public announcements were included in the sample. Hence, it is unlikely that there is such bias in this research.

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components that contain high environmental and social attributes, and then use these materials/ components in buyers' own operations (e.g., recyclable materials) (PR Newswire, 2010). Buyers' engagements and subsequent operational changes are necessary for these comprehensive SCSM practices (Hoejmosse & Adrien-Kirby, 2012), which are more likely to increase the transaction costs and the risk of disruption to the operations.

The finding of this research represents the most common impact of SCSM on buyers' financial performance. Supplier selection is rarely used alone in SCSM. In business practices, most buyers create comprehensive SCSM practices, focusing on managing suppliers' compliance (Hoejmosse & Adrien-Kirby, 2012). Supplier selection is likely to create a certain level of environmental and social standards for suppliers. However, suppliers' commitment to these standards can hardly be maintained without buyers' engagement (Miemczyk et al., 2012). Buyers that solely rely on supplier selection are likely to have substantial supply chain sustainability risk because the suppliers' commitment to SCSM is not closely managed by buyers. In practice, buyers commonly adopt comprehensive SCSM practices to manage suppliers' compliance, where buyers' engagement is required (Tachizawa & Wong, 2015). This research focuses on these comprehensive SCSM practices. The finding of this research, thus suggests the most likely financial performance that buyers can have in their SCSM adoption.

5.1.1.2 The cost perspective in SCSM theory building

NRBV needs to be developed taking into account the costs associated with SCSM. The empirical evidence in this research is contrary to the propositions in earlier conceptual works (e.g., Hart, 1995; Markley & Davis, 2007; Srivastava, 2007). These conceptual works have used a theoretical perspective to discuss the relationship between SCSM and buyers' financial performance, and developed NRBV as an important theory to support the benefits that buyers achieve by adopting SCSM. NRBV proposes that the management of the natural environment is an important source of rare, valuable, imperfectly imitable, and non- substitutable resources and capabilities. The possession and configuration of these resources and capabilities develop competitive advantages (Schmidt et al., 2017). NRBV has been a widely applied theory in the SCSM literature (Touboullic & Walker, 2015), and is used to motivate firms' adoption of SCSM (Golicic & Smith, 2013; Schmidt et al., 2017). In this research, the finding of buyers' negative

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financial performance indicates that the adoption of SCSM in practice creates substantial costs to buyers. This finding reveals the gap between SCSM in practice and the theoretical desirability of NRBV. This gap may be created by the incomplete theories of SCSM as noted by Wu and Pagell (2011) and Pagell and Shevchenko (2014). The resources suggested by NRBV are mostly intangible assets (e.g., reputation); however, the relationship between intangible assets and performance outcomes are often causally ambiguous (Pullman et al., 2009). Importantly, NRBV does not include buyers' costs associated with SCSM. Transaction costs are increased, and there are also costs as a result of the disruption to the even flow of buyers' operations as discussed in section 2.5.1.1. These costs are higher than the potential benefits as revealed by buyers' negative financial performance in this research. There is no discussion in NRBV on what to do with the costs. The emphasis on the benefits while overlooking the costs in theories such as NRBV creates a theoretical issue that the true relationship between SCSM and financial performance is not captured (Pagell & Shevchenko, 2014). The recent conceptual works have increased the awareness of this theoretical issue. Pagell and Shevchenko (2014) and Touboulic and Walker (2015) both discussed from a theoretical perspective that there may be a trade-off between financial performance and environmental and/or social performance, and scholars should study the SCSM issues with the awareness of this trade-off. This research provides empirical evidence to support that the financial performance decreases with SCSM adoption. Theories represent the keystone of knowledge production (Handfield & Melnyk, 1998). The development of theory in SCSM should capitalize on the strong connection with practices (Touboulic & Walker, 2015). The evidence provided in this research reminds that the theory development of SCSM, in particular of NRBV, should take into account the costs associated with SCSM and provide strategies for dealing with the costs. More complete theories of SCSM may constitute useful frames that firms can use to help them address the sustainability challenges.

5.1.1.3 Maintaining the effectiveness of the SCSM system by mitigating buyers' negative financial performance

Buyers' negative financial performance creates a risk to the effectiveness of the SCSM system on sustainability performance. Hall (2000) discussed that SCSM as a systematic approach (as discussed in section 2.3.2), where buyers use supply chain power to mandate their suppliers' sustainability, is an effective approach to transfer stakeholder

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pressure on sustainability to the upstream supply chains. SCSM effectively improves supply chain environmental and social performance (Touboullic et al., 2014). In this research, the finding indicates SCSM trades off buyers' financial performance against environmental/social performance. Buyers are less likely to rely on environmental/social performance than on financial performance to make business decisions (Tachizawa & Wong, 2015). The substantial costs of SCSM may increase the reluctance of buyers in adopting SCSM. Even though buyers may adopt certain levels of SCSM, pressured by the fear for the supply chain sustainability risk imposed by their stakeholders, buyers are more likely to adopt the practices of window-dressing in order to avoid the substantial costs of SCSM. The practices of window-dressing provide little value to the improvement of environmental and social performance in the supply chains and reduce the effectiveness of the SCSM system as designed.

The mitigating sources of buyers' financial performance can be used to restore and maintain the effectiveness of the SCSM system in sustainability performance. Buyers' willingness to adopt SCSM is dependent on it doing no harm to their financial performance (Pagell & Shevchenko, 2014). In this research, despite the generally negative impact of SCSM on buyers' financial performance, there are factors (i.e., the nature of SCSM and firm-specific attributes) that influence buyers' negative financial performance. sSCSM and group SCSM can be developed as business strategies to proactively mitigate the costs that buyers have in their SCSM adoption. In particular, buyers that have high growth prospects need to deal with the high business risks of their SCSM adoption. Third-party certification and SRM are not significantly related to buyers' financial performance. Possible reasons for the insignificant findings are credibility issues in the application of third-party certification and the fitness of SCM strategies in the SCSM context. These possible reasons may provide potential insights into SCSM to mitigate buyers' costs further. The costs of SCSM adoption can be effectively reduced by strategically monitoring and analyzing these influential factors as found in this research. In turn, the reduced costs motivate buyers to continuously adopt SCSM to meet stakeholder demand for sustainability and to avoid supply chain sustainability risk. Thus, supply chain environmental and social performance can be improved and maintained. In the next sections, these influential factors are discussed in detail.

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5.1.2 sSCSM

The result shows that buyers have less negative financial performance when they require their suppliers to comply with the social dimension of SCSM practices (i.e., sSCSM). The result provides empirical evidence that buyers may utilize sSCSM as a strategy in SCSM design. Busse (2016) discussed that for each SCSM practice, associated financial performance effects can be computed by weighting the associated benefits against the costs. All implementable SCSM practices can then be sorted by their financial performance effects, beginning with those that pay off the most strongly and finally arriving at those for which the performance effects become negative. The finding of the mitigating effect of sSCSM in this research offers a measure by which to sort the order of the adoption between the practices of sSCSM and eSCSM. Buyers may begin with sSCSM practices (e.g., work safety) and incrementally move forward to eSCSM practices (e.g., carbon emission reduction). The less negative impact of sSCSM on financial performance enables buyers with sufficient resources to maintain the existing operations and incrementally implement more costly eSCSM.

This research fills the research gap concerning sSCSM in the literature. The main focus in SCSM research has remained on eSCSM (Ashby et al., 2012)). Both Seuring and Müller (2008) and Touboulic and Walker (2015) in their review of the SCSM literature called for filling the deficit of the research on sSCSM. This research contributes to the literature by exploring the effect of sSCSM on financial performance relative to eSCSM. Few studies have investigated the impacts of both sSCSM and eSCSM on financial performance (Pullman et al., 2009; Wang & Sarkis, 2013). However, these studies have mainly examined sSCSM as a part of integrated SCSM, discussed the consistently positive impacts of sSCSM and eSCSM on financial performance, and found an unclear impact of sSCSM relating to financial performance. In this research, sSCSM was explored as a strategic factor. A comparative discussion between sSCSM and eSCSM was presented. The empirical evidence provided in this research points to the effectiveness of sSCSM in mitigating buyers' negative financial performance relative to eSCSM. From the perspective of financial performance, this research fills the research gap concerning sSCSM in the literature.

The mitigating effect of sSCSM is quickly revealed to buyers; however, the negative effect of eSCSM can last over a long term. In contrast to their hypotheses, Wang and Sarkis (2013) found that eSCSM practices are negatively related to lagged financial

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performance (i.e., return on asset [ROA] and return on equity [ROE] two years after adopting these practices), but sSCSM practices are insignificant to the lagged financial performance. In this research, the concurrent measure of financial performance was employed (i.e., the abnormal returns associated with SCSM announcements), which provides an instant estimate of the current and future impact of SCSM on financial performance. Thus, the finding in this research indicates that the mitigating effect of sSCSM can be quickly revealed to buyers. In contrast, the substantial costs of eSCSM may persist in the long term (as shown by using lagged ROA and ROE in the study of Wang & Sarkis [2013]).

The mitigating effect of sSCSM relative to eSCSM may be reduced in certain industries. Pullman et al. (2009) found that in the food industry both eSCSM and sSCSM are not significantly related to buyers' cost performance. In this research, the observations in the food industry are only 2% of the total sample (in the category of 'others' in Figure 4.3). Thus, the effect of sSCSM in reducing negative financial performance relative to eSCSM may not be noticeable in the food industry. Also, the present research acknowledges that firms in certain industries (e.g., the chemical industry) may place particular weight on eSCSM as industry-specific factors (e.g., toxic materials and waste) may trigger a high environmental risk (Robertson & Nicholson, 1996). However, this research provides a generic pattern by controlling these industry-specific factors (by controlling the industry effect in the regression analysis). Thus, the less negative impact of sSCSM on buyers' financial performance should be considered in the SCSM design, when the choice between sSCSM and eSCSM is available.

5.1.3 Group SCSM

The result indicates that there is less negative financial performance when buyers collaborate by using the group SCSM approach. This finding complements the literature by providing empirical evidence supporting the benefits of buyers' collaboration in SCSM. The main focus in SCSM research has remained on buyer-supplier relationships, with discussion predominantly on the individual buyers' management of suppliers' compliance (Gimenez & Sierra, 2013; Jiang, 2009b; Tachizawa & Wong, 2015), and the consequence on buyers' financial performance (Golicic & Smith, 2013; Thornton et al., 2013). Carter and Rogers (2008) and Jacobs and Singhal (2017) discussed the possible benefits of buyers' collaboration in SCSM, such as reduction of transaction costs.

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Nonetheless, there has been a lack of empirical evidence to support their discussion. In this research, the benefits of buyers' collaboration are comprehensively discussed in line with the group purchasing literature (e.g., Nollet & Beaulieu, 2005; Nollet et al., 2016; Sandberg & Mena, 2015; Schotanus et al., 2010), where group SCSM share similar attributes. The finding supports the discussion of Carter and Rogers (2008) and Jacobs and Singhal (2017). The SCSM research should be extended to include buyers' collaboration because of the mitigating effect of group SCSM on the financial performance found in this research

The finding confirms buyers' benefits as discussed in the group purchasing literature (Nollet & Beaulieu, 2003; Schotanus & Telgen, 2007). Buyers' collaboration is a hybrid form, which extends the dichotomy of market versus hierarchy in the traditional TCE (Tella & Virolainen, 2005). The centralized and standardized institution creates a group effect, which increases the bargaining power, thus significantly reducing the transaction costs (Schotanus et al., 2010). Economies of scale and scope can also be achieved through the recurrent use of the same investment in group activities (Sandberg & Mena, 2015). The information sharing between group members improves the firms' expertise and know-how (Bakker et al., 2006). Group SCSM shares similar attributes to group purchasing as discussed in section 2.5.1.5.1. The finding of this research is consistent with that of the group purchasing literature, indicating similar benefits also come to buyers that collaborate in their SCSM adoption.

The effect of group SCSM on reducing buyers' negative financial performance found in this research provides an interesting discussion in comparison with the finding of Jacobs and Singhal (2017). After the 2013 Rana Plaza disaster in Bangladesh, two SCSM groups (i.e., AFBSB and ABWS) were formed to reinforce the inspection system for Bangladeshi factories. Jacobs and Singhal (2017) found an insignificant stock market reaction for the buyers who participated in these two SCSM groups. While AFBSB and ABWS were formed in response to the misconduct of the suppliers, the identified SCSM groups in the present research represent the proactive adoption of buyers' collaboration. The SCSM groups, such as "The Electronics Industry Citizenship Coalition", "Supply Chain Leadership Coalition", and "Automotive Industry Guiding Principles", were created amid the buyers' own concern about SCSM operations rather than in reaction to any significant aftermath of suppliers' misbehavior. Hence, the mitigating effect of group SCSM is likely to be revealed only to buyers that proactively search for collaboration. Jacobs and Singhal (2017) discussed the low contribution of the participating buyers in

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two SCSM groups after the Rana Plaza disaster led to an insignificant cost saving from the group efforts, which may reflect the nature of requiring genuine collaboration between member buyers in group SCSM. This genuine collaboration is more likely to be built with long-term commitments as illustrated in the SCSM groups in this research. The reactive formation of SCSM groups in response to non-compliant suppliers is unlikely to represent long-term cooperation between buyers but rather to rescue the stained image. Therefore, group SCSM is more effective when used as a proactive strategy rather than being used as a reactive mechanism.

5.1.3.1 Group SCSM – future development of SCSM

The present research discusses that group SCSM operations may provide a direction for future development of SCSM. As shown in some of the SCSM announcements in the sample of this research, several SCSM groups invited NGOs to join SCSM operations or to provide expertise and information on suppliers' monitoring; for example the partnership of 'Supply Chain Leadership Coalition' with the NGO 'Carbon Disclosure Project' (Spencer, 2007), and the collaboration in "Automotive Industry Guiding Principles" with the NGO 'CSR Europe' which represents 38 National Partners (PR Newswire, 2014). Due to a very small sample of group SCSM announcements indicating the partnership with NGOs, the effect of group SCSM together with NGOs is not statistically tested in this research. However, the close work of these buyers with NGOs links the SCSM groups to downstream stakeholders. Direct contact with downstream stakeholders through group SCSM discloses the participating buyers' efforts to end markets; in particular, the group effect may amplify the efforts and thus the reputation of the participating buyers. The reputation gain may bring the participating buyers the access to new markets, increasing sales and the charge of premium prices (Roberts & Dowling, 2002; Zhu & Sarkis, 2004).

Moreover, group SCSM enables the direct involvement of buyers' downstream stakeholders (e.g., NGOs) in SCSM operations. Downstream stakeholders hold buyers accountable for their suppliers' sustainability performance due to their concern with low visibility and stakeholder power to upstream suppliers (Busse, 2016). Group SCSM provides an opportunity that downstream stakeholders can directly be involved in sustainable operations in the supply chains by working with, for instance, NGOs. The transparency of the SCSM operations may effectively increase the market forces to

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reward the genuinely sustainable firms (both buyers and suppliers) and threaten firms' misconducts or window-dressing. The benefits of group SCSM to buyers' downstream stakeholders, buyers, and suppliers continuously motivate the joint efforts, which may present the future trend of SCSM.

5.1.4 Growth prospects

The results indicate that the buyers with high growth prospects experience more negative financial performance when they adopt SCSM. The finding is consistent with those of previous studies that have explored the impact of growth prospects on financial performance when firms face disruptions in their operations, such as product recalls (Ni et al., 2016; Thirumalai & Sinha, 2011), supply chain glitches (Hendricks & Singhal, 2003), and demand-supply mismatches (Hendricks & Singhal, 2008a). The firms with high growth prospects need to constantly introduce new and innovative products to keep competitive in the markets (Fisher, 1997; Hendricks & Singhal, 2003). These firms have a relatively high requirement for the reliability and responsiveness of their supply chains (i.e., even flow of operations as discussed in the theory of SEF in section 2.2.3.3). A disruption to operations substantially increases the costs of the firms with high growth prospect. The congruent finding in this research extends the previous studies to the SCSM context. The requirements on environmental and social performance in supplying are additional to the ordinary business activities (Touboulic & Walker, 2015). Buyers' planned throughput time and product specifications are required to change in order to realign with their suppliers' physical material flow upgraded with more environmental and social elements in operations, which creates a disruption to buyers' operations. The disruption created by SCSM is against the reliability and responsiveness strongly required by the buyers with high growth prospects, and thus adds more costs to the buyers. The consistent finding of this research with those in previous studies indicates the high business risks associated with high growth prospects when a disruption to firms' operations incurs, such as SCSM adoption.

The more negative financial performance to the buyers with high prospects is likely to reveal a gap between the SCSM required innovation and the present innovation. The firms with high growth prospects are often characterized as having high innovativeness (Fisher, 1997; Ni et al., 2016). Klassen and Vereecke (2012) found by using case studies that innovative firms have a high capability of developing an effective SCSM system and thus

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can improve sustainability and financial performance. In contrast, the finding of this research implicitly suggests that highly innovative buyers (i.e., buyers with high growth prospects) have not effectively transferred their innovativeness to cost-saving in the SCSM context. SCSM requires substantially different components and capabilities from SCM (Tachizawa & Wong, 2015). Most supply chains are presently not sustainable from environmental and social perspectives (Pagell & Shevchenko, 2014). The innovations that the firms have in the present supply chains scarcely include environmental and social elements. The integration of SCSM and present innovation may require substantial investment in supply chain operations over the long term (Geffen & Rothenberg, 2000), or radical innovation with new business models may be required in supply chain configurations (Pagell & Shevchenko, 2014). There may be a gap between the SCSM required innovation and the present innovation, which prevents the currently innovative firms from reducing the negative impact on financial performance when they adopt SCSM. While a certain cost-saving in some cases, as discussed by Klassen and Vereecke (2012), may occur, the finding of this research suggests that by using large empirical data and statistical analysis, on average the innovativeness that buyers with high growth prospects commonly have has not been effective in reducing the costs associated with SCSM.

5.1.5 Third-party certification

The coefficient sign of third-party certification is positive as predicted, but the coefficient is not statistically different from zero. The result indicates that the buyers that require their suppliers to meet SCSM compliance through third-party certification do not have a different financial performance from others by using different governance mechanisms (e.g., code of conduct).

The insignificant finding suggests that the buyers' choice of SCSM governance mechanisms may not be a factor influencing financial performance. SCSM governance mechanisms are necessary to ensure the suppliers' commitment to sustainability, and in general to improve suppliers' social and environmental performance (Gimenez & Sierra, 2013; Tachizawa & Wong, 2015). However, the transaction costs are substantially increased with any form of governance mechanisms (Dyer, 1997). The minor saving of using third-party certification may not sufficiently offset the transaction costs that are increased with buyers' management of additional supplying criteria (i.e., environmental

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and social performance) in SCSM. Other governance mechanisms such as code of conduct or collaboration may require higher buyers' costs and asset-specific investments than in the case of third-party certification (Jiang, 2009a), which could further increase negative financial performance.

Another aspect is that the credibility of third-party certification may be influenced by complex factors, thus creating an uncertain effect on financial performance. In the study of firms' internal efforts to improve environmental performance, Jacobs et al. (2010a) discussed that scope, prestige, certifiers, and transparency are different across different types of third-party certification, which, therefore, provides different levels of credibility. They found that there is no difference between firms' self-reported corporate environmental efforts and third-party certified environmental performance in firms' financial performance. However, ISO 14001 as a highly regarded environmental certification shows a significant and positive impact on financial performance. This research focuses on the overall effect of third-party certification on buyers' financial performance. The sample in this research covers different types of third-party certifications, where the scope, prestige, certifiers, and transparency may be various. Hence, the credibility of these third-party certifications may not be consistent, resulting in an insignificant relationship with buyers' financial performance. While this research was constrained by the sample size to study very specific categories of SCSM certifications, the result may suggest buyers should carefully evaluate the credibility of one type of third-party certification used in their SCSM.

5.1.6 Supplier relationship management

In this research, three measures were used to test buyers' SRM in relation to the financial performance in SCSM adoption. These are the ratio of COGS to sales, accounts payable turnover, and inventory turnover. Contrary to the predictions, none of the measures was found to be significantly related to buyers' financial performance.

In section 4.3, the test results showed the reduced explanatory power of the model by introducing three measures of SRM. After excluding any potential statistical reasoning (e.g., multicollinearity and non-linearity), the present research proposes that one potential cause is the gap between SCSM and SCM (as represented by SRM). SRM is an important component of SCM (Johnston et al., 2004). Good SRM has been widely found to improve firms' financial performance in ordinary business, where environmental and social

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elements are absent in operations (Forkmann et al., 2016; Lambert & Schwieterman, 2012; Liou & Gao, 2011; Tseng, 2014). SCSM is a concept developed by interacting SCM with sustainability (Ashby et al., 2012). SCM strategies (e.g., SRM) are expected to be highly relevant to SCSM adoption. The findings in this research, however, suggest that from the financial performance perspective the SRM strategies in SCM are not useful in the SCSM context. Pagell and Shevchenko (2014) critically discussed how today SCSM is researched as a separate stream of SCM. The authors argued that while SCSM research mostly relies on existing and traditional SCM strategies and practices (e.g., SRM), SCM practices and strategies are designed to improve financial result in the *absence* of the management of environmental and social performance in the supply chains. Therefore, there may be a limitation of applicability of these existing SCM strategies in the SCSM context as more than just financial result is considered. The finding in this research partially supports the argument of Pagell and Shevchenko (2014) with regard to the use of SRM (as one of the SCM strategies) relating to financial performance. In the SCSM research, scholars may have to move beyond traditional SCM strategies and adopt radical innovation in the development of the strategies that are fit for the SCSM context, where different business norms and performance measures should be accommodated (Pagell & Shevchenko, 2014).

Another possible explanation is that the used measures may not proxy the full domain of SRM. While the ratio of COGS to sales, account payable turnover, and inventory turnover are the established measures for SRM (Liou & Gao, 2011; Tang & Liou, 2010), the relational rents developed from good SRM may not be fully covered by using these measures, such as commitment and trust built by informal mechanisms (Cho et al., 2012; Forkmann et al., 2016). The present research discusses this limitation in detail in section 6.3.

5.1.7 Summary of the discussion from the perspective of buyers

This research adds value to the literature by finding the negative impact of SCSM on buyers' financial performance, where a relatively large sample and objective measures were used. This research reveals substantial costs to buyers in their SCSM adoptions. The literature that has used NRBV to discuss the impact of SCSM on buyers' financial performance has often overlooked these costs.

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sSCSM and group SCSM are discussed in this research as effective strategies to mitigate negative financial performance. In particular, group SCSM may represent the future development of the SCSM model. This research also discovered the vulnerability of buyers with high growth prospects in SCSM adoption, which may demonstrate that the innovativeness that firms with high prospects are characterized by has not been effectively transferred to cost-saving in SCSM adoption. While third-party certification and SRM were found insignificant in buffering buyers' negative financial performance, the potential explanations are discussed in relation to the credibility of third-party certification and potential divergent strategies and practices between SCSM and SCM.

5.2 Implications of SCSM adoption for buyers' corporate policies and society

The findings enable this research to provide buyers' managers and society with the insights of business risks and strategies relating to SCSM adoption. Buyers' managers are able to be more effective in adopting SCSM by allocating proper resources in dealing with the business risks. Moreover, only balanced development of environmental, social, and economic/financial performance is beneficial to society. Thus, supportive forces in society should be provided to mitigate the business risks that the buyers have. In addition to the corporate policies that buyers' managers may deploy, some implications for society are highlighted in this research, focusing on financial, technological, and political supports from downstream stakeholders. The cooperative operations of buyers and society can effectively mitigate the costs that buyers have in their SCSM adoption, which, in turn, continuously motivates buyers to improve the environmental and social performance of the supply chain.

5.2.1 Implications for buyers' corporate policies

Buyers' managers should improve internal capabilities and resources to buffer the costs in their SCSM adoption. This research provides four practical suggestions. First, buyers' managers can make a strategic choice between sSCSM and eSCSM. The response to the stakeholder pressure on SCSM can be initiated with the management of the social dimension of suppliers' operations (e.g., workplace safety), where the disruption to buyers' operations is relatively low. Buyers are able to reduce the costs at early stages in

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their SCSM adoption. Also, through these initial practices, the alignment of supply chain operations with the additional SCSM terms can be incrementally reached. Buyers, therefore, can adopt more complicated and costly practices of the environmental dimension of SCSM (i.e., carbon emission).

Second, buyers should proactively form SCSM groups and invite the participation of downstream stakeholders in the SCSM operations. In the collaboration between buyers, standardized and centralized SCSM mandates should be created to realize the reduction in operational and transaction costs and to share expertise. Moreover, buyers' managers should utilize the group effect to attract the participation of downstream stakeholders in the SCSM operations. The group SCSM that directly include the forces and supports of downstream stakeholders can effectively provide the buyers with the opportunities to promote their efforts to the end markets, thus improving the buyers' reputation and bringing financial benefits. Furthermore, governments and NGOs should also actively facilitate the formation and operations of SCSM groups. The proactive participation of downstream stakeholders motivates additional buyers to join SCSM groups, thus promoting the positive extension of group operations.

Third, buyers with high growth prospect should strategically reconcile SCSM to their supply chain design by strategic purchasing on a limited supply base. In this research, a more negative financial performance was found relating to buyers with high growth prospects. SCSM disrupts the reliability and responsiveness of the supply chains that are strongly required by buyers with high growth prospects. As the stakeholder pressures of SCSM are increasing, SCSM adoptions are also inevitable by buyers with high growth prospects. Strategic purchasing with a limited number of suppliers in a close working relationship can provide opportunities for these buyers to reduce the business risks in their SCSM adoption. A limited supply base is more likely to enable the cooperation of suppliers in transactions, where the information sharing is increased, suppliers' opportunism is reduced, and importantly, suppliers' asset-specific investment is encouraged (Chen et al., 2004). A limited supply base facilitates the buyers' realignment of their supply chain to maintain high reliability and responsiveness in their SCSM adoption. The highly cooperative suppliers developed by using a limited supply base can enable smooth compliance with the buyers' SCSM. The buyers with high growth prospects, therefore, can reduce the disruption to their supply chain operations and meanwhile meet downstream stakeholders' demand on SCSM.

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Fourth, buyers' managers should carefully evaluate the credibility of different types of third-party certification. In the choice of third-party certification, credibility is built on the evaluation of suppliers' commitment. Managers may assess the scope (single versus multiple facilities, environmental versus social dimension of sustainability), the certifier (government versus non-government), the prestige (short versus long history, low versus high requirements) to ensure the quality of different types of third-party certification.

5.2.2 Implication for society

There are three implications for society concerning buyers' negative financial performance. First, downstream stakeholders (e.g., governments, NGOs, and consumers) should offer a clear incentive to the buyers that adopt SCSM. Most downstream stakeholders do not appear to acknowledge the business risks that buyers have in their SCSM adoption, while continuously pressuring buyers to ensure sustainable operations in their supply chains (Hartmann & Moeller, 2014). As discussed (section 2.3.2), buyers' mandates are an important and effective method in the SCSM system of transferring sustainability responsibility to upstream supply chains. Downstream stakeholders should raise concerns about buyers' negative financial performance. The negative financial consequence from SCSM adoption discourages buyers' continuous investments and management in their supply chain environmental and social performance (Pagell & Shevchenko, 2014), which may threaten the continuity of the SCSM system. Buyers expect to gain credibility and reputation from downstream stakeholders through SCSM mandates (Busse, 2016). Governments and NGOs may stipulate rewards or awards publicizing buyers' SCSM efforts and therefore increase corporate credibility and reputation in end markets. Therefore, a high brand value, premium prices, and new market entry can be realized by the buyers.

Second, political and technological support from downstream stakeholders should be given to the buyers with high growth prospects when adopting SCSM. Buyers with high growth prospects are characterized by high innovativeness (Fisher, 1997; Ni et al., 2016). Buyers with growth prospects were found to have more negative financial performance in their SCSM adoption, indicating that the innovativeness that these buyers have is not effectively transferred in their SCSM and does not support financial growth. Firms' innovativeness and SCSM are both important to societal development (Beckman & Sinha, 2005; Busse, 2016). Downstream stakeholders should provide support to minimize the

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negative impact of SCSM adoption on buyers with high growth prospects. Additional political and technological support should be provided to reach the reconciliation of innovation and sustainability. The governments' financial support and funded training, as well as consultation with external experts (e.g., NGOs), may effectively develop technological innovation in the sustainability domain (van Hoof & Lyon, 2013).

Third, managers may improve communication with investors over their SCSM efforts. Buyers' managers may increase the awareness of investors over the substantial cost of supply chain sustainability risk to firms. SCSM mandates are an effective method of reducing risks and costs, which justifies buyers' SCSM initiatives. The investors will rebalance the cost structure associated with the SCSM efforts, and buyers' SCSM initiatives may not be so negatively evaluated.

5.3 Discussions on the findings of how suppliers are impacted by their buyers' SCSM

There is negative financial performance for suppliers required by their buyers to comply with SCSM. This research is the first empirical study to find suppliers' negative financial performance by using objective measures. The finding indicates that there is a discernible cost to the suppliers in their SCSM compliance. These costs are discussed as being harmful to the efforts in improving environmental and social performance and to overall society.

This research analyzed the nature of SCSM and supplier resources that influence suppliers' negative financial performance. Buyers' dependence on supplier and inventory slack are effective capabilities and resources that suppliers can build to buffer negative financial performance. A long-term relationship with buyers in the SCSM context, however, indicates more negative financial performance due to the increase in buyers' opportunism and transaction costs. The group SCSM approach tends to increase the negative impact of SCSM on suppliers' financial performance, in contrast to group purchasing which provides benefits to the suppliers. Financial slack is found to conditionally buffer suppliers' negative financial performance under a high level of supplier's dependence on buyer. The insignificant effect of sSCSM and third-party certification will be critically discussed below.

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In the next sections, the discussion will start with the finding of suppliers' negative financial performance. Each influential factor explored in this research will be discussed in the sections corresponding to the hypothesis sections in the literature review chapter.

5.3.1 The impact of SCSM compliance on suppliers' financial performance

The finding in this research suggests that buyers' SCSM has a negative impact on suppliers' financial performance. This research is the first to provide empirical evidence on suppliers' financial performance in response to their buyers' SCSM. The main interest in the SCSM literature has remained on buyers' perspective (e.g., Busse, 2016; Golicic & Smith, 2013; Hajmohammad & Vachon, 2016), providing little insight into the financial consequences for suppliers when required by their buyers to improve environmental and social performance. The uncertainty on financial performance results in difficulty in suppliers' managers' business-decision making concerning SCSM implementations and compliance. The finding in this research suggests that there is a discernable cost to suppliers of buyers' SCSM.

The exploration of suppliers' financial performance in this research answers the calls of Carter and Easton (2011) and Pagell and Shevchenko (2014). The authors discussed that the lack of analysis in the supply chain context leads to understanding only a limited set of impacts that SCSM may create. The analysis of SCSM should be at least at a dyadic level (Carter & Easton, 2011). This research responds to the authors' calls by revealing suppliers' negative financial performance in their SCSM compliance using the suppliers and their buyers as a supply chain dyad. The negative financial performance of both buyers (as discussed in section 5.1.1) and their suppliers (as in this section) provides the empirical evidence that SCSM is harmful to financial performance in the supply chain dyads.

5.3.1.1 Costs and benefits to the suppliers in SCSM compliance

This finding indicates that the costs outweigh the benefits for suppliers. The previous studies discussed the benefits to the firms in terms of improving their environmental and social performance, including increased purchasing prices (Busse, 2016), enhanced reputation, and cost reductions on labor, energy, and production lines (Markley & Davis, 2007). Nonetheless, these studies hardly counted in the costs of developing these benefits

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and the business risks raised by SCSM compliance. The substantial and continuous investment in manufacturing-changeover creates implementation costs to suppliers. The additional requirements in supplying criteria create compliance costs, where suppliers bear the disruption to the even flow of their operations. Many of the benefits created by suppliers' SCSM efforts may be retained by buyers.

These benefits discussed in the literature (Busse, 2016; Markley & Davis, 2007) may remain uncertain to suppliers. The increasing purchasing prices largely rely on the suppliers' traditional operational competence (e.g., costs, quality, flexibility, and delivery) rather than on environmental and social performance (Seuring & Müller, 2008). Cost-saving through SCSM implementation may be difficult to achieve and unlikely to offset the substantial implementation and compliance costs. Giunipero et al. (2012) conceptualized that investment and economic uncertainty are top barriers for suppliers in implementing sustainability practices. The finding in this research provides empirical evidence to support the study of Giunipero et al. (2012) that considerable costs are a reasonable concern for suppliers. The finding in this research suggests that these implementation and compliance costs outweigh the potential benefits that suppliers may have through SCSM.

Different benefits and costs may exist between self-selected and buyer mandate practices. The finding in this research contradicts that of Schmidt et al. (2017). By using survey-based methods, the authors found that suppliers have a positive financial performance when they implement green supply chain practices (e.g., the design of disassembly, reuse, recycling of materials, and environmental packaging). There may be two reasons for the conflicting findings. First, in their research design, 'suppliers' is defined by self-reported "business unit's position within the supply chain" (Schmidt et al., 2017, p. 12). The environmental practices are more likely to be suppliers' self-selected implementation. Suppliers may have high flexibility in adjusting internal operations to fit the SCSM design. Suppliers are also less likely to rely on the values shared with buyers to ensure financial performance. Thus, the compliance costs to the suppliers may not be substantial in the self-selected implementations as shown in the study of Schmidt et al. (2017). In this research, the focus is on suppliers' compliance with their buyers' SCSM in line with the discussion of stakeholder pressure in the SCSM literature (Hall, 2000; Touboulic et al., 2014). The nature of compliance adds compliance costs to suppliers, where disruption to operations and the retained values of buyers occur. Second, although there are some environmental benefits, the primary reason for these self-selected practices

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are more likely to be concerned with reducing costs (Dam & Petkova, 2014). However, suppliers' engagement in buyers' SCSM is primarily in the pursuit of environmental (and/or social) performance (Busse, 2016). The practices mandated by buyers contain more comprehensive environmental (and/or social) elements. Therefore, in this research, suppliers were found to have more costs than in the study by Schmidt et al. (2017). The SCSM literature has consistently found that downstream stakeholder pressure and buyers' enforcement are the main drivers of suppliers' improvement in environmental and social performance (Busse, 2016; Seuring & Müller, 2008; Touboulic & Walker, 2015). The present research is consistent with the literature through its focus on suppliers' compliance with buyers' SCSM. Relative to self-selected implementation, as in the study of Schmidt et al. (2017), the finding of this research suggests the most common impact of SCSM on suppliers' financial performance is negative.

5.3.1.2 The harm of suppliers' negative financial performance to the efforts to improve environmental and social performance and to overall society

Suppliers' negative financial performance in response to SCSM is harmful to the efforts of improving environmental and social performance in the supply chains. A high percentage of environmental and social problems take place in suppliers' operations (Gimenez & Sierra, 2013). Therefore, suppliers' sustainable operations are essential to the success of SCSM (Caniëls et al., 2013). However, investment and economic uncertainty are the highest barriers to suppliers regarding SCSM compliance (Giunipero et al., 2012). Foerstl et al. (2010) discussed that suppliers' commitment to SCSM efforts can only be maintained if there is no harm to their financial performance. The negative financial performance as found in this research may lead to greater supplier resistance to buyers' SCSM. Suppliers are unlikely to continuously improve their environmental and social performance. Each element of TBL in SCSM (i.e., environmental, social, and financial performance) should support each other (Pagell & Wu, 2009). Without the support of financial performance (i.e., suppliers' negative financial performance), the SCSM efforts to improve environmental and social performance in the supply chains may fail.

Suppliers' negative financial performance is a threat to the development of overall society. The improvement of supply chain environmental and social performance is an

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increasing social requirement (Tachizawa & Wong, 2015). Economic viability is also critical to human development (Pagell & Wu, 2009). Sustainability is expected to reach a balanced improvement among environmental, social, and economic/financial performance (Carter & Rogers, 2008). However, the finding in this research indicates the suppliers' improvement in environmental and social performance is a trade-off against the growth of financial performance. This trade-off is harmful to suppliers' operations. The negative financial performance associated with these efforts in SCSM decrease the availability of resources to maintain traditional operational performance. Quality, delivery, and flexibility may not be ensured while production costs are increasing. Suppliers' decreasing operational performance may restrict or reduce the supply volumes, which creates a contagion effect on their buyers. Buyers' delivery to the downstream markets may be negatively influenced by such as supply chain glitches. The overall society may be affected by the disruption of supply as a result of suppliers' struggle to fulfill SCSM. Pagell and Wu (2009) discussed that only 'true sustainability' contributes to the development of overall society, where firms can improve environmental and social performance while still maintaining economic viability. At this stage, this research found that SCSM does not create true sustainability.

Despite the generally negative impact of buyers' SCSM on suppliers' financial performance, not all suppliers have an equally negative financial performance. Supply chain power is identified as an influential factor, where the suppliers that have high buyers' dependence can reduce their negative financial performance. Suppliers in a long-term relationship with the buyers need to especially deal with the high business risk in SCSM compliance. The development of inventory slack is an effective business strategy that suppliers can deploy to mitigate the costs. The buffering effect of financial slack in the form of leverage, however, is conditionally effective based on the high dependence on buyers. In contrast to group purchasing, the suppliers that are required to comply with the group SCSM approach suffer more costs. The details of the discussions are provided in the next sections.

5.3.2 Supply chain power

Three measures of supply chain power (i.e., buyer's dependence on supplier, supplier's dependence on buyer, and relationship length) were used in this research. A high level of buyer's dependence on supplier reduces the suppliers' negative financial performance,

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while a long-term relationship with buyers increases the negative effect. Supplier's dependence on buyer was found not to be statistically significant to suppliers' financial performance.

The findings in this research support that supply chain power is an important factor in the analysis of suppliers' financial performance in the SCSM context. The focus on studying supply chain power in SCSM has, from buyers' perspective, remained on the management of suppliers' compliance (Hoejmose et al., 2013; Touboulic & Walker, 2015) or buyers' financial performance (Dabhilkar et al., 2015). In this research, the effectiveness of supply chain power from the suppliers' perspective in dealing with business risks relating to SCSM was examined. The findings suggest that the suppliers that have high buyers' dependence can explore the opportunity to mitigate the negative financial performance, while suppliers in a long-term relationship with buyers need to deal with the substantial costs.

This research evaluates the effect of supply chain power on suppliers' financial performance by using three objective measures. In previous SCSM studies that have investigated the effect of supply chain power (Dabhilkar et al., 2015; Hoejmose & Adrien-Kirby, 2012; Touboulic et al., 2014), justification has largely been based on case studies or survey-based research using perceptual measures. Case studies may limit generalizability, due to the lack of systematic statistical evidence (López-Gamero et al., 2010). Perceptual measures may merely represent the unilateral perspective of power (i.e., by only using the perception of power by either buyers or suppliers) (Kim & Wemmerlöv, 2015). In this research, the bilateral and objective measures of supply chain power address the dependence of both upstream and downstream in the supply chains. This research supplements previous studies with rigorous empirical data, providing a stronger rationale for prescribing strategies to deal with the negative financial performance concerning SCSM.

5.3.2.1 Different power effect in disruptive and favorable supply chain practices

The power effect may differ depending on suppliers' financial performance in different supply chain practices. By also using event study methodology, Deitz et al. (2009) found suppliers have positive financial performance when they are enforced by their buyers to conduct supply chain technology integration, and this positive financial performance is

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increased with high supplier's dependence on buyer. In this research, there was found to be no significant effect of supplier's dependence on buyer in suppliers' financial performance, while suppliers were found to have negative financial performance in SCSM compliance. The different findings may be caused by the nature of supply chain practices that suppliers must comply with. In the study of Deitz et al. (2009), the authors found that overall positive financial performance indicates that the buyers' mandates on supply chain technology integration are a favorable practice amongst suppliers. In such a favorable practice, the suppliers that are highly dependent on buyers may have an opportunity to explore more benefits, as the buyers' practice positively influences a large percentage of overall business due the high dependence on buyers. In this research, the overall negative financial performance found for suppliers shows that buyers' SCSM mandates are a disruptive practice to suppliers. The finding in this research indicates that in such a disruptive practice, the high dependence on buyers is not a factor that influences financial performance.

In contrast, the result in this research suggests a clear mitigating effect of high buyer's dependence on supplier in a disruptive practice such as buyers' SCSM. The suppliers that have high buyers' dependence have high buyers' loyalty in the relationships, and thus fewer transaction costs in their SCSM compliance (Kim & Wemmerlöv, 2015). The suppliers that have high buyers' dependence may also motivate buyers' desire for mutual benefits, thus allowing an equal share of the value generated from SCSM (Hawkins et al., 2008). The reduction in transaction costs and increased shared value are effective resources to reduce suppliers' negative financial performance, as proven by the finding in this research.

Nonetheless, Deitz et al. (2009) did not measure the effect of buyer's dependence on supplier (BDS) on suppliers' financial performance in their study. It is uncertain, in a favorable practice, how suppliers' financial performance will change with high buyer's dependence. Further investigation in future research may provide an interesting comparison with the finding in this research.

5.3.2.2 Relationship length

The result suggests that the negative impact of buyers' SCSM on suppliers' financial performance increases with the relationship length.

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This finding is partially congruent with the study of Brown et al. (2009). The authors found that suppliers' abnormal returns are negatively related to buyers' leverage buyouts (i.e., acquisition by using debt), and a long and dependent relationship (i.e., the combined measure of a long-term relationship and high supplier's dependence on buyer) increases suppliers' negative abnormal returns. While Brown et al. (2009) focused on the financial perspective (i.e., leverage buyouts), this research explores the effect of relationship length on suppliers' financial performance from the operations and supply chain perspective (i.e., SCSM compliance). SCSM adoption increases buyers' costs (as the buyers' negative financial performance found in this research). When managing the suppliers' compliance with SCSM, the increased asset-specific investment of a supplier in a long-term relationship gives the buyer an opportunity to reduce the costs by exploiting the supplier. Thus, a buyer's SCSM will create more costs for a supplier that has a long-term relationship with the buyer.

In the SCSM context, a long-term relationship may increase buyers' opportunism. Previous studies found that a long-term relationship can increase trust in the buyer-supplier relationship, which mitigates the buyers' opportunism (Hawkins et al., 2008; Johnston et al., 2004). Suppliers may reduce the transaction costs by decreasing opportunism in a long-term relationship and thus improve their financial performance (Liu et al., 2009). The finding in this research contradicts that of these previous studies, suggesting the increased buyers' opportunism in the SCSM context due to their substantial costs. The trust effect of improving financial performance is more likely to be in pursuit of mutual benefits between buyers and suppliers, such as improving supply chain responsiveness (Handfield & Bechtel, 2002), and building cooperative relationship behaviors (Johnston et al., 2004). This research found that in the SCSM context, buyers have substantial costs in the SCSM adoption. In a long-term relationship, there is increasing asset-specific investment and thus high cost of switching to alternative buyers. Buyers are more likely to utilize this chance of opportunism to reduce their own costs. Therefore, suppliers that have been in a long-term relationship with their buyers have more costs in their SCSM compliance as found in this research

Moreover, in the SCSM context, buyers may not have the same vulnerability to suppliers' opportunism. Kim and Wemmerlöv (2015) discussed that in a long-term relationship, where buyers have dominant power, buyers do not have a large asset-specific investment with their suppliers, because buyers manipulate the asset-specific investment in the relationship with their power to safeguard against suppliers' opportunism. In the

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SCSM context, as shown in Table 4.6, buyers on average have higher power than suppliers. Thus, while suppliers may suffer from their buyers' opportunistic behavior, they are unlikely to reduce their costs by doing the same to their buyers.

In summary, in SCSM compliance, a long-term relationship is more likely to increase buyers' opportunism, thus suppliers' costs. The finding in this research suggests suppliers' costs increase with relationship length. The trust that is built in a long-term relationship may reduce the opportunism, which is, however, unlikely to be relevant in the SCSM context due to the substantial costs on buyers.

5.3.3 sSCSM

Although the coefficient of sSCSM is positive as predicted, the coefficient is not statistically different from zero. There is no significant impact found on suppliers' financial performance when they are required to comply with the social dimension of SCSM (i.e., sSCSM).

Suppliers' nature of compliance may explain the insignificant relationship between sSCSM and suppliers' financial performance. In general, a positive relationship between the social dimension of sustainability practices and financial performance is supported in the literature (Lo et al., 2014; Orlitzky et al., 2003). However, these previous studies have mainly focused on firms' internal improvement of the social dimension of sustainability practices, where firms make their own strategic choices on the tasks and timeline of the implementation. In this research, suppliers are compelled by their buyers' strategic choices to improve the social dimension of SCSM. The green bullwhip effect suggests that buyers intend to improve suppliers' compliance by compressing the timeline and increasing the stringency of sustainability requirements (Lee, 2016; Lee et al., 2014). Buyers may attempt to exploit suppliers' compliance with sSCSM by continuously adding requirements (e.g., a higher standard or shorter timeline), which eliminates potential benefits such as costs savings and quality improvement as discussed in section 2.5.2.3. Thus, the sSCSM is not significantly related to suppliers' financial performance as found in this research.

5.3.4 Third-party certification

While the coefficient of third-party certification is negative as predicted, the coefficient is not statistically different from zero. There is no significant impact on

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suppliers' financial performance when they are required by their buyers to comply with third-party certification.

The insignificant finding may be related to the nature of third-party certification at the supplier level. Third-party certification at the supplier level is mostly process-based (Foerstl et al., 2015). Suppliers are mainly certified by having underlying environmental and/or social processes in their operations. However, these certifications do not ensure the improved environmental or social outcomes at suppliers' sites (Hoejmose & Adrien-Kirby, 2012). The level of continuous investment in maintaining and improving environmental and social performance is uncertain once the desired value in the third-party certification is attained. This uncertainty regarding the actual investment in suppliers' compliance may be the reason for the insignificant finding on third-party certification.

5.3.5 Group SCSM

Suppliers' financial performance was found more negative when their buyers collaborate by using the group SCSM approach. Few SCSM studies have provided a similar discussion to group SCSM in relation to suppliers' financial performance (Carter & Rogers, 2008; Jacobs & Singhal, 2017). However, there has been a lack of empirical evidence in the literature. Drawing on the discussion in the group purchasing literature (Nollet & Beaulieu, 2005; Sandberg & Mena, 2015; Schotanus et al., 2010), this research suggests a negative impact of group SCSM on suppliers' financial performance.

The consolidation and standardization of SCSM practices are harmful to suppliers' financial performance. Carter and Rogers (2008) discussed that that consolidation of the auditing procedures adopted by an industry coalition can allow a signal, effective supplier sustainability audit, which decreases suppliers' transaction costs. Suppliers, otherwise, have to meet different SCSM criteria from individual buyers (Jacobs & Singhal, 2017). SCSM groups consolidate the auditing procedures that are mainly created by industry peers (as discussed in section 2.5.1.5.2). Thus, group SCSM discussed in this research refers to the 'industry coalition' suggested by Carter and Rogers (2008). However, the finding in this research indicates that the 'consolidation of auditing procedures' creates additional costs for suppliers. The nature of group SCSM is to improve suppliers' commitment to SCSM implementations. The consolidation and standardization of SCSM practices reinforce compliance costs that suppliers may bear, because group SCSM

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creates institutional pressure and stringent compliance as discussed in section 2.5.2.5. The additional compliance costs are substantially greater than the benefit suppliers may have (e.g., reduction on transaction costs), which is supported by the finding in this research.

Group SCSM and group purchasing have different impacts on suppliers' financial performance. The finding in this research is in contrast to those in the group purchasing literature. In group purchasing, suppliers, in general, improve their financial performance. While buyers reduce their purchasing costs, suppliers maximize their revenue by the increased sales volumes (Anand & Aron, 2003). The suppliers may also realize economies of scale and scope, as group purchasing provides suppliers with a minimum quantity of orders and multiple product categories that individual buyers cannot guarantee (Sandberg & Mena, 2015). Additionally, with the expansion of group purchasing from traditional its purchasing function to include inventory management, supply chain finance, and IT solution, suppliers may have spare resources freed from inventory holding, cash flow pressure, and infrastructure investment (Shi et al., 2016). In contrast, this research found that group SCSM increases suppliers' negative financial performance. The reason may be that the improvement of environmental and social performance does not lead to the increased sales volume of suppliers from their buyers. Cost is a buyers' primary concern in supply chain operations (Tachizawa & Wong, 2015). In group purchasing, suppliers offer lower purchasing prices, which increases their sales volume to buyers, and thus suppliers' revenue. In group SCSM, suppliers primarily improve their environmental and social performance (Carter & Rogers, 2008). However, buyers do not make a purchasing decision primarily based on suppliers' environmental and social performance (Tachizawa & Wong, 2015). Improved environmental and social performance cannot ensure suppliers' increased sales volume from their buyers. The intensified pressure from group SCSM increases the suppliers' costs in SCSM compliance (as discussed in section 2.5.2.5). Thus, in contrast to group purchasing, the group SCSM approach increases suppliers' negative financial performance.

Suppliers' negative financial performance may decrease the effectiveness of group SCSM in environmental and social performance. The group purchasing literature has found that the savings on purchasing costs can be effectively achieved by group purchasing due to the pressure of group work on supply markets (Schotanus & Telgen, 2007). Using a similar argument, the institutional pressure created by group SCSM may effectively improve supply chain environmental and social performance. However, the continuous saving by group purchasing is supported by the mutual benefits to buyers and

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suppliers (Tella & Virolainen, 2005). While buyers reduce their purchasing costs, suppliers increase their sales volume (Anand & Aron, 2003). Given suppliers' negative financial performance as found in this research, the effectiveness of group SCSM in improving environmental and social performance may be reduced in the long term. Nollet and Beaulieu (2005) discussed the harm to the group purchasing when suppliers have negative financial performance as a result of buyers' excessive control of purchasing costs. In the case that buyers carelessly use their negotiation power to drive prices down, suppliers could be forced to withdraw from the markets and/or merge with/acquire other suppliers in the long term. Also, the entry barriers are increased in supply markets. Alternative suppliers may not have sufficient sales volume to continue their business. In the long term, suppliers' power would dynamically move to a high level relative to the buyers due to the high concentration in the supply markets (Cox, 2014). Buyers may have no option but to deal with powerful suppliers with high purchasing prices (Nollet & Beaulieu, 2005). The same effect, as discussed by Nollet and Beaulieu (2005), may also be relevant to group SCSM due to the shared attributes with group purchasing. In the group SCSM context, the negative financial performance as found in this research may also pressure suppliers to either withdraw from the markets or acquire/merger with other suppliers. The high entry barriers (e.g., environmental performance in addition to traditional operational performance) prevent new entrants. Suppliers' power may also move dynamically to a high level relative to buyers. Buyers may have to negotiate with a few powerful suppliers over SCSM implementations by using the group SCSM approach. SCSM as a systematic approach is supported by buyers' power to effectively transfer sustainability responsibilities to suppliers (Hall, 2000). The suppliers' high power in supply markets would create a substantial barrier to the implementation of SCSM (Touboulic et al., 2014). Consequently, effective efforts of group SCSM to improve supply chain environmental and social performance would be substantially reduced.

5.3.6 Operational slack

Capacity slack, inventory slack, and supply chain slack were used to measure the suppliers' operational slack. While the coefficients of capacity slack and supply chain slack are positive as predicted, the coefficients are not statistically different from zero. There is no significant impact of capacity slack and supply chain slack on suppliers'

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financial performance. Inventory slack was found to have a significant effect on mitigating suppliers' negative financial performance as predicted.

The results suggest building inventory slack is an effective operational strategy that suppliers may adopt to mitigate the negative impact of SCSM. The advantage of holding spare inventory mirrors as presented in the findings of Azadegan et al. (2013) and Wood et al. (2017), demonstrating the necessity of building inventory slack in the face of disruption (e.g., suppliers' SCSM compliance). The additional inventory provides suppliers with the flexibility to reallocate resources as necessary to ensure continuity of supply, which ensures the sustenance of their operations and, thus, cash flow to address the SCSM commitments. As buyers increasingly enforce SCSM (Gimenez & Tachizawa, 2012), the buffer afforded by slack may be valuable. The evidence of buffering afforded by inventory slack provides the empirical evidence that suppliers' managers must strategically plan the inventory slack to prepare for the business challenge (e.g., suppliers' SCSM implementations).

The result suggests firms need to strategically analyze market conditions when choosing to develop operational slack and efficiency. Driven by the concepts of lean management, many firms have focused on improving operational efficiency by eliminating slack and redundancy (Hopp & Spearman, 2004). There is empirical evidence that operational efficiency is positively related to firms' financial performance (Modi & Mishra, 2011; Shah & Ward, 2003). However, these studies mostly focus on a stable market environment (i.e., the absence of SCSM compliance as a disruption to the even flow of operations). Buyers' SCSM changes their suppliers' market conditions, where social and environmental performance are additional operational criteria in supplying (Seuring & Müller, 2008). This change in the market conditions disrupts the even flow of suppliers' operations. The sole emphasis on leanness increases the suppliers' vulnerability in dealing with operational disruption (Hendricks et al., 2009). The adaptability and flexibility built with operational slack reduce the suppliers' business risks relating to SCSM compliance. The finding in this research provides empirical evidence to support that the presence of inventory slack is rewarded in the suppliers' SCSM compliance. The effectiveness of operational slack in financial performance under various disruptive market conditions has been found in previous studies (i.e., the overall negative financial performance has been found, and operational slack reduces negative financial performance) (Azadegan et al., 2013; Hendricks et al., 2009; Kovach et al., 2015; Wood et al., 2017). The result of this research adds value to the literature,

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suggesting that firms need to strategically analyze the market conditions (i.e., disruptive or stable) and develop appropriate operations attributes. While operational efficiency is beneficial in a stable market condition, firms need to effectively utilize operational slack to reduce business risks when facing a disruptive market condition, such as SCSM compliance.

Firms should make strategic choices in the form of operational slack that they use in disruptive market conditions. Inventory, capacity, and supply chain slack are the three most common forms of operational slack (Kovach et al., 2015). However, the mitigating effects of the three forms of operational slack vary over the different types of disruptive market conditions. Wood et al. (2017) found capacity slack increases firms' negative financial performance in toy recalls, while inventory slack reduces negative financial performance. Hendricks et al. (2009) found that inventory slack has no significant effect, but supply chain slack and capacity slack can reduce firms' negative financial performance in supply chain disruptions. Kovach et al. (2015) found that in unstable market conditions (i.e., high market instability), supply chain slack has a negative impact on the firms' financial performance, while capacity and inventory slack improves the financial performance. Similar to these prior studies, the findings of this research suggest that inventory slack is an effective form of operational slack in reducing suppliers' negative financial performance in the context of suppliers' SCSM compliance. In contrast, capacity slack and supply chain slack have no significant buffering effects. The results of this research and those of previous studies indicate that choice in the forms of operational slack should be carefully considered in the different disruptive market conditions. Firms may not have sufficient resources to develop every form of operational slack. A wrongly-deployed form of operational slack wastes resources (as the insignificant effect of capacity slack found in this research) and may even create a negative impact on financial performance (as the negative impact of capacity slack found by Wood et al. (2017)). Due to the high stakeholder pressure, SCSM has been increasingly adopted by buyers in modern business (Tachizawa & Wong, 2015). The finding in this research was that suppliers need to focus on developing inventory slack rather than supply chain and capacity slack, which provides the most effective cushion for negative financial performance.

Wood et al. (2017) discussed that the disruption-specific context (i.e., toy recalls and the toy industry in their study) may have an impact on the effectiveness of the different forms of operational slack in terms of firms' financial performance. In this research, the

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SCSM-specific conditions may make capacity slack and supply chain slack less effective. First, fundamental SCSM compliance is to require suppliers to undergo a change in internal manufacturing processes. Therefore, capacity slack (e.g., equipment and machinery) is likely to become obsolete by transitions to more sustainable operations. Capacity slack is found to be more useful in buffering the disruptions when changes to internal operations are not required, such as supply chain disruption (Hendricks et al., 2009) and venture survival (Azadegan et al., 2013).

Second, suppliers' benefit of high supply chain slack may be offset by buyers' management of cash flow. Supply chain slack is estimated by a cash-to-cash cycle which is cash flow between a firm's upstream and downstream supply chains (Kovach et al., 2015). A long cash-to-cash cycle indicates that a firm has a positive account balance, which should provide sufficient cash flow to support the firm in any operational difficulty (Hendricks et al., 2009). However, a core component in a long cash-to-cash cycle is the high level of 'accounts receivable'. Accounts receivable is the trade credit offered by suppliers to buyers in order to maintain suppliers' existing sales volume (Oliveira et al., 2017), and thus the management of supply chain slack requires collaboration from buyers (Farris & Hutchison, 2002). In the context of suppliers' SCSM compliance, given buyers' negative financial performance and bargaining power, buyers are more likely to secure their own cash flow by delaying the payment of suppliers' accounts receivable. Therefore, suppliers may not effectively utilize the supply chain slack to buffer the negative financial performance. In the disruptions where the power between supply chain partners is less relevant, such as supply chain disruptions (Hendricks et al., 2009), or sales surprise (i.e., actual sales exceed expected sales) (Manikas & Patel, 2016), the supply chain slack is found to be an effective buffer.

5.3.7 Financial slack

Financial slack is measured by leverage in this research. High leverage indicates a low level of financial slack. While the coefficient of leverage is negative as predicted, the coefficient is not statistically different from zero. The result indicates that financial slack alone does not have a significant effect on reducing suppliers' negative financial performance.

The finding in this research is consistent with previous studies that have examined the effect of financial slack under disruptive conditions, while using a different form of

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financial slack. Voss et al. (2008) found no significant effect of financial slack measured by cash reserves on product exploration and exploitation. Wood et al. (2017) found no significant effect of financial slack measured by inventory-adjusted working capital on financial performance in toy recalls. Wood et al. (2017) also called for using an alternative form of financial slack to further explore the mitigating effect in a disruptive condition. This research answered their call by using leverage as the form of financial slack. The consistent result in this research to the previous studies adds knowledge to the literature that the effectiveness of financial slack as a buffer to the firms under these disruptive conditions is not salient.

In contrast, by employing meta-analysis Daniel et al. (2004) found that financial slack is significantly and positively related to firms' financial performance. The authors used multiple forms of financial slack (e.g., leverage and working capital). The finding of the insignificant effect of financial slack in this research may be related to the operational slack that suppliers hold. Daniel et al. (2004) focused only on financial slack. This research is consistent with Wood et al. (2017) and Voss et al. (2008), where the mitigating effects of both operational and financial slack were considered. Operational slack shows the ease of redeployment and versatility in the application of a broad set of production-related issues (Azadegan et al., 2013), which have been widely found to be effective in mitigating business risks (Wood et al., 2017). While financial slack is an important resource to support firms' growth (Daniel et al., 2004), it may be reasonably assumed that the presence of firms' operational slack reduces the necessity of holding financial slack. In this research, there is a low correlation between operational slack and financial slack, as shown in Table 4.8. The finding in this research is congruent with that of Wood et al. (2017) and Voss et al. (2008), where financial slack is not significantly related to financial performance when operational slack is considered. The presence of suppliers' operational slack may be the reason for the insignificant effect of financial slack found in this research.

5.3.8 The interaction of financial slack and supplier's dependence on buyer

The result indicates that a high level of leverage (thus a low level of financial slack) and supplier's dependence on buyer has a significant and negative effect on suppliers' financial performance. The finding suggests financial slack has a buffering effect on

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suppliers' negative financial performance, which is, however, only effective under high supplier's dependence on buyer. Figure 5.2 recapitulates the interaction plot. Financial slack is measured by supplier's leverage, where a high level of leverage indicates a low level of financial slack. The horizontal axis shows the level of leverage. Suppliers' financial performance is measured by suppliers' CAR on the vertical axis. The dashed line indicates the high supplier's dependence on buyer. The downward slope of the dashed line shows that suppliers' CAR is reversely related to suppliers' leverage under a high level of supplier's dependence on buyer.

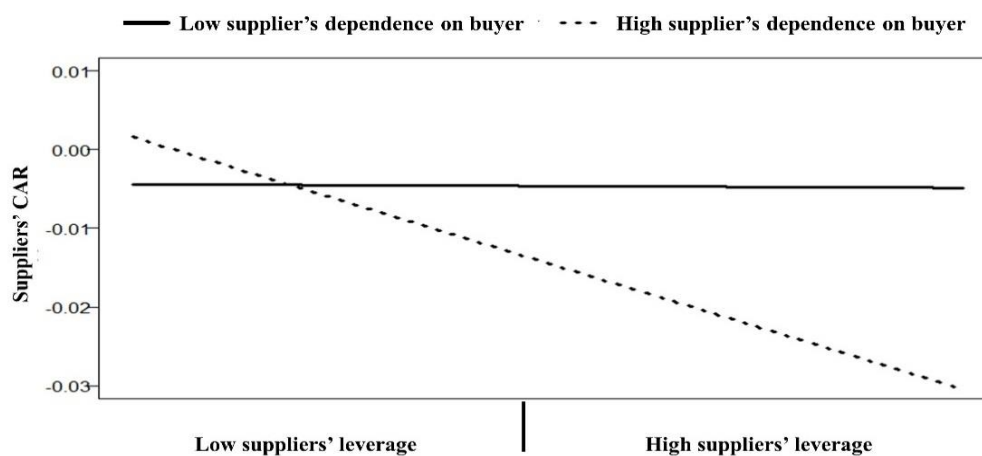


Figure 5.2 Interaction Plot for the Effect of Financial Slack under a High Level of Supplier's Dependence on Buyer on the Financial Performance for Suppliers (reproduced from Figure 4.6)

The effectiveness of financial slack in reducing firms' business risks is conditional. The finding in this research is consistent with that of Voss et al. (2008) and Mishina et al. (2004). The authors in both studies found that financial slack alone does not have a significant buffering effect of reducing various business risks, while the effectiveness of financial slack is significant when financial slack interacts with additional disruptive conditions (e.g., environmental threat and new product development). In this research, the financial slack alone was found to be insignificantly related to suppliers' financial performance. However, under a high level of supplier's dependence on buyer, financial slack was found to be an effective buffer to suppliers' negative financial performance. The high level of supplier dependence on buyer intensifies suppliers' needs in compliance with buyers' SCSM requirements, due to the high percentage of sales to buyers in suppliers' overall business. Therefore, supplier's high dependence is an additional

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disruptive factor that increases the requirement of slack resources to maintain suppliers' operations while complying with buyers' SCSM. The congruent finding in this research to those previous studies provides empirical evidence that the effectiveness of financial slack as a buffer is conditional. Unless there is a strong disruption caused by additional factors (i.e., high supplier's dependence on buyer in this research), the financial slack is not useful in reducing firms' business risks.

This finding adds knowledge to the literature by investigating an alternative form of financial slack. The results in this research (i.e., the insignificant buffering effect of financial slack alone but a significant buffering effect of financial slack interacting with additional disruptive conditions) are consistent with previous studies (Mishina et al., 2004; Voss et al., 2008). However, leverage is used in this research as an alternative form of financial slack in contrast to cash reserves (Voss et al., 2008) and working capital (Mishina et al., 2004). Cash reserve, working capital, and leverage are different forms of financial slack, where leverage has the strongest impact on firms' financial performance as found in the meta-analysis of Daniel et al. (2004). The use of leverage as a form of financial slack in this research supplements previous studies, and provides robust evidence that the effectiveness of different forms of financial slack (e.g., leverage, working capital, and cash reserve) is only significant when additional disruptive conditions exist.

In summary, the suppliers in their SCSM compliance may not have to always maintain financial slack, as the insignificant buffering effect of financial slack alone was found both in this research. However, the effectiveness of financial performance as a buffer is revealed when interacting with additional disruptive conditions. A high level of financial slack is required when the disruptive condition refers to the supplier's dependence on the buyer in the SCSM context.

5.3.9 Summary of the discussion from the perspective of suppliers

Suppliers' financial performance was found to be negative when they are required to comply with their buyers' SCSM. The finding suggests that there is a discernible cost to suppliers in their SCSM compliance. The present research discusses that suppliers' negative financial performance is harmful to sustainability efforts and overall society. The negative financial performance reduces suppliers' resources of investing in the

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maintenance of environmental and social performance and of continuing their business, which creates a contagion effect to reduce the production of buyers and the delivery to the downstream markets.

The factors influencing suppliers' negative financial performance are explored in this research. Supply chain power was found to be an essential factor in SCSM research, which needs to be addressed in the analysis of suppliers' financial performance. Particularly, buyer's dependence on supplier and relationship length are the significant factors that influence suppliers' financial performance. In contrast to group purchasing, suppliers have negative financial performance when their buyers use the group SCSM approach, suggesting that environmental and social performance as the primary concern in group SCSM can not ensure suppliers' growth in revenue. Among three forms of operational slack (i.e., capacity, inventory, and supply chain slack), inventory slack is the most effective resource suppliers can build to mitigate the negative financial performance, indicating the buffering effect of inventory slack in a disruptive market condition. Financial slack in the form of leverage has a conditional buffering effect. Unless a high level of supplier dependence on buyers exists, financial slack is not a salient resource to reduce the negative financial performance in suppliers' SCSM compliance. Third-party certification and sSCSM were found insignificantly related to financial performance. Third-party certification in the SCSM context is process-based rather than performance-based; therefore, it may create uncertainty regarding suppliers' actual costs, which is the potential reason explaining the insignificant effect of third-party certification. Due to the nature of compliance, suppliers are compelled to buyers' uncertain changes in stringency and conditions in SCSM implementation, which is the possible explanation of the insignificant effect of sSCSM.

5.4 Implications of SCSM compliance for suppliers' corporate policies, buyers, and society

The findings enable this research to provide managers and society with insights into business risks and strategies relating to SCSM compliance. For suppliers' managers, the explored mitigating sources provide insights into the necessary resources that suppliers need to deploy under the increasing pressure of buyers' SCSM. Moreover, suppliers' negative financial performance is harmful to buyers' operations and society due to the

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contagion effect in the supply chain operations. Thus, supportive forces from buyers and society should be provided to mitigate the business risks that suppliers have. The implications for suppliers' corporate policies, buyers, and society are provided in this research.

5.4.1 Implications for suppliers' corporate policies

The present research provides five practical suggestions to suppliers' managers in coping with negative financial performance in SCSM implementations.

First, suppliers may proactively request buyers' support when high buyers' dependence exists. The positive relationship between buyer's dependence on supplier (BDS) and suppliers' financial performance indicates the potential opportunities for supplier development from buyers (e.g., information and capability sharing) in SCSM compliance. When a buyer mandates SCSM practices, the managers of a supplier may strategically analyze the buyer's power and dependence in the supply markets (with publicly available data). If it is observed that there is a higher level of the buyer's dependence on the supplier than on peers, suppliers' managers may utilize the information to proactively negotiate to establish collaborative programs relating to SCSM implementation, where additional benefits (e.g., inventory flexibility) may be achieved through compliance.

Second, suppliers should strategically develop inventory slack. As suppliers may not have sufficient resources to develop every form of operational slack, they will, therefore, need to evaluate the trade-off associated with likely events. In the case of SCSM implementation, suppliers' managers should concentrate on the strategic development of inventory slack, as this research has demonstrated that it is most likely to cushion negative financial performance. Moreover, investors could appreciate inventory productivity (i.e., low inventory slack) in ordinary operations (i.e., in the absence of SCSM implementation) (Alan et al., 2014). Suppliers need to explain to investors the necessity of building inventory slack with increasing buyers' mandates on SCSM implementation so that investors accurately reflect the value of slack in their valuations (Hendricks et al., 2009).

Third, suppliers' managers should strategically develop financial slack. This research found the mitigating effect on financial slack in SCSM implementation is conditional. Unless the level of supplier's dependence on buyer (SDB) is high, financial slack does not reduce suppliers' negative financial performance. Suppliers' managers should balance

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the firms' financial slack with market information. Financial slack may not be necessarily developed when a supplier is required by its buyer to comply with SCSM. However, the suppliers' managers should measure the dependence on the particular buyer in the overall business. If compliance is required by a buyer taking a high percentage of sales of the suppliers' total business, financial slack is needed. The development of an effective form of financial slack is to reduce the leverage ratio.

Fourth, suppliers' managers should be careful with long-term relationships with the buyers that mandate SCSM practices. In the SCSM context, long-term relationships are more likely to be a mechanism used by the buyers to conduct opportunism; suppliers' managers, thus, should develop protective strategies to safeguard buyers' opportunism. An effective safeguard is 'supplier development investment', where suppliers negotiate with buyers to provide direct financial, technical, and quality training assistance to suppliers relating to SCSM implementation (Mahapatra et al., 2012), which may increase buyers' asset specific investments and thus reduces buyers' opportunism. However, the ultimate solution may be the change in buyers' negative financial performance, which may release buyers' financial difficulty and motivate genuine buyer-supplier relationships in the long term.

Fifth, suppliers may negotiate with SCSM groups to develop cooperative programs. As observed in the announcement sample, suppliers have not actively participated in the decision-making of SCSM groups, possibly due to the low supply chain power. In fact, suppliers' managers may strategically present genuine commitments, technological advantages, and operational competence to SCSM groups, which can effectively attract SCSM groups to design a collaborative function with suppliers.

5.4.2 Implications for buyers and society

Suppliers' negative financial performance in SCSM compliance may have a contagion effect on buyers' operations and society. The negative financial performance reduces suppliers' resources and ability to maintain operational competence. Buyers' operations are negatively influenced by the reduced supply in volume and speed. Also, the substantial costs increase suppliers' resistance to SCSM compliance (Giunipero et al., 2012). The continuous improvement of supply chain environmental and social performance as demanded by society cannot be provided. Therefore, buyers and society

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are required to proactively support the suppliers in dealing with the business risks in SCSM compliance. There are two relevant implications provided in this research.

First, buyers and downstream stakeholders should motivate suppliers implementing SCSM practices. Reputation is an important asset in SCSM, however, is less likely to be secured by suppliers due to their position in the upstream supply chain (Schmidt et al., 2017). Buyers and downstream stakeholders may facilitate the reputational exposure of suppliers' compliance through sustainable eco-labels available to consumers. Suppliers are thus provided with a mechanism to share the profits reaped from sustainable operations (e.g., cost reduction on supply chain sustainability risk). Such mechanisms can highlight the efforts made by supply chains and enable a more equitable sharing of the benefits of SCSM across the different firms involved.

Second, buyers and downstream stakeholders should effectively utilize the resources created by group SCSM to support suppliers' sustainable operations. The group SCSM approach is beneficial to buyers through cost reduction and to downstream stakeholders by improvement in environmental and social performance. Suppliers, however, bear more costs. The member buyers in SCSM groups may share the costs to create co-funding programs to financially support compliant suppliers. SCSM groups can expand the supply chain collaboration with suppliers into inventory management, supply chain finance, and IT solutions. For example, SCSM group members may share with suppliers the information on the market demand for sustainable goods, where the suppliers can build inventory flexibility to reduce the costs of compliance.

5.5 Discussions on the finding of the difference in financial performance relating to the green bullwhip effect

The green bullwhip effect indicates that buyers impose a shorter timeline of compliance and add more stringent sustainability practices to their suppliers than what is actually demanded by their downstream stakeholders (Lee et al., 2014). In this research, from the financial performance perspective, the green bullwhip effect is regarded as adding more costs to suppliers due to the compressed timeline and rigorous practices in their SCSM compliance. The finding supports the prediction that suppliers have more negative financial performance than their buyers in SCSM.

5.5.1 The opposite financial performance to environmental performance and buyers' shift of the costs of SCSM to their suppliers

This research provides empirical evidence on the consequence of the green bullwhip effect on financial performance. Previous studies have found that the green bullwhip effect amplifies the environmental stringency of upstream supply chains, and thus improves supply chain environmental performance (Lee et al., 2014; Seles et al., 2016). Nonetheless, the resulting effect on financial performance remains unclear (Schmidt et al., 2017). In this research, samples of buyers and their paired suppliers were used in order to be consistent with the studies of Lee et al. (2014) and Seles et al. (2016), as major studies of the green bullwhip effect. Objective measures and statistical tests were used to ensure a high level of generalizability in order to supplement the studies of Lee et al. (2014) and Seles et al. (2016) by using case studies.

The green bullwhip effect creates opposite environmental performance to financial performance, indicating buyers' shift of the associated costs with SCSM to their suppliers. The compressed timelines and stringent requirements imposed by buyers increase the scale of SCSM implementation in the upstream supply chains. There is a positive spill-over effect with regard to supply chain environmental/social performance (Seles et al., 2016). Lee et al. (2014) proposed that the green bullwhip effect is not necessarily a negative phenomenon and might create positive value that exceeds direct costs as suppliers may be capable of providing their buyers with greener/safer products ahead of demand in the point of sales. However, the finding in this research contrasts with the proposition of Lee et al. (2014). Environmental and social performance is not transferred to the resources that offset the considerable costs of SCSM implementation (as the negative financial performance of buyers and suppliers found in this research). The green bullwhip effect increases the requirements of suppliers' investment in environmental/social management relative to their buyers. Thus, suppliers suffer more severely negative financial performance. In contrast to generating positive value that exceeds direct costs as suggested by Lee et al. (2014), this research adds understanding to the green bullwhip effect that financial performance is worse in the upstream supply chains.

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The reason for more negative financial performance of suppliers than their buyers is buyers' shift of the costs to their suppliers. The main cause of the green bullwhip effect is buyers' information distortion to create a buffer in their SCSM adoption (Lee et al., 2014). This buffer enables buyers to reduce their costs of suppliers' opportunism in SCSM. Suppliers have substantial costs in SCSM compliance as found in this research (section 5.3.1). Suppliers may intend to reduce the costs by opportunistically violating the pre-agreed environmental and social conditions in their compliance. The more rigorous practices and compressed timeline can ensure a certain level of suppliers' sustainability performance. Buyers can reduce the supply chain sustainability risk and the associated costs. Also, the buffer reduces buyers' negotiation costs in suppliers' SCSM compliance. The distorted information amplifies the urgency of the demand from downstream stakeholders, which reduces the costs of buyers to provide an incentive to their suppliers in SCSM compliance (Adobor & McMullen, 2014). Nonetheless, this buyers' buffer creates additional costs taken by suppliers in the SCSM compliance, due to the overly rigorous practices and conditions (Schmidt et al., 2017). The finding of more negative financial performance for suppliers than buyers in this research supports the buyers' shift of the costs to their suppliers in SCSM.

5.5.2 The effective shift of costs to paired supply chain partners and by high supply chain power

The shift of the associated costs of SCSM may be more effective between the paired supply chain partners (i.e., buyers and their immediate suppliers) and with a high level of buyers' power. The finding in this research contradicts that of Schmidt et al. (2017). In contrast to their prediction linking with the green bullwhip effect, the authors found that financial performance decreases from the upstream to the downstream supply chains. Two issues may lead to the different finding of Schmidt et al. (2017) from that in this research. First, buyers can more effectively shift the costs to their paired suppliers. Schmidt et al. (2017) categorized the supply chain positions based on self-reported measures. In their methodology section, "A total of 750 randomly selected companies from German-speaking Europe were contacted [...]. Informants were asked to choose their business units' position within the supply chain" (Schmidt et al., 2017, pp. 9, 12). Therefore, the downstream and upstream firms may not be paired supply chain partners (i.e., buyers and their immediate suppliers working in the same supply chains). However,

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the green bullwhip effect is consistently found between the buyers and their paired suppliers (Lee et al., 2014; Seles et al., 2016). A buyer can effectively coerce the suppliers working in the same supply chains to include a more stringent and additional sustainability requirement. In this research, the paired sample was used, which is consistent with the studies of Lee et al. (2014) and Seles et al. (2016). In contrast to that of Schmidt et al. (2017), the finding in this research suggests that buyers can more effectively shift their costs to their paired suppliers.

Second, a high level of buyers' power supports the shift of costs to paired suppliers. Lee et al. (2014) found that suppliers' responses to the green bullwhip effect vary as the supply chain power differs. The suppliers that have low supply chain power relative to their buyers are coerced by highly stringent sustainability practices, while the suppliers that have high supply chain power are influenced by their buyers using non-coercive strategies (e.g., negotiation). In the link to financial performance, buyers are less likely to effectively transfer their costs to suppliers that have high supply chain power, because the non-coercive strategies used by buyers indicate buyers need to share the costs with their suppliers in SCSM (Jiang, 2009a). In this research, as shown in Table 4.6, buyers have high supply chain power relative to their paired suppliers in the sample. The finding of greater suppliers' negative financial performance bears the attribute of high buyers' supply chain power. In contrast, Schmidt et al. (2017) did not evaluate the supply chain power in their study. The finding of this research indicates buyers can effectively transfer the costs to their suppliers when supply chain power is in favor of buyers.

In summary, the green bullwhip effect improves supply chain environmental performance by adding stringent and compressed sustainability practices toward upstream supply chains. However, the consequence of the green bullwhip effect on financial performance is the increased costs in the upstream supply chains, indicating buyers' shift of their costs to their suppliers. Moreover, the effectiveness of buyers shifting costs to their suppliers is high when the suppliers are paired supply chain partners, and the buyers have high supply chain power.

5.6 Implications of the green bullwhip effect for suppliers' corporate policies, buyers, and society

Linking with the green bullwhip effect, suppliers were found to have more negative financial performance than their buyers, suggesting a greater business risk to suppliers that comply with their buyers' SCSM. In this research, the implications for suppliers' corporate policies are provided. Suppliers' managers can proactively mitigate the additional costs by strategically increasing buyers' dependence and information sharing.

Moreover, the green bullwhip effect occurs in a supply chain context, where environmental requirements are transferred from downstream stakeholders to their next tier supply chain partners (Lee et al., 2014). The ultimate solution to remove the additional costs raised by the green bullwhip effect requires the cooperation offered by the buyers and society. The implications for buyers and society are also provided in this research. The financial, technological, and political support from the buyers and society in cooperation with suppliers can ultimately remove the additional costs in relation to the green bullwhip effect.

5.6.1 Implications for suppliers' corporate policies

The present research discusses two strategies that suppliers' managers may use to reduce the costs in relation to the green bullwhip effect. First, suppliers may strategically increase buyers' dependence and develop a loyal partnership with buyers. Buyers in transactional relationships with their suppliers are more likely to amplify and compress the SCSM demands to the suppliers than in a partner-based relationship, as in a transactional relationship, the low buyer's dependence on supplier may allow buyers to exercise power to enforce additional SCSM practices (Lee et al., 2014). Suppliers, therefore, may strategically increase buyers' dependence by, for example, attracting buyers' asset-specific investment, which motivates buyers to move from transaction-based to partner-based relationships. The increasing importance of the suppliers in buyers' supply chain operations can defer buyers to add the extra burden of SCSM on suppliers.

Second, as illustrated in the classic bullwhip effect (Lee et al., 1997a), information distortion is a critical cause of the green bullwhip effect. Thus, information sharing on SCSM demands is necessary in the supply chains. The information sharing is twofold.

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On the one hand, suppliers may improve buyers' visibility of the information on suppliers' sustainability competence. As discussed in section 2.5.3.2, one of the important causes of the green bullwhip effect is buyers' rationing game, where buyers' uncertainty of suppliers' compliance encourages buyers' tougher SCSM requirements to mitigate potential delay and low commitment. Suppliers, therefore, must proactively provide buyers with their information on sustainability capabilities, managerial dedication, and operational slack, which effectively increases buyers' confidence in suppliers' competence in SCSM practices. On the other hand, an integrated SCSM information flow must be created in the supply chains. Buyers, as the partners in the central position between upstream suppliers and downstream stakeholders, need to develop integrated sustainability information systems, where the information on suppliers' competence and accurate sustainability demand may be continuously exchanged and evaluated. The low uncertainty created by the integrated information flow may translate into appropriate SCSM practices and timelines.

5.6.2 Implications for buyers and society

The reduction of the negative consequence of the green bullwhip effect on suppliers' financial performance requires the cooperation offered by buyers and society. It depends on buyers how the downstream stakeholders' demand for sustainability is transferred to their suppliers, and in turn, whether a green bullwhip effect occurs (Lee et al., 2014). As buyers' financial performance remains negative in their SCSM adoption, buyers are unlikely to remove the shift of their SCSM costs by compressing timelines and increasing the stringency of sustainability practices in their suppliers' SCSM compliance. Suppliers, thus, are unlikely to avoid the additional costs as discussed in the green bullwhip effect. The ultimate solution to the additional costs that are raised by the green bullwhip effect is to improve buyers' financial performance in their SCSM adoption, which requires the cooperation of the partners from the downstream to the upstream supply chain.

Buyers' managers can adopt corporate policies as discussed in section 5.2, such as using the group SCSM approach. Society needs to work with buyers and suppliers in their SCSM practices jointly. Consumers should be aware of constraints in firms' efforts to improve their environmental and social performance. The willingness to pay for sustainably produced products provides a great financial incentive for buyers and suppliers that conduct sustainable operations. Governments and NGOs should offer

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technological and political support in addition to penalizing firms that show environmental and social misconduct. Government rewards (e.g., tax reduction) should be provided to sustainable buyers and suppliers in addition to regulatory pressure. NGOs can propagate and facilitate the technology and know-how related to environmental and social elements in products and production. The technology and know-how should provide add-on attributes that can be easily incorporated into existing processes rather than investing in extensive change-over in manufacturing. Also, governments and NGOs can facilitate the identification of sustainable suppliers to consumers by improving information transparency, which creates a market demand for the products related to the suppliers' operations.

The cooperation among suppliers, buyers, and downstream stakeholders can ultimately create a synergy among environmental, social, and financial performance. The synergy can remove buyers' concern about the costs associated with SCSM. In turn, the negative financial consequence of the green bullwhip effect on suppliers can be removed.

5.7 Theoretical contributions

In this research, the established theories deepen the understanding of the phenomena relevant to SCSM and help to develop the hypothesized relationships. The findings by the hypotheses testing can be related back to these established theories and provide useful insights into theory development (Stratton, 2008). The theoretical contributions of this research focus on suggestion, explanation, and extension of stakeholder theory, the green bullwhip effect, TCE, and the theories of SEF and VUB.

5.7.1 Coercive and supportive forces in stakeholder theory

This research suggests stakeholder theory should consider the stakeholders' supportive functions in addition to the coercive force in the SCSM context. Shareholder theory has merely contained the coercive force in the SCSM context. Stakeholder theory illustrates that stakeholder pressure is a core force in firms' adoptions of SCSM practices, and this pressure is transferred from the downstream to the upstream firms (as discussed in section 2.3.2). This research discusses that stakeholder pressure in the SCSM context is more likely to be a coercive force concentrating on improving supply chain environmental and social performance. Downstream stakeholders (governments, NGOs, consumers) continuously request buyers to adopt SCSM practices due to the concern for

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environmental and social performance. However, buyers' negative financial performance found in this research illustrates the uncertainty of buyer support and rewards from downstream stakeholders. Moreover, suppliers are pressured by their buyers (i.e., suppliers' stakeholders) to implement SCSM practices. However, suppliers' financial performance was found to be more negative than their buyers. The finding demonstrates that in the SCSM context, buyers as a stakeholder to suppliers merely focus on shifting their costs and fulfilling their own market demands by using stakeholder power. Stakeholder theory in the SCSM context is more likely to illustrate the coercive force to improve environmental and social performance while overlooking the supportive force to reduce negative financial performance.

The supportive function of stakeholders should be added to stakeholder theory in the SCSM context. Stakeholder pressure, as an important element in the SCSM system, effectively coerces firms in the supply chains to improve their environmental and social performance. However, stakeholders' supportive force is missing in the SCSM context. The failure of SCSM increases buyers' and suppliers' costs (e.g., supply chain sustainability risk). The firms that comply with their stakeholder demands on sustainability, however, are unsure of business success. Stakeholder theory in the SCSM context should include supportive forces for compliant firms. For example, governments could provide regulatory benefits (e.g., tax reduction) to firms with good environmental and social performance. Consumers would be willing to pay for the firms' sustainability efforts. NGOs could promote the brand image of sustainable firms. Buyers would increase the purchasing prices or volume of sustainable suppliers, given that buyers are rewarded and supported by their downstream stakeholders. Meanwhile, the coercive force of stakeholders should remain to pressure for continuous improvement and genuine compliance in environmental and social management. Supply chain sustainability risk and associated costs could effectively defer the firms' environmental and social misconduct. If the balanced use of coercive and supportive force was illustrated in stakeholder theory in the SCSM context, suppliers, buyers, downstream stakeholders could together meet different stakeholders' expectations on environmental, social, and financial performance.

5.7.2 The financial performance in relation to the green bullwhip effect

This research adds understanding to the green bullwhip effect by exploring related financial performance, suggesting the green bullwhip effect creates an opposite impact on environmental performance to financial performance in the supply chains. The focus of studying the green bullwhip effect has remained on the changes in environmental performance (Lee et al., 2014; Seles et al., 2016). The stringent practices and compressed timeline lead to the increasing implementation of environmental practices from the downstream to the upstream supply chains. The supply chain environmental performance, thus, is improved with the overly strict requirements. Financial performance relating to the green bullwhip effect is found in this research. The intensified requirements on the SCSM implementations add more costs to the upstream suppliers, suggesting buyers' shift of the costs associated with SCSM to suppliers. The financial performance, thus, decreases from the downstream to the upstream supply chains.

Suppliers' increased costs relating to the green bullwhip effect as found in this study indicates that SCSM should be studied in a supply chain context. SCSM research has remained focused on buyers' financial performance (Carter & Easton, 2011). This research links the green bullwhip effect to financial performance and reveals that buyers can shift their costs to their suppliers. Any potential improvement of buyers' financial performance in their SCSM adoption may indicate buyers' cost reduction through outsourcing of environmental and social responsibilities to their suppliers. A limited impact of SCSM in the supply chains is seen if focusing only on buyers. Thus, in the analysis of financial performance in the SCSM context, multiple links in the supply chains should be explored (e.g., buyers and suppliers). An SCSM approach should be developed that provides solutions to dealing with business risks in the holistic supply chains.

5.7.3 A further extension to TCE

This research supports that a hybrid form created by buyers' collaboration as an extension to TCE reduces buyers' transaction costs. Traditional TCE suggests the firms should use transaction costs as a unit of analysis to make a business decision between 'buy' and 'make' (Williamson, 1981). Group purchasing extends TCE by adopting buyers' collaboration as a hybrid form between buy and make. The hybrid form can effectively

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reduce the transaction costs for both buyers and suppliers in purchasing while keeping the independence of operations to explore low production costs in market transactions (Tella & Virolainen, 2005). Group SCSM in this research also refers to the hybrid form, where buyers collaborate to work on SCSM. From buyers' perspective, the finding in this research supports the group purchasing literature that the group SCSM approach can effectively reduce buyers' transaction costs. The increased bargaining power creates an institutional pressure, which can save buyers' negotiation and enforcement costs in managing their suppliers' SCSM compliance.

This research further extends TCE by identifying the shift of buyers' transaction costs to their suppliers. In group purchasing, the overall transaction costs are reduced in the buyer-supplier relationship through the mutual benefits. While buyers reduce their negotiation, search, and enforcement costs, suppliers also reduce their transaction costs as they deal with the consolidated transactions from a group of buyers (Tella & Virolainen, 2005). In contrast, in this research the suppliers that comply with the group SCSM approach were found to have more negative financial performance, suggesting buyers' transaction costs are shifted to their suppliers through the hybrid form. The consolidation and standardization of buyers' SCSM mandates may partially reduce suppliers' transaction costs (Carter & Rogers, 2008). However, the increased bargaining power by using the group SCSM approach enables the buyers to intensify their suppliers' compliance. Buyers may opportunistically add stringent conditions and compress the timeline of implementations so that they can buffer their operations to meet the downstream stakeholders' demands (Lee et al., 2014). In group SCSM, transaction costs are still in the buyer-supplier relationship but shifted from the buyers to their suppliers.

In group SCSM, buyers shift additional transaction costs as a result of SCSM. In group purchasing, it is more likely that buyers reduce the existing transaction costs by using the hybrid form. When buyers pursue low production costs by using market transactions (i.e., purchasing), transaction costs inevitably incur (Grover & Malhotra, 2003). By using the group SCSM approach, buyers are more likely to reduce the additional transaction costs. Environmental and social performance are additional terms to the ordinary transactions due to the downstream stakeholder pressure (Tachizawa & Wong, 2015). The management of supply chain environmental and social performance adds transaction costs (e.g., extra coordination and control costs) to buyers in the buyer-supplier relationships (Dam & Petkova, 2014). The additional transaction costs are not offset by the improvement in operations as indicated by buyers' negative financial performance

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found in this research. Group SCSM increases the buyers' bargaining power and thus enables the buyers to reduce the additional transaction costs by shifting them to their suppliers. Additional transaction costs incur as a result of SCSM, which is the reason that group SCSM is utilized to shift buyers' transactions costs to their suppliers.

5.7.4 The application of the theory of SEF and the extension to the theory of VUB

The theoretical contributions of this study are also underlined by the application of the theory of swift, even flow (SEF) and explanation of the theory of variation and uncertainty buffering (VUB) in a supply chain context, focusing on buyers' and suppliers' financial performance. There are previous studies that have investigated the effect of buffering mechanisms in a disruption to the even flow of operations in the context of product recall (Wood et al., 2017), supply chain disruptions (Hendricks et al., 2009), dynamic environments (Kovach et al., 2015), and product exploitation and exploration (Voss et al., 2008). However, these studies have mainly focused on single firms. This research expands the application of SEF to a supply chain context, focusing on buyers' and their suppliers' operations linked to SCSM, as well as empirically testing the propositions of SEF and VUB by using event study methodology. Buyers' additional requirements in the supply criteria result in the increased variabilities and thus disrupts the even flow of suppliers' operations. While suppliers' financial performance is degraded, there is a knock-effect on buyers' operations. The variabilities in supply chains consequently also disrupt buyers' even flow in production and decreases the financial performance. The findings of buyers' and their suppliers' negative financial performance support the propositions of SEF and VUB that this disruption degrades financial performance.

Moreover, multiple buffering mechanisms from the perspective of suppliers were empirically tested in this research. The finding of the buffering effect of inventory on suppliers' negative financial performance supports the proposition of VUB that firms that adopt buffering mechanisms can protect their financial performance from the disruption to the even flow of operations. From suppliers' perspective in the SCSM context, this research additionally identified that inventory slack is a more effective buffer mechanism than capacity slack, which further explains VUB in the choice of buffering mechanisms.

Furthermore, this research explains VUB by finding the conditional buffering effect of financial slack. VUB illustrates three buffering mechanisms: forward load, inventory,

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and capacity (Stratton, 2008). Financial slack in the form of leverage is not discussed in VUB. In this research, the conditional effects of financial slack under a high level of supplier's dependence on buyer is found. The finding illustrates that in a supply chain context, supply chain power should be considered as a trigger for the necessity of holding financial slack when a disruption to the even flow of operations occurs. This finding explains VUB by including financial slack as a buffering mechanism to protect financial performance, and explaining the choice of financial slack (i.e., leverage) and the condition of effectiveness (i.e., supply chain power).

In summary, this research answers the calls for verification of SEF and VUB through empirical testing (Schmenner, 2004; Stratton, 2008) and expands the application of the theories from a single firm to the level of supply chain dyad. This research explains VUB by exploring financial slack as a buffer mechanism in addition to those proposed by VUB.

5.8 The synthesis of the discussions on the research findings

In this research, the novelty of studying supply chain dyads in SCSM contributes the initial step of exploring the supply chain impact of SCSM to the literature. The findings in this research provide empirical evidence that SCSM degrades the shareholder value within supply chain dyads and negatively affects both suppliers and buyers. The detrimental financial performance supports the discussion on cost outweighing benefits from the supply chain perspective, where the adoption of sustainability practices substantial disrupts the even flow of supply chain operations. While SCSM provides a systematic approach for propagating sustainability practices upstream along the supply chain (Busse, 2016), the detrimental financial performance for supply chain dyads would discourage the long-term management and implementation on sustainability practices in supply chains.

The study of SCSM on the level of supply chain dyad also enables this research to discover the extent of buyers' cost transfer to their suppliers in SCSM. This finding is important as the review of the literature in this research shows that SCSM research is dominated by studying from the buyers' perspective, and some studies found positive financial performance for buyers (e.g., Busse, 2016; Dam & Petkova, 2014; Golicic & Smith, 2013; Thornton et al., 2013; Wang & Sarkis, 2013). The evidence of buyers'

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shifting cost to their suppliers raises an interesting question about the positive financial performance for buyers suggested by the previous studies: Does buyers' positive financial performance merely indicate that these buyers have the competence to transfer the costs associated with SCSM to their suppliers, and suppliers consequently bear more detrimental financial performance? The finding in this research suggests the importance of studying the impact of SCSM at the supply chain level rather than solely relying on the buyers' perspective.

This research took the first step in exploring the influential factors relating to financial performance. The significant factors found in this research show the opportunities that firms can deal with the negative impact of SCSM. The influential factors from buyers' perspective are mostly related to the SCSM governance (e.g., group SCSM and sSCSM). Additionally, buyers with high growth prospects should take special care in dealing with the increased variabilities in supply chain operations. The influential factors from suppliers' perspective relate to operational competence. Suppliers can improve own operational capacity by strategically developing inventory- and financial-slack. The increased resources can not only buffer the disruption but also reduce buyers' intent to use "rationing gaming" strategy and thus shift costs to suppliers. Suppliers should also tactically measure and enhance their supply chain power, which creates the opportunity to gain buyers' financial and technical support.

Economic viability is important for business firms to maintain the SCSM governance and implementation (Foerstl et al., 2015). The finding of detrimental financial performance in this research indicates substantial efforts required for the supply chain actors to achieve the synergy of TBL, where the support in downstream markets, efficient and effective governance, and the fitted operational competence for SCSM need to be developed.

5.9 Chapter conclusion

In this chapter, the research findings were highlighted, discussed and compared with previous studies, providing academic, managerial, and societal implications. The theoretical contributions of the research focus on stakeholder theory, the green bullwhip effect, TCE, the theory of SEF and VUB. This research complements the SCSM literature, focusing on investigating the impact of SCSM on financial performance in a supply chain dyad (i.e., buyers and suppliers), exploring the mitigating sources to reduce the costs and

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business risks that buyers and suppliers should deal with, and examining buyers' shift of the costs to their suppliers linked with the green bullwhip effect. The influential factors explored have implications for further research to develop a framework of SCSM, where financial, environmental, and social performance can be improved in a synergic manner as SCSM is designed for.

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“To be truly sustainable a supply chain would at worst do no net harm to natural or social systems while still producing a profit over an extended period of time; a truly sustainable supply chain could, customers willing, continue to do business forever.”
(Pagell & Wu, 2009, p. 38)

The preceding chapter discussed the academic and managerial implications of this research. This chapter provides the conclusion for this research. The contribution of this research will be discussed in this chapter, and the answers to the research questions will be provided. The value of this research to a wider context will be presented. The limitations of this research and future directions driven by this research will be discussed. Finally, a final remark will be provided to close the thesis.

6.1 The contribution of this research

This research provides four broad contributions.

First, by using objective measures and a relatively large sample, this research quantified the negative impact of buyers' SCSM adoption on their financial performance with unbiased analysis. The research explored the business risks to buyers in SCSM adoption, and thus increased the knowledge on the relationship between SCSM and buyers' financial performance.

Second, this research, as the first, found the negative impact of buyers' SCSM on their suppliers' financial performance. Given the buyers' negative financial performance, the finding of the negative impact on suppliers' financial performance highlights the impact of SCSM in the supply chain context (in dyadic relationships).

Third, suppliers' financial performance was found to be more negative than their buyers'. While suppliers are mandated on more stringent sustainability practices, buyers, in fact, shift their financial costs to their suppliers.

Fourth, this research explored the factors that influence negative financial performance from both buyers' and suppliers' perspective. The findings indicated opportunities for firms at any level of the supply chains to offset negative financial performance.

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These four broad contributions are supported by achieving the research objectives and answering the research questions. Next, the research objectives and questions are restated, and concise answers are provided.

6.1.1 Research objective one

Research objective one: to investigate the impact of buyers' SCSM on their financial performance, using objective measures.

Research objective one is achieved. This research concludes that SCSM adoption has a negative impact on buyers' financial performance. This negative impact is reduced by the use of the social dimension of SCSM practices (i.e., sSCSM) and the group SCSM approach. The buyers that have high growth prospects have a more negative impact. This research objective is achieved by providing the answers to two research questions (i.e., 1.1 and 1.2).

6.1.1.1 Answer to research question 1.1

Research question 1.1: What is the impact of buyers' SCSM on their financial performance?

This research used event study methodology to test buyers' abnormal returns in response to SCSM announcements in a relatively large sample of 308 SCSM announcements. There is statistically significant and negative mean cumulative abnormal return (CAR) in the event window (-1,1) at -0.22%. Thus, **research question 1.1** is answered by showing that the impact of SCSM on buyers' financial performance is negative.

This research contributes to the literature by providing an unbiased and statistically generalized result that demonstrates the negative impact of SCSM on buyers' financial performance. Prior to this research, the SCSM literature remained uncertain as to whether SCSM improved buyers' financial/economic performance. Perceptual measures were predominately used while hardly addressing social desirability bias. Due to the use of objective measures, this research does not suffer from social desirability bias. Also, the relatively large sample size and the different SCSM programs across industries and countries used in this research provide a relatively precise estimate of buyers' financial performance supported by high statistical power.

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6.1.1.2 Answer to research question 1.2

Research question 1.2: What factors influence the negative impact of buyers' SCSM on their financial performance?

OLS regression was used to test the hypothesized factors against the CARs. The ratio of COGS to sales, accounts payable turnover, and inventory turnover was not found to be significantly related to the buyers' CARs, which indicates that supplier relationship management does not reduce buyers' negative financial performance. However, growth prospects were found to be significantly and negatively related to buyers' CARs; thus, buyers with high growth prospects have more negative financial performance. The use of third-party certification to manage suppliers' SCSM commitments was not found to be significantly related to buyers' CARs; therefore, the buyers that use third-party certification as the governance mechanism in SCSM do not have a better financial performance than those using code of conduct. Buyers that require their suppliers to comply with sSCSM practices (e.g., improving labor welfare) and that collaborate with other buyers through group SCSM were both found to have less negative financial performance.

Research question 1.2 is answered by highlighting the following SCSM attributes and firm-specific characteristics as influential factors in buyers' negative financial performance;

- sSCSM: the social dimension of SCSM (e.g., working conditions, labor rights, diversity)
- group SCSM: buyers' collaboration on mandating suppliers to improve environmental and social performance
- growth prospect: buyers having a high market expectation of their growth (measured by the ratio of market to book value)

These findings enable this research to provide evidence of the effectiveness of three business strategies to mitigate negative financial performance. First, buyers may strategically choose to require suppliers to improve the social dimension of SCSM rather than beginning with the environmental dimension of SCSM (e.g., reduction of carbon emissions). Second, buyers may proactively collaborate with peers to conduct SCSM mandates, which create the sharing of both the business risks and the benefits of SCSM. Third, buyers with high growth prospects should be cautious in adopting SCSM; external

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support from downstream stakeholders should be claimed, and supply chain design should accommodate the negative impact with strategic purchasing.

6.1.2 Research objective two

Research objective two: to investigate the impact of buyers' SCSM on their suppliers' financial performance by using objective measures, providing a supply chain impact of SCSM.

Research objective two is achieved. This research concludes that buyers' SCSM has a negative impact on their suppliers' financial performance. Both buyers' and suppliers' negative financial performance suggest a negative impact SCSM in a supply chain context (with a dyadic relationship). From suppliers' perspective, the negative impact of buyers' SCSM on the financial performance is reduced by a high level of buyer's dependence on supplier, inventory slack, and high financial slack under the condition of high supplier's dependence on buyer. The negative impact is further increased by buyers' use of the group SCSM approach and a long relationship with buyers. This research objective is achieved by providing the answers to two research questions (i.e., 2.1 and 2.2).

6.1.2.1 Answer to research question 2.1

Research question 2.1: What is the impact of buyers' SCSM on their suppliers' financial performance?

The methods of studying related firms in event study methodology were used to test the suppliers' abnormal returns in response to the buyers' SCSM announcements. In total, 219 announcements were used to generate 2189 supplier observations. The mean portfolio CAR (with 219 observations) in the event window (-1,1) was found to be negative and statistically significant at -0.53%. **Research question 2.1** is thus answered that the impact of buyers' SCSM on suppliers' financial performance is negative.

The main research focus in the SCSM literature has remained on buyers' perspective as discussed in several literature review papers (Ashby et al., 2012; Hoejmose et al., 2013; Touboullic & Walker, 2015). This research is the first to provide empirical evidence on suppliers' financial performance. The finding in this research suggests that buyers' SCSM have a discernable and negative impact on suppliers' financial performance. Also, the

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finding on suppliers' financial performance highlights the impact of SCSM in a supply chain context (in dyadic relationships).

6.1.2.2 Answer to research question 2.2

Research question 2.2: What factors influence the negative impact of buyers' SCSM on their suppliers' financial performance?

Robust regression was used to test the hypothesized factors against suppliers' CARs, where suppliers' individual CARs were used to facilitate cross-sectional regression analysis. In the analysis of the effect of supply chain power on suppliers' CARs, the buyer's dependence on supplier was found to be significant and positive; relationship length was found to be significant and negative; the supplier's dependence on buyer was found to be insignificant. These results partially confirm that supply chain power is an important factor in influencing suppliers' financial performance. In the investigation of the effects of SCSM-related factors on suppliers' CARs, buyers' use of third-party certification and the requirement for the compliance with sSCSM practices were not found to be significant, while buyers' collaboration through group SCSM was found to be significant and negative. In the examination of the effects of operational slack and financial slack on suppliers' CARs, while capacity slack and supply chain slack were not found to be significant, inventory slack was found to be significant and positive. Financial slack measured by suppliers' leverage was not found to be significantly related to suppliers' CARs. However, a lack of financial slack (i.e., a high level of leverage) under the condition of high supplier's dependence on buyer was found to be significant and negative in relation with suppliers' CARs.

Research question 2.2 is answered by highlighting the following SCSM attributes and firm-specific characteristics as influential factors in suppliers' negative financial performance;

- Buyers' dependence on suppliers
- Relationship length with buyers
- Group SCSM: the suppliers that are mandated by a group of buyers to improve environmental and social performance
- Inventory slack

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- The interaction term between leverage (the measure of financial slack) and suppliers' dependence on buyers

Through these findings, this research provides evidence of the effectiveness of several mitigating sources in response to the suppliers' negative financial performance. First, suppliers should evaluate the supply chain power when required by their buyers to implement SCSM practices. Buyers' dependence and relationship length can effectively influence the associated financial performance of SCSM compliance. Second, suppliers should be cautious about buyers' collaboration through group SCSM as it creates substantially negative financial performance to suppliers. Third, suppliers should strategically develop inventory slack to buffer negative financial performance, which is the most effective operational slack found in the SCSM context. Finally, suppliers that are highly dependent on buyers should increase financial slack to accumulate resources in preparation for buyers' SCSM mandates. While financial slack is not always required, the effectiveness of financial slack as a buffer is salient when high dependence on buyers exists in suppliers' SCSM compliance.

6.1.3 Research objective three

*Research objective three: to investigate **the different impact** of buyers' SCSM on the financial performance of buyers and suppliers.*

Research objective three is achieved. This research concludes the impact of SCSM is more negative on the financial performance of suppliers than their buyers, providing understanding to the green bullwhip effect with buyers' shift of the costs to their suppliers. This research objective is achieved by answering the research question 3

6.1.3.1 Answer to research question 3

Research question 3: Is there a difference in financial performance between buyers and their paired suppliers relating to buyers' SCSM?

This research used paired samples (i.e., suppliers were paired with buyers in the same supply chains). The use of paired samples is consistent with the setting of the green bullwhip effect as discussed by Lee et al. (2014), which ensured an unbiased result in this research. A paired t-test was used to test the difference in mean CAR between buyers and suppliers. This research found that buyers' mean CAR is statistically significant and

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greater than that of suppliers. **Research question 1.3.** is thus answered in that suppliers have a more negative financial performance than their buyers when adopting SCSM practices.

This research contributes to the literature by revealing a more negative financial performance in the upstream than in downstream supply chains in SCSM. The finding provides a greater understanding bullwhip effect. By adding stringent practices and compressing the timeline of suppliers' SCSM compliance, buyers buffer their business risks by shifting the transaction costs to their suppliers.

6.2 This research in a wider context

This research provides six implications in a wider context for both SCSM research and policymaking.

First, the sustainability (including SCSM) literature should not always rely on the proposed positive relationship between sustainability and financial performance. The findings of negative financial performance (for both buyers and suppliers), resulting from the objective measures used in this research, oppose the propositions found in the conceptual literature (Carter & Rogers, 2008; Markley & Davis, 2007) and empirical studies by using perceptual measures (Golicic & Smith, 2013; Schmidt et al., 2017). Scholars should be cautious of the findings in this research. It is true that sustainable development is urgent, as natural resources are running out over time, and the working conditions in suppliers' factories are continuously disclosed as inadequate (Pagell & Shevchenko, 2014). However, corporate economic/financial growth is important to the overall society, and sustainable development includes economic/financial performance (Carter & Rogers, 2008). The sustainability literature has not yet provided confirmative information on the impact of environmental and social management on financial performance. This is harmful to the overall society and sustainable development as it motivates firms to implement environmental and social management with the assumption that a positive outcome will emerge following the integration of environmental and social management into economic activities. When negative financial performance is observed by managers, there are no meaningful strategies to cope with the business challenge. There are operational and transaction costs to the firms that adopt SCSM as found in this research. The disclosure of these costs would remind scholars and managers of the potential business risk in the design of sustainable operations. Accordingly, sustainability

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research may develop better environmental or social management practices that incorporate corporate economic growth.

Second, sustainability scholars should examine the potential bias in the use of perceptual measures and apply more objective measures. Sustainability (including SCSM) is still a new research field (Ashby et al., 2012); thus, researchers often adopt the mature methodologies (e.g., survey and case study) developed in traditional research fields (e.g., operations and supply chain management). However, researchers should be aware of major methodological problems when applying these methodologies in the sustainability context. While social desirability bias has been commonly mentioned as a critical issue in survey-based research, which often uses perceptual measures (Carter & Easton, 2011; Walker et al., 2012), the empirical literature using survey-based methods have hardly addressed this bias (Carter & Easton, 2011). This research used objective measures and found significant and opposite results to those the studies that have mostly used perceptual measures (e.g., Golicic & Smith, 2013; Schmidt et al., 2017). This should alert sustainability scholars to the need to examine potential bias when perceptual measures are applied. Sustainability scholars are therefore advised to apply and explore more objective measures to overcome social desirability bias. Abnormal returns can be compared with the results of self-reported operational/accounting performance in order to provide multiple measures of firm performance in response to sustainable development.

Third, in the SCSM context, suppliers' commitment should be motivated by providing mitigating strategies to their negative financial performance. While SCSM is conducted through the operations of multiple links from supply chains, SCSM research surprisingly overlooks the impact of SCSM on suppliers' financial performance. Rather, the SCSM literature appears to focus on buyers' management of suppliers' commitment to maintaining the operations of SCSM (Foerstl et al., 2015; Gimenez & Sierra, 2013; Hojmosse et al., 2013). However, this research found that suppliers have negative financial performance. Given the suppliers' negative financial performance, it is questionable that suppliers' genuine commitment can be developed merely through the management of buyers. SCSM operations are unlikely to be truly 'sustainable' in the long term. Therefore, SCSM scholars should further explore from suppliers' perspective, including the costs of compliance, the required resources and capabilities, and supply chain power. By providing the analysis of the costs and benefits and discovering strategic factors to avoid business risk relating to SCSM compliance, the SCSM literature may

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offer genuine motivation to suppliers' commitment to SCSM operations, and thus SCSM as a systematic approach can sustain in the long term.

Fourth, the SCSM research should analyze the multiple links in the supply chains in the study of the impact of SCSM on firms' financial performance. This research found that the negative impact of SCSM on suppliers' financial performance, and the negative impact on suppliers, are more severe than that on buyers. The SCSM literature could explore certain sources to mitigate buyers' negative firm performance. However, if the negative impact on suppliers is not explored and reduced with specific mitigating sources from the suppliers' perspective, only limited solutions can be provided. Due to the connection to supply chain operations, the suppliers' negative firm performance may harm suppliers' business and in turn, threaten buyers' businesses and overall societal benefits. Thus, SCSM research should study the financial performance of multiple links in the supply chains, which would give a holistic view of supply chain impacts, thus enabling the development of strategies in a supply chain context to decrease overall business risks relating to SCSM.

Fifth, SCSM research could utilize the influential factors explored in this research to develop a framework for SCSM adoption. This research identified significant factors influencing buyers' and suppliers' financial performance. These findings indicate that there is an opportunity for SCSM research to provide business strategies to change negative financial performance. The SCSM literature should adopt these factors in the analysis of financial performance and explore more influential factors to ultimately create a framework, where both buyers and suppliers may accordingly analyze the required resources and capabilities and evaluate business risk in SCSM adoption. Group SCSM as discussed in this research (section 5.1.3) could contribute to the design of this framework. The group SCSM approach was found to reduce buyers' costs, which simplifies the development of the framework by mainly focusing on accommodating suppliers' negative financial performance. Also, group SCSM creates an opportunity to integrate the SCSM efforts of buyers' downstream stakeholders, buyers, and suppliers, which could facilitate SCSM researchers to develop SCSM practices that meet multiple and different stakeholder expectations (e.g., environmental, and financial growth).

Sixth, downstream stakeholders (e.g., government, NGOs, and consumers) should provide clear economic/financial incentives to support firms' SCSM adoption. SCSM is an effective and systematic approach to improving environmental and social performance within the supply chain (Hall, 2000). However, downstream stakeholders are more likely

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to be a coercive force rather than a supportive force in SCSM operations. While there is increasing downstream stakeholder pressure (both market and regulatory pressure) on firms' SCSM adoption, it is questionable if consumers will be willing to pay for such sustainability (Dam & Petkova, 2014) and there is no explicit reward from governments for compliance. The firms face a dilemma in which SCSM adoption may not secure financial benefits, while supply chain sustainability risk is high with no SCSM adoption. This research suggests that downstream stakeholders should balance coercive and supportive forces. On one hand, the firms that genuinely adopt SCSM should be provided with explicit financial benefits; for example, governments may provide tax reductions, or NGOs may positively expose these firms' efforts to increase the awareness of conscious consumers. On the other hand, governments should enforce fines and NGOs should provide negative exposure to those firms resisting SCSM adoption. Hence, firms that have adopted SCSM would be differentiated with competitive advantages supported by downstream stakeholders from the firms that have not adopted SCSM.

6.3 Limitations and future research

Although this research was based on careful and rigorous methods, there are inevitable trade-offs and limitations. Also, some avenues of future research may be derived from this research.

The methods used in collecting samples led to several limitations. The sample firms were limited to public firms, as stock return data were required. Therefore, the findings in this research may not be fully applicable to private firms.

The supplier sample included only U.S. public firms. The supplier data were collected from Compustat Segment File which includes only U.S. public firms, and the database for identifying buyer-supplier relationships are not readily available in other countries. Since the U.S. market shows a higher level of consumer concern and regulatory pressure on SCSM than in other markets (Zhu et al., 2005), the suppliers in other markets may not have the same scale of financial performance found in this research. Additionally, the past sustainability performance of the suppliers in the sample was not controlled in this research. The use of secondary data, relatively large data set (i.e., 2189 supplier observations), and long year span (i.e., 26 years) in the sample places a constraint on the measure of past sustainability performance than could be employed in this research.

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Also, U.S. buyers may have more negative financial performance than non-U.S. buyers. Table 4.3 shows that in the estimate by using the market model, the mean CAR by using U.S. sample (-0.34%) was more negative than the mean CAR by using the full sample (-0.22%). The full sample covered non-U.S. buyers (e.g., Japanese, Korean, and European firms); thus, U.S. buyers may have more negative financial performance when they announce their SCSM. This research focuses on exploring the overall impact of SCSM on buyers' financial performance and only controlled the country effect in the cross-sectional regression analysis. Thus, there is no statistical evidence to confirm the more negative financial performance of U.S. buyers in this research.

Given the limitations of this research discussed above, two avenues for future research may be provided. First, it would be interesting to study if SCSM has a different impact on the financial performance of suppliers in other countries. In particular, the effectiveness of the influential factors on suppliers studied in this research could be evaluated under different country contexts. However, researchers may have to mine for supplier data in other countries or continue to use secondary data as in this research. Alternatively, survey-based research may provide access to supplier data, although social desirability bias must be addressed. Second, future research could explore the gap in buyers' financial performance focusing on U.S. and Non-U.S. firms. Researchers could apply a statistical test on the difference between mean CARs with a sample containing more non-U.S. buyers than that in this research. The abnormal returns associated with SCSM announcements made by buyers in emerging markets (e.g., China) may provide a meaningful comparison with those in U.S. markets, due to the cross-cultural context of sustainability.

In the sample used in this research, buyers had a higher level of power than suppliers, as demonstrated in Table 4.6. The literature suggests, in general, buyers are more powerful than suppliers (Kim & Wemmerlöv, 2015), and the supply chain power in favor of buyers enables them to mandate supply chain practices, and thus creates the systematic approach of SCSM (Hall, 2000). Buyers' high level of power presented in the sample is consistent with the literature and validates the findings of this research. However, there could be a scenario in which suppliers are more powerful than buyers in SCSM operations (Touboulic et al., 2014). Hence, future research should be cautious in applying the findings of this research when a high level of supplier power is observed. Additionally, In section 5.3.2.1, the contrast findings of Deitz et al. (2009) relating to power in a favorable supply chain practice (i.e., positive suppliers' financial performance was found)

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were discussed. This research focuses on a disruptive supply chain practice (i.e., the SCSM compliance leads to suppliers' negative financial performance) and found the mitigating effect of high buyer's dependence on supplier. Future research may further investigate the effect of buyer's dependence on supplier in a favorable supply chain practice. The findings of future research may provide an interesting comparison with those in this research.

This research did not explore specific operational problems for both buyers and suppliers. As discussed in section 3.2, this research estimated buyers' and their suppliers' financial performance by using stock returns which incorporate a series of operational changes relating to SCSM adoption (e.g., increasing transaction costs and operational complexity). Therefore, these results represent the overall impact of SCSM on financial performance but do not deconstruct specific operational problems (e.g., the rise of inventory costs, longer lead time). This research chose to accept this inevitable trade-off in order to use an objective measure (i.e., stock returns) in the statistical tests of financial performance.

Future research could explore specific operational problems based on the findings of this research. The case study and simulation approach could be used with primary data to identify the potential problem area. Survey-based methods could be subsequently used to explore the core operational problems by designing survey items reflecting negative financial performance, such as asking respondents to identify the operational difficulty in adopting SCSM with the assumption of negative financial performance.

This research investigated the financial performance of dyadic buyer-supplier relationships. The literature supports using the method of 'related firms' in event study methodology only in terms of immediate suppliers (Brown et al., 2009; Fee & Thomas, 2004). The content of announcements in the sample used in this research indicates salient information relating to immediate suppliers only. However, the analysis of SCSM can be based on the triadic (e.g., second-tier suppliers) (Touboulic et al., 2014), chain, or network levels (Miemczyk et al., 2012). This research did not reveal the financial performance of the firms in the further upstream supply chains (e.g., second-tier suppliers), or the holistic supply chain impact. Future research could work on exploring the financial performance in a wider supply chain context, such as from second-tier suppliers' perspective.

The buyers' cost transfer to suppliers is an important finding made possible through investigating the supply chain dyad in this research. This finding suggests future SCSM research should focus on supply chain impact rather than solely rely on the buyers'

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perspective. In SCSM research, when a study finds that buyers increase their profits with reduced carbon emission, it commonly assumes a positive ‘supply chain impact’ (Pagell & Shevchenko, 2014). The present research demonstrates the potential bias of such assumption. Future SCSM research should, therefore, provide evidence at the supply chain level (e.g., suppliers’ emission and profits). Moreover, future studies can explore the governance mechanisms and operational capacity to manage/avoid/reduce the cost transfers, which supports developing TBL synergies at the supply chain level.

One of interesting future research might use the influential factors explored by this research to develop an SCSM framework to mitigate overall negative financial performance. Two directions of future research may be i.) the development of SCSM practices (e.g., group SCSM) or ii.) the improvement of firms’ capabilities in SCSM operations (e.g., operational slack). Further exploration of SCSM practices and firms’ capabilities may be integrated to create an SCSM framework, which could effectively improve environmental/social performance while maintaining financial performance.

Group SCSM may provide a direction for future research to develop the SCSM framework. While this research found that suppliers have more negative financial performance when buyers utilize the group SCSM approach, the effect of group SCSM on reducing buyers’ negative financial performance provides an opportunity for group SCSM to be designed in a way that leads to the sharing of the values generated from SCSM adoption with suppliers. Therefore, buyers and suppliers may both be able to mitigate their negative financial performance. Future research could use a qualitative approach (e.g., case study) to study the mechanisms in group SCSM of how to mitigate suppliers’ costs. Additionally, the case that suppliers are more powerful than their buyers could be studied with group SCSM. The power in favor of suppliers may facilitate their decision-making in group SCSM operations and create equally shared costs and benefits between buyers and suppliers. The group purchasing literature could be used to develop such future research, or to investigate the possible integration of SCSM function into group purchasing.

The insignificant effect of supply chain slack (i.e., cash-to-cash cycle) and capacity slack could represent an important area for future research in supply chain management. This research suggests that the discussed mitigating effect of supply chain slack should be carefully considered in supply chain research (e.g., buyers mandate a supply chain practice to their suppliers), as the mitigating effect may be offset by the power relationships between buyers and suppliers. Also, the effectiveness of capacity slack is

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likely to fluctuate in different disruptive events. Firms do not usually have sufficient resources to develop capacity, inventory, and supply chain slack altogether. Future research could explore the strategic development of operational slack under different scenarios. A meta-analysis study could be conducted to explore the moderators or mediators in the relationship between financial performance and various forms of operational slack.

Also, in this research, the financial slack was found to be less important than the operational slack in relation to suppliers' financial performance. The meta-analysis of Daniel et al. (2004) focused only on financial slack (e.g., leverage and working capital). An updated meta-analysis can include both financial slack and operational slack and analyze comparatively the mitigating effect between these two broad forms of slack resources relating to the financial performance.

The 'swiftness' and 'forward load' as proposed by the theories of SEF and VUB can be further tested. This research focuses on the disruption to the even flow of operations as proposed by SEF. Further research can investigate the 'swiftness' component of the theory. For example, how the changes in throughput time influence the financial performance. Moreover, the investigation can be connected to forward load as a buffering mechanism suggested by VUB. Forward load indicates additional time buffer against variation included backlogs (Stratton, 2008). This research explored inventory, capacity, and supply chain slack as the buffering mechanisms. Future research could examine the effectiveness of forward load to mitigate the financial performance influenced by the changes of throughput time.

More SCM factors can be tested in relation to the financial performance in SCSM adoption. This research found an insignificant relationship between supplier relationship management and buyers' financial performance. However, supplier relationship management may only represent one aspect of SCM strategies. Future studies could examine other components of SCM strategies, such as the impact of effective and efficient information flow on buyers' financial performance in SCSM adoption, which could explore more links between SCM and SCSM.

The use of secondary data (rather than primary data) places constraints on the measurement of some variables in this study. Secondary indicators and measures often reflect the influence of multiple processes, and sometimes may not be a perfect proxy for the full domain of the construct of interest (Houston, 2004). In this research, the cost of goods sold to sales, inventory turnover, and account payable turnover were used to

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measure SRM. While these measures for SRM are well established (Liou & Gao, 2011; Tang & Liou, 2010), the complex strategic and relational factors of SRM may not be fully measured and evaluated in these measures, such as the scale of integration of operations between buyers and suppliers that SRM commonly represents (Lambert & Schwieterman, 2012). Also, capacity slack (as measured by the ratio of property, plant, and equipment to sales in this research) might be better measured using planned idle time or machine load rate (Bourland & Yano, 1994), which, however, are variables more likely available if primary data were collected. While the present research benefited from the use of secondary data to avoid self-reported bias in sustainability research and provide triangulation to the findings of the prior research dominated by using perceptual measures, the use of secondary data constrained how variables were measured. Based on the findings in this research, future research could use alternative measures and approaches (e.g., simulation, in-depth case studies and surveys) to further explore the mitigating effects of SRM and capacity slack in the SCSM context.

There are limitations to adopting TCE as a theoretical lens when analyzing the SCSM governance. This research focused on the market governance of SCSM in a dyadic relationship, and thus, used TCE as a theoretical lens to understand the relationships between market governance and financial performance. However, some scholars claim a key limitation of TCE, the focus on cost efficiency, limits the potential for the firms to form value-creating linkages (Hawkins et al., 2008). Dyer and Singh (1998) discussed from the relational view that firms may choose to continue relationships even when economic benefits diminish, because there are relational rents (e.g., knowledge sharing and the combining of complementary resources) that firms can develop through long-term, inter-firm linkages. The present research used RDT and discussed the extension of TCE through the group approach of SCSM to complement TCE. However, the potential relational rents in SCSM are not fully explored in this research. Relational governance has a greater impact than market governance on environmental and social performance (Jiang, 2009b; Tachizawa & Wong, 2015), which may indicate the development of relational rents from the perspective of environmental and social performance. There is a lack of SCSM research relating the relational governance to financial performance, and the use of relational governance may increase firms' investment (Jiang, 2009b). Future research should adopt alternative theoretical lenses, such as the relational view, to analyze the trade-off between the increase of capital investment and the development of relational rents, and its impact on the financial performance in the SCSM context.

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There may be long-term effects of SCSM that are not fully captured by using the stock market reaction as an instant assessment surrounding announcements. Event study is a well-established methodology, and the assumption of market efficiency is economically and empirically sound (Kothari & Warner, 2007; MacKinlay, 1997). The stock market reaction is a forward evaluation for the impact of managerial decisions on future cash flow and thus is assumed to include long-term effects (Eroglu et al., 2016). However, one may argue that the SCSM is very complex due to its nature of changing traditional operations domain by incorporating environmental and social attributes. Therefore, there may be long-term effects which are not accurately assessed and evaluated in the immediate assessment by market participants. If this is the case, future studies may assess the long-term effects of SCSM, such as conducting a longitudinal event study.⁷ Nonetheless, the assessment on long-term announcement effect is acknowledged as difficult (Kothari & Warner, 2007) and such longitudinal event studies have not been widely justified in related-firms research (e.g., the impact of buyers' announcements on suppliers in this research). Future research using a longitudinal event study must carefully examine the data and justify the application of the approach if adopted. At the current stage of SCSM research, although the assessment period in this research may be limited in the short term, the well-established methodology used in this research seems to be the best possible option for estimating financial performance relating to SCSM.

6.4 Final remarks

This research was motivated by the debate on the relationship between SCSM and firms' financial performance. TBL states that corporate sustainability involves the integration of environmental, social, and economic/financial performance. Indeed, corporate sustainability is necessary for the development of human society. However, the overall society appears to de-emphasize financial performance as an important bottom line, when continuously requesting firms to improve environmental and social performance. Due to high stakeholder pressure, many firms adopt sustainability practices without a clear view of the business risk. Moreover, sustainability research has solely relied on the synergy of environmental, social and financial performance suggested by TBL and has not clearly provided suggestions on what firms can do when the synergy

⁷ The detailed discussion on the longitudinal event study methodology is given by Barber and Lyon (1996)

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cannot be reached. The improvement of environmental and social performance to the detriment of financial performance is not true sustainability. Firms are unlikely to be able to improve environmental and social performance when negative financial performance persists. This research analyzed the potential financial costs relating to sustainability in a supply chain context (for both buyers and suppliers) and provided researchers, managers, and overall society with empirical evidence on the need to be aware of and prepared for business risk in the adoption of SCSM.

These mitigating sources (e.g., collaboration through group SCSM and the development of operational slack) identified in this research demonstrate that there is an opportunity for the synergy of environmental, social, and financial performance to be reached, if firms are internally prepared with the resources, and overall society provides firms with supports. Therefore, researchers, managers, and overall society should focus on exploring and implementing these internal resources and external support, and ultimately developing a framework accommodating firms' overall business risks relating to sustainable development. Corporate sustainability is valuable and urgent. True sustainability that includes the improvement in environmental, social and financial performance, however, can only be realized when firms are able to skillfully cope with the business risks in a well-developed sustainability framework.

Appendix A. OLS and Robust Regression (supplier sample)

Given that there were influential observations detected in supplier dataset, robust regression was used in the analysis of suppliers. Cohen et al. (2003) suggested that the results by OLS regression should have substantial differences from those by robust regression if there are influential observations in the dataset, and the difference provides evidence to use robust regression to ensure the reliability of the test results. OLS regression was additionally performed by using supplier data to show the difference.

Table A.1 provides the coefficients and significance estimated by using OLS regression, which compare with those in Table 4.11 (reproduced in this appendix below in Table A.2) estimated by robust regression. The results between the two tables are substantially different. Supplier's dependence on buyer (SDB) and third-party certification are additionally significant when using OLS regression but not when using robust regression, while the interaction term and group SCMS are significant when using robust regression but not when using OLS regression. The effect scales on inventory slack, buyer's dependence on supplier (BDS), and relationship length are larger in OLS regression than in robust regression. These differences support the use of robust regression in the supplier analysis to avoid bias by these influential observations on the estimated coefficients and significance.

Appendix A

Table A.1 OLS Regression Results for the Analysis of Suppliers

Independent Variables	Model 1	Model 2	Model 3	Model 4
	Coefficient	Coefficient	Coefficient	Coefficient
Intercept	0.0083 (0.0071)	0.0043 (0.0096)	0.0210** (0.0113)	0.0210** (0.0113)
Supplier's Dependence on Buyer (SDB)	-0.0030 (0.0118)	-0.0020 (0.0119)	-0.0366*** (0.0141)	-0.0376*** (0.0142)
Buyer's Dependence on Supplier (BDS)	0.0032** (0.0018)	0.0034** (0.0018)	0.0049** (0.0022)	0.0049** (0.0022)
Relationship length	-0.0007*** (0.0003)	-0.0008*** (0.0003)	-0.0005* (0.0003)	-0.0005* (0.0003)
sSCSM		-0.0020 (0.0051)	0.0040 (0.0060)	0.0005 (0.0060)
Third-Party Certification		-0.0027 (0.0037)	-0.0058* (0.0042)	-0.0059* (0.0042)
Group SCSSM		-0.0020 (0.0035)	0.0000 (0.0042)	0.0002 (0.0042)
Year in sample		0.0004 (0.0003)	0.0001 (0.0004)	0.0001 (0.0004)
Capacity Slack			0.0035 (0.0031)	0.0036 (0.0031)
Inventory Slack			0.0097** (0.0044)	0.0096** (0.0044)
Supply Chain Slack			0.0004 (0.0007)	0.0004 (0.0007)
Leverage			-0.0029 (0.0079)	-0.0026 (0.0079)
Leverage * Supplier's Dependence on Buyer				-0.0507 (0.0731)
Control for Industry effect	Yes	Yes	Yes	Yes
N	1448	1448	1023	1023
F	2.2780	2.1060	2.189	2.147
Significance	0.0000	0.0001	0.0000	0.0000
R ²	0.0549	0.0564	0.0838	0.0843

Note: The dependent variable is the suppliers' individual CARs in the event window (-1,1) using the market model. *, ** and *** denote the significance at 0.1, 0.05 and 0.01 level (one-tailed tests) respectively. Standard errors are reported in parentheses. Leverage is the measure of financial slack; low leverage indicates high financial slack.

Appendix A

Table A.2 Robust Regression Results for the Analysis of Suppliers (Reproduced from Table 4.11)

Independent Variables	Model 1	Model 2	Model 3	Model 4
	Coefficient	Coefficient	Coefficient	Coefficient
Intercept	0.0070* (0.0050)	0.0050 (0.0060)	0.0140** (0.0080)	0.0150** (0.0070)
Supplier's Dependence on Buyer (SDB)	0.0080 (0.0080)	0.0090 (0.0080)	-0.0091 (0.0090)	-0.0104 (0.0090)
Buyer's Dependence on Supplier (BDS)	0.0033*** (0.0010)	0.0035*** (0.0010)	0.0043*** (0.0010)	0.0044*** (0.0010)
Relationship Length	-0.0004*** (0.0002)	-0.0010*** (0.0002)	-0.0004** (0.0002)	-0.0004** (0.0002)
sSCSM		0.0020 (0.0030)	0.0040 (0.0040)	0.0030 (0.0040)
Third-Party Certification		-0.0020 (0.0020)	-0.0020 (0.0030)	-0.0020 (0.0030)
Group SCSM		-0.0044** (0.0020)	-0.0020 (0.0030)	-0.0010 (0.0030)
Year in Sample		0.0002 (0.0002)	0.0001 (0.0003)	0.0001 (0.0003)
Capacity Slack			0.0018 (0.0020)	0.0023 (0.0020)
Inventory Slack			0.0050** (0.0030)	0.0049** (0.0030)
Supply Chain Slack			0.0002 (0.0005)	0.0002 (0.0005)
Leverage			-0.0044 (0.0050)	-0.0037 (0.0050)
Leverage * Supplier's Dependence on Buyer				-0.1900*** (0.0480)
Control for Industry effect	Yes	Yes	Yes	Yes
N	1448	1448	1023	1023

Note: The dependent variable is the suppliers' individual CARs in the event window (-1,1) using the market model. *, ** and *** denote the significance at 0.1, 0.05 and 0.01 level (one-tailed tests) respectively. Standard errors are reported in parentheses. Leverage is the measure of financial slack; low leverage indicates high financial slack. R² values are not reported, because the iterative reweighting on observations in robust regression gives R² little statistic inference (Willett & Singer, 1988).

Appendix B. OLS and Robust Regression (buyer sample)

Given there were no influential observations detected in buyer data, OLS regression was used in the buyer analysis. As suggested by Cohen et al. (2003), the test results by OLS regression should have a small difference from those by robust regression when influential observations were absent. Robust regression was additionally performed by using buyer data to validate the use of OLS regression in the buyer analysis.

Table B.1 provides the coefficients and significance of the variables estimated by using robust regression in comparison with those in Table 4.4 (reproduced in Table B.2) estimated by using OLS regression. The only difference is that the significance of group SCSM in model 4 becomes lower when using robust regression than when using OLS regression. There is no substantial difference on effect scales and significance of the tested variables across the two tables, which provides additional support for the use of OLS regression in the buyer analysis.

Appendix B

Table B.1 Robust Regression Results for the Analysis of Buyers

Independent Variables	Model 1 (Control variables)	Model 2 (Growth prospects)	Model 3 (Governance)	Model 4 (SRM)
Intercept	0.0019 (0.0056)	0.0056 (0.0058)	0.0031 (0.0061)	0.0061 (0.0083)
Consumer Goods	-0.0005 (0.0056)	-0.0012 (0.0057)	-0.0002 (0.0059)	-0.0015 (0.0059)
Autos	0.0048 (0.0048)	0.0038 (0.0051)	0.0043 (0.0053)	0.0046 (0.0054)
Computers	-0.0014 (0.0052)	-0.0019 (0.0052)	-0.0014 (0.0053)	-0.0010 (0.0058)
Recreation	0.0040 (0.0064)	0.0024 (0.0065)	0.0032 (0.0067)	0.0032 (0.0066)
Electronic Equipment	-0.0108** (0.0052)	-0.0129*** (0.0052)	-0.0130*** (0.0054)	-0.0126** (0.0054)
Aero	0.0095* (0.0064)	0.0076 (0.0065)	0.0083 (0.0067)	0.0077 (0.0071)
Utility	-0.0016 (0.0047)	-0.0044 (0.0048)	-0.0044 (0.0052)	-0.0058 (0.0057)
Retailers	-0.0005 (0.0035)	-0.0020 (0.0036)	-0.0022 (0.0038)	-0.0014 (0.0040)
Meals	0.0019 (0.0046)	0.0008 (0.0048)	-0.0003 (0.0051)	-0.0015 (0.0067)
European Firms	-0.0040 (0.0047)	-0.0039 (0.0048)	-0.0057 (0.0051)	-0.0052 (0.0051)
North American Firms	-0.0035 (0.0039)	-0.0022 (0.0041)	-0.0030 (0.0042)	-0.0027 (0.0042)
Year in sample	-0.0001 (0.0002)	-0.0001 (0.0002)	-0.0001 (0.0002)	-0.0001 (0.0002)
Growth Prospects		-0.0006* (0.0004)	-0.0007** (0.0004)	-0.0007* (0.0004)
sSCSM			0.0062** (0.0035)	0.0050* (0.0036)
Third-Party Certification			0.0026 (0.0028)	0.0031 (0.0028)
Group SCSM			0.0040* (0.0029)	0.0035 (0.0030)
The ratio of COGS to Sales				-0.0001 (0.0099)
Accounts Payable Turnover				-0.0002 (0.0004)
Inventory Turnover				-0.0015 (0.0046)
N	308	300	300	290

Note: Significance levels (one-tailed tests): * 0.1 level, ** 0.05 level, *** 0.01 level. R² values are not reported, because the iterative reweighting on observations in robust regression gives R² little statistic inference (Willett & Singer, 1988).

Appendix B

Table B.2 OLS Regression Results for the Analysis of Buyers (Reproduced from Table 4.4)

Independent Variables	Model 1 (Control variables)	Model 2 (Growth Prospects)	Model 3 (Governance)	Model 4 (SRM)
Intercept	0.0037 (0.0066)	0.0073 (0.0069)	0.0040 (0.0071)	0.0058 (0.0086)
Consumer Goods	-0.0018 (0.0045)	-0.0020 (0.0046)	-0.0008 (0.0051)	-0.0016 (0.0052)
Autos	0.0035 (0.0051)	0.0040 (0.0051)	0.0042 (0.0055)	0.0045 (0.0059)
Computers	-0.0009 (0.0051)	-0.0010 (0.0051)	-0.0007 (0.0050)	-0.0001 (0.0061)
Recreation	-0.0020 (0.0089)	-0.0031 (0.0089)	-0.0019 (0.0090)	-0.0019 (0.0090)
Electronic Equipment	-0.0105** (0.0062)	-0.0122** (0.0061)	-0.0128** (0.0062)	-0.0124** (0.0063)
Aero	0.0093 (0.0081)	0.0077 (0.0078)	0.0075 (0.0078)	0.0075 (0.0080)
Utility	-0.0030 (0.0058)	-0.0056 (0.0061)	-0.0064 (0.0069)	-0.0073 (0.0076)
Retailers	-0.0004 (0.0042)	-0.0018 (0.0043)	-0.0016 (0.0044)	-0.0009 (0.0042)
Meals	0.0020 (0.0052)	0.0012 (0.0056)	0.0001 (0.0053)	-0.0021 (0.0075)
European Firms	-0.0052 (0.0046)	-0.0044 (0.0046)	-0.0069* (0.0050)	-0.0063 (0.0051)
North American Firms	-0.0058* (0.0042)	-0.0037 (0.0042)	-0.0043 (0.0042)	-0.0044 (0.0075)
Year in sample	-0.00003 (0.0003)	-0.0001 (0.0003)	-0.0001 (0.0003)	-0.0001 (0.0003)
Growth Prospects		-0.0008** (0.0004)	-0.0008** (0.0004)	-0.0009** (0.0004)
sSCSM			0.0063** (0.0031)	0.0047* (0.0032)
Third-Party Certification			0.0031 (0.0031)	0.0037 (0.0032)
Group SCSM			0.0057* (0.0035)	0.0055* (0.0036)
The ratio of COGS to Sales				-0.0011 (0.0094)
Accounts Payable Turnover				-0.0001 (0.0005)
Inventory Turnover				-0.0006 (0.0054)
N	308	300	300	290
F	0.9081	1.1976	1.3983*	1.1455
R ²	0.0356	0.0516	0.0733	0.0746

Note: Significance levels (one-tailed tests): * 0.1 level, ** 0.05 level. Robust standard errors are reported in parentheses and corrected for heteroscedasticity and autocorrelation

Appendix C. Robustness Check on Non-linearity (buyer analysis)

The plot of residuals versus fitted values was used to detect any non-linear trend for the regression model 4 in Table 4.4. The equally spread residuals around the horizontal dash-line without distinct patterns indicate no concern with the non-linear relationships (Fox & Weisberg, 2010). The red line in Figure C.1 shows the pattern of residuals for model 4. The residuals are equally distributed along the horizontal dash-line, and thus there is no concern with non-linear relationships in the model.

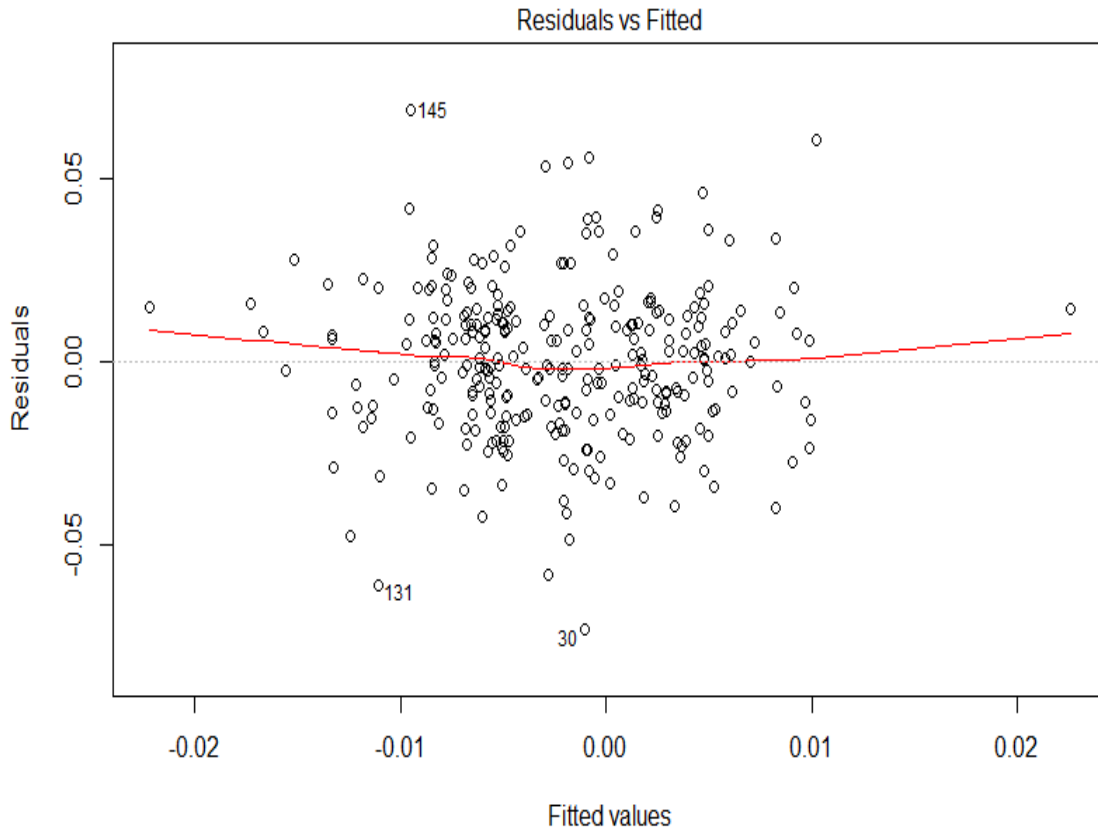


Figure C.1 Plot of Residuals versus Fitted Values for Model 4 in buyer analysis

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