SUPPLY RISK MITIGATION AND ITS IMPACT ON OPERATIONAL PERFORMANCE OF SMALL- AND MEDIUM-SIZED ENTERPRISES: A SOCIAL CAPITAL APPROACH

A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

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DECLARATION

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed. I acknowledge the support I have received for my research through the provision of an RMIT PhD International Scholarship.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
BCHEAN	Business College Human Ethics Advisory Network
BDT	Bangladesh Taka
BEIOA	Bangladesh Engineering Industry Owners Association
BGMEA	Bangladesh Garment Manufacturers and Exporters Association
BSCC	Buyer–Supplier Cognitive Capital
BSRC	Buyer–Supplier Relational Capital
BSSC	Buyer–Supplier Structural Capital
BTS	Bartlett's Test of Sphericity
CC	Cluster Cooperation
CCC	Cluster Cognitive Capital
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CMIN/DF	Chi-square normalised by degree of freedom
CMV	Common Method Variance
CR	Construct Reliability
CRC	Cluster Relational Capital
CS	Convergence Statistic
CSC	Cluster Structural Capital
DF	Degree of Freedom
EFA	Exploratory Factor Analysis
FS	Flexible Sourcing
GDP	Gross Domestic Product
GOF	Goodness-of-Fit
IS	Information Sharing
KMOMSA	Kaiser-Meyer-Olkin Measure of Sampling Adequacy
MI	Modification Indices
ML	Maximum Likelihood
OP	Operational Performance
PCFI	Parsimonious Comparative Fit Index
RMSEA	Root Mean Square Error of Approximation

RS	Resource Sharing
SC	Supplier Collaboration
SD	Standard Deviation
SEM	Structural Equation Modelling
SFL	Standardised Factor Loadings
SMEs	Small- and Medium-Sized Enterprises
SPSS	Statistical Package for the Social Science
SR	Supply Risk
SRMR	Standardised Root Mean Square Residual
TLI	Tucker-Lewis Index
USD	United States Dollar

LIST OF PUBLICATIONS

Journal Articles

1. Chowdhury, P, Lau, KH and Pittayachawan, S 2019, 'Operational supply risk mitigation of SMEs and its impact on operational performance: a social capital perspective', *International Journal of Operations and Production Management*, accepted for publication – ABDC ranking: A, ERA Ranking: A.

2. Paul, SK, Chowdhury, P and Ahsan, S, Ali, SM and Kabir, G 'A new intelligent decision-making framework for manufacturing plant location selection', *IEEE Transactions on Engineering Management* – ERA Ranking: A – Revision submitted.

3. Ali, SM, Paul SK, Chowdhury, P and Agarwal, R 'Decision modelling of supply chain disruption factors and drivers for ready-made garment industry: a hybrid approach applied to an emerging economy context, *The International Journal of Advanced Manufacturing Technology* – ERA Ranking: B – Under review.

Refereed Conference Papers

1. Chowdhury, P, Lau, KH and Pittayachawan, S 2019, 'Operational supply risk mitigation of small and medium enterprises: a social capital approach', 2nd International Conference on Business and Management Research and Practice (iCBMRP), 20–22 January, Dhaka, Bangladesh.

2. Chowdhury, P, Lau, KH and Pittayachawan, S 2017, 'Buyer–supplier social capital for supply risk mitigation of small and medium-sized enterprises', *Production and Operations Management Society (POMS) Conference 2017*, 12–14 December, Sydney, Australia.

3. Chowdhury, P, Lau, KH and Pittayachawan, S 2017, 'Supply risk management in small and medium-sized enterprises: a systematic literature review', *31st Australian and New Zealand Academy of Management (ANZAM) Conference*, 5–8, Melbourne, Australia.

4. Chowdhury, P, Lau, KH and Pittayachawan, S 2017, 'Supply risk mitigation of SME through leveraging social capital: development and validation of a measurement instrument', *3rd World Conference on Supply Chain Management (WCOSM)*, 18-19 May, Colombo, Sri Lanka.

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ABSTRACT

Supply risk has become a key concern for manufacturing small- and medium-sized enterprises (SMEs) because of its frequent occurrence and profound impact on SME performance. As such, it is imperative to understand how SMEs can alleviate this hazard. While previous studies have identified various supply risk mitigation measures for big firms, little corresponding research has been done for SMEs especially from an empirical perspective. Underpinned by the Social Capital Theory and the Theory of Swift, Even Flow, this study investigates how SMEs can leverage social capital gained via networking with their key suppliers and with peers located within a geographical cluster to mitigate supply risk, thereby improving operational performance. Through a literature review, a framework that posits the direct and indirect effects of buyer–supplier social capital, cluster social capital, supplier integration, and cluster cooperation on supply risk of SMEs and consequently their operational performance is developed. To test the framework and the hypotheses, a questionnaire survey is used to gather data from apparel-manufacturing SMEs in Bangladesh. The psychometric properties of the questionnaire are developed based on a rigorous process of content validity. In total, 487 complete responses are collected from the respondents for analysis using structural equation modelling.

Analysis of the collected data reveals that supply risk, in the form of variations in upstream supply characteristics such as quality, quantity, lead time or overall requirements, can considerably weaken the ability of SMEs to meet customer needs and substantially undermine their operational performance. Buyer–supplier social capital plays a crucial role in enabling SMEs to mitigate their supply risk directly and indirectly through enhancing supplier integrative practices, such as exchange of information and resources, joint actions and flexible arrangements. It also transmits the impact of cluster social capital and assists in mitigating

supply risk. Similarly, cluster social capital can mitigate supply risk of SMEs indirectly through promoting cooperative practices among peers and improving social capital with key suppliers. The results also confirm that both supplier integration and cluster cooperation can mitigate supply risk directly. Apart from the direct impacts, their mediating roles in the relationships between social capital and supply risk are also confirmed.

This study contributes to both knowledge and practices. For academic contribution, it establishes and validates a risk mitigation model focusing on SMEs, which are less studied in the current supply risk literature. The findings affirm the feasibility and importance of leveraging social capital resources to mitigate supply risk in the case of SMEs. The observations that cluster social capital serves as a bridge to connect with key suppliers, and different types of social capital of SMEs have different levels of reliance on network integration or cooperation to impact on supply risk, are some unique contributions. The study also extends the scope of supply risk literature by considering the factors impacting on supply risk and its effect on operational performance in a single framework. The study uses the theoretical lens of the Social Capital Theory and the Theory of Swift, Even Flow to conceptualise the relationships among network resources, supply risk and operational performance. It is the first attempt to apply these two theories in a survey-based risk mitigation model focusing on SMEs, thereby extending the applications of the theories. For practical contribution, the findings of the study also provide insight for SME practitioners and policy makers to effectively exploit this risk mitigation approach. They can assist practitioners and policy makers in identifying practices for the development and implementation of supply risk mitigation strategies to enhance operational performance.

Keywords: Supply risk, social capital, small- and medium-sized enterprises, operational performance

CHAPTER ONE
INTRODUCTION

1.1 Introduction

This study investigates how small- and medium-sized enterprises (SMEs) can leverage social capital to mitigate supply risk, thereby reducing its impact on operational performance. To achieve this objective, this study develops and validates a model for identifying (1) the effect of supply risk on the operational performance of SMEs, (2) the roles of social capital with key suppliers and with peers located within a geographical cluster in mitigating SMEs' supply risk, and (3) the mediating impacts of supplier integration and cluster cooperation in the relationships between social capital and supply risk. This introductory chapter outlines the background, context, motivations, justifications, and contributions of the research. It also puts forward the research questions and the research objectives.

1.2 Background of the Study

With an increasingly competitive and uncertain business environment in recent years, firms have become more exposed to supply risk incidents (Fan & Stevenson 2018; Kirilmaz & Erol 2017). The term 'supply risk' refers to the manifestation of variations in expected outcomes of the upstream supply chain, that is, variations in terms of time, quality, quantity, and overall requirements (Chen, Sohal & Prajogo 2013). These variations have become a concern for all businesses across the globe (Brusset & Teller 2017; Ambulkar, Blackhurst & Grawe 2015). For example, a study by Snell (2010) states that 90 per cent of firms are threatened by supply risk. Another recent study (Alcantara, Riglietti & Aguada 2017) reveals that 65 per cent of the

firms investigated in the study reported at least one instance of supply risk in the past 12 months, with six to 50 instances for 13 per cent of the firms.

Supply risk incurs substantial financial losses for organisations who fail to protect themselves against this risk. For example, Hendricks and Singhal (2005) report that supply risk reduces the operating income of the investigated firms by 31.28 per cent. Alcantara, Riglietti and Aguada (2017) also inform that, averaging across all the firms investigated in their study, supply risk resulted in 55 per cent and 32 per cent losses of productivity and revenue, respectively. Several other studies (Davletshin, Agrawal & Fugate 2018; He & Yang 2018; Kim & Vonortas 2014; Wiengarten, Pagell & Fynes 2013) also find that supply risk negatively affects the additional measures of financial performance, such as return on sales, return on assets, and return on stock. In addition to financial losses, supply risk also leads to many non-financial losses for the firms. For example, supply risk can damage the brand image (Alcantara, Riglietti & Aguada 2017), reduce employment in the firm (Thun & Hoenig 2011), and threaten the buyer' life and safety (Zsidisin 2003a).

In general, supply risk is more pronounced for SMEs, defined as firms with no more than 250 employees (Bangladesh SME Foundation 2013). The impact of this risk on firm performance is also more severe for SMEs than large firms (Ellegaard 2008; Hendricks & Singhal 2003, 2005; Kaufmann, Carter & Rauer 2016). For example, Hendricks and Singhal (2005) report that the operating income of SMEs can be reduced by 75.77 per cent more than that of large firms with similar supply risks. They also find that the impacts of supply risks on return on sales and return on assets for SMEs are also substantially more negative than that for larger enterprises. The higher vulnerability of SMEs may be attributable to a number of factors, including limited resources and skills (Thakkar & Deshmukh 2008), the domino effect of supply risk on other risks (Falkner & Hiebl 2015), a lack of negotiating power, the absence of

a strategy for quick recovery (Hendricks & Singhal 2003, 2005), and inadequate support from other supply chain partners (Arend & Wisner 2005).

Although SMEs are more vulnerable to supply risk than large firms, studies on supply risk mitigation measures for SMEs are still limited (Falkner & Hiebl 2015; Niemann, Kotze & Mannya 2018). As a result, many of the supply risk mitigation strategies recommended in previous studies are not suitable for SMEs. While these strategies include various response actions to help firms reduce supply risk incidents and lessen their negative impacts, these strategies are simply beyond the capabilities of SMEs (Gao, Sung & Zhang 2011; Prasad, Tata & Guo 2012). For example, mitigation strategies such as holding buffer stock, developing the capabilities of suppliers, and ensuring formal processes in sourcing require considerable resources, structured management, or strong positional power to influence suppliers, which are more typical features of large firms. In contrast, SMEs are generally less structured, short on resources, and run by smaller management teams (Lavastre, Gunasekaran & Spalanzani 2012), hence, these strategies are not feasible for them.

As an alternative solution for SMEs, a number of studies have proposed leveraging social capital with key suppliers and with peers located within a geographical cluster to reduce supply risk (Colicchia & Strozzi 2012; Gao, Sung & Zhang 2011; Kaufmann, Carter & Rauer 2016; Villa & Antonelli 2009). The central argument is that social capital, which is defined as the sum of actual and potential resources gained via networking with an individual or social unit (Nahapiet & Ghoshal 1998), exists within the horizontal and vertical network of an SME. The efforts of SMEs to leverage social capital with their key supplier and peers enable them to gain access to and leverage the resources residing in the network of relationships. Like other forms of capital, social capital can improve the supply management capabilities of the buying SMEs, a critical component for mitigating supply risk (Cheng, Yip & Yeung 2012; Gao, Sung & Zhang 2011). Unlike other strategies, this increased social capital approach requires less

financial investment (Uphoff 2000), thereby overcoming the barriers of resource deficiency that SMEs face as part of supply risk mitigation.

Previous studies, such as Ellegaard (2008) and Prasad, Tata and Guo (2012), claim that increased social capital with the key suppliers (hereafter referred to as buyer–supplier social capital in line with Carey, Lawson and Krause (2011)) can have the effect of minimising variations in the upstream supply of SMEs by making suppliers more responsive, dependable, and like-minded. They also report that increased buyer–supplier social capital, in the form of frequent interactions, trust, mutual respect, reciprocity, and shared understanding can result in lower supply risk for SMEs by minimising potential conflicts between the parties. Moreover, buyer–supplier social capital can reduce SMEs' supply risk by improving the supplier integrative practices, such as the exchange of information and resources and collaborative actions (Adams *et al.* 2013). On the other hand, improved social capital with similar SMEs located within the same geographical cluster (hereafter referred to as cluster social capital in line with Ng *et al.* (2017)) can reduce supply risk through improving cooperation among the members of the cluster network (Asgari *et al.* 2016). Enhanced cluster social capital improves cluster cooperation where network members share required supply information and knowledge with each other and undertake joint sourcing related actions. Such cluster cooperative practices can enhance the supply management skills and buying power of SMEs, thereby reducing supply risk (Villa & Antonelli 2009).

Even though the leveraging of social capital from these two networks is considered a feasible supply risk mitigation measure for SMEs (Gao, Sung & Zhang 2011; Prasad, Tata & Guo 2012), no study has empirically tested the validity of the notion. Moreover, a number of other studies, such as Arregle *et al*. (2007) and Villa and Antonell (2009), theoretically argue that the impact of social capital on SMEs performance is more indirect through network cooperation than direct. These studies contend that, driven by a sense of fairness, network members would

first recognise the need to share information and resources for the coordination of key activities and joint actions to gain mutual benefits, which, in turn, improve the performance of SMEs. Due to the lack of empirical evidence, it remains unclear in the literature whether these two types of social capital have direct or indirect impact through supplier integration and cluster cooperation or both simultaneously on the supply risk of SMEs. In other words, the mechanisms by which buyer–supplier social capital, cluster social capital, supplier integration and cluster cooperation are reflected in the reduction of supply risk have remained unexplored. Moreover, due to the lack of empirical evidence, it is not clear how significant the impact of supply risk is on the operational performance of SMEs.

1.3 Motivation of the Study

SMEs are the most common business entities found across the globe. In many economies of the world, SMEs comprise around 99 per cent of all business organisations (Madanchian *et al.* 2018; Mazzarol 2014). The contribution of SMEs in most economies worldwide is also significant (Burgstaller & Wagner 2015; Niemann, Kotze & Mannya 2018). For instance, 99 per cent of the economic activities of the European Union can be traced back to SMEs, which provide two-thirds of all job positions in the private sector (Gama & Geraldes 2012). In many developing countries, SMEs are primarily the main source of employment, industrial output, and export earnings. For example, in the Asia-Pacific Economic Cooperation (APEC) countries, SMEs comprise 90 per cent of all business firms and are the main contributors of gross domestic product (GDP) (Khan & Khalique 2014). On average, SMEs account for 80 per cent of the global economic growth, thus, they are considered to be the backbone of the economic growth in all countries (Singh, Garg & Deshmukh 2009).

A survey conducted by Hillman and Keltz (2007) finds that supply risk is the number one risk factor in most supply chains. Of those surveyed, 92 per cent of the respondents claim that the

level of supply risk will increase or remain the same in the future. Later, several other studies (Alcantara, Riglietti & Aguada 2017; Chen, Sohal & Prajogo 2016; Guertler & Spinler 2015) agree that it is the most common risk in a supply chain, and has a negative impact on the performance of a firm. Despite the fact that other types of supply chain risk have been extensively investigated, attention to supply risk is relatively limited in terms of the number of studies and depth of investigation (Son & Orchard 2013). Particularly, studies on supply risk of SMEs are very scarce (Maloni, Hiatt & Astrachan 2017; Niemann, Kotze & Mannya 2018) even though SMEs suffer more from supply risk incidents than larger firms.

Moreover, SMEs and large firms implement different supply risk mitigation strategies due to the differences in the management structure, and organisational capability and orientation (Adams *et al.* 2016; Lavastre, Gunasekaran & Spalanzani 2012). For example, to mitigate supply risk, many large corporations invest heavily in software and applications for improving sourcing processes. In contrast, SMEs are not able to afford such technology-driven supply risk mitigation practices due to limited resources and capabilities (Hendricks & Singhal 2003; Thun, Drüke & Hoenig 2011). As a result, a number of recent studies urge researchers to empirically investigate more appropriate supply risk mitigation strategies for SMEs (Asgari *et al.* 2016; Falkner & Hiebl 2015; Kamalahmadi & Parast 2016; Maloni, Hiatt & Astrachan 2017). Responding to this call, this study investigates the practicality of SMEs leveraging social capital with their key suppliers and with peers located inside the cluster to mitigate supply risk. Moreover, this study investigates the potential impact of supply risk on the operational performance of SMEs to reveal the importance of mitigating this risk.

Given the vulnerability of SMEs in terms of supply risk, the limited studies on supply risk mitigation of SMEs, and the significant role of SMEs in economies worldwide, this research seems timely and important in contributing to knowledge and industrial practice.

1.4 Context of the Study

In this study, manufacturing SMEs in the apparel industry of Bangladesh are taken as the subject of investigation. To avoid ambiguity, the definition of SME stated in the National Industrial Policy 2010 of Bangladesh is adopted (Table 1.1).

Table 1.1: Definition of SME in this study

Enterprises	Maximum employment	Maximum replacement cost of fixed assets (Bangladesh Currency - BDT)
Small	99 staff	100 million
Medium	250 staff	300 million

Source: (Bangladesh SME Foundation 2013, p. 15)

Situated in the northern part of South Asia, Bangladesh is bounded by India to the east, west, and north, Myanmar to the south-east and the Bay of Bengal to the south (Figure 1.1). Being a developing country, Bangladesh is one of the major emerging countries by its growth in GDP, which is predicted to continue to increase in the coming years (World Bank 2018a).

Figure 1.1: Map of Bangladesh

Source: smarttraveller.gov.au

Bangladesh is chosen as a study country for a number of reasons. First, literature on operations research, particularly on supply risk mitigation, in the context of developing countries is still relatively limited (Sodhi & Tang 2014). Through a systematic review of the studies published in this area, Fan and Stevenson (2018) report that only 13.6 per cent of the studies focus on a developing country context. SMEs in developing countries, such as Bangladesh, lack resources and have limited access to technology and formal training (Niemann, Kotze & Mannya 2018). This context is largely different from that of developed countries where SMEs are relatively technology savvy and are provided with formal training opportunities (Kartiwi & MacGregor 2007; Tang, Wang & Zhao 2015). As a result, the findings in the literature that show the best managerial practices for mitigating supply risk in the context of developed countries may not be applicable in the context of developing countries. By selecting Bangladesh as the context of this study, the study can contribute to the inadequate literature on supply risk mitigation of developing countries.

Second, the impact of social capital is not universally the same. Relatively speaking, social capital plays a more influential role in developing countries. For example, Stam, Arzlanian and Elfring (2014) find that network ties, both strong and weak, have stronger impact on the performance of SMEs in developing countries than developed countries. Unlike developed countries, where reliable information are publicly available, SMEs in a developing country depend on strong network relations to obtain high-quality information and to build risk management knowledge and skills (Kannadhasan *et al.* 2018; Rezaei, Ortt & Trott 2015; Stam, Arzlanian & Elfring 2014). For example, Mursalin (2012) reports that social influences play an important role in the decision making of Bangladeshi SMEs.

Third, Bangladesh depends heavily on SMEs for its economic achievements (Hoque 2018a, 2018b; Hoque & Awang 2019). SMEs represent 99.85 per cent of all businesses in Bangladesh, totalling to around six million active establishments (Hoque 2018a). According to the

Bangladesh Engineering Industry Owners Association (BEIOA), SMEs absorb around 80 per cent of industrial workers in the country (BEIOA 2010). As Table 1.2 reveals, SMEs account for 89 per cent of total export earnings and 85 per cent of total industrial jobs (BEIOA 2010). Considering that SMEs contribute substantially to the Bangladeshi economy, the government of Bangladesh has also acknowledged the importance of SMEs to achieve its Vision 2021, which aims to attain a number of economic and entrepreneurial goals (Hoque *et al.* 2015).

Table 1.2: Contributions of SMEs in Bangladesh

Areas of Contribution	Contribution of SMEs
National gross domestic product	25%
Gross manufacturing output	40%
Industrial jobs	85%
Total labour force	25%
Total export earning	89%
Per cent of business	Over 95%
Absorbed industrial workers	70%–80%

Source: BEIOA (2010)

The other reason for choosing Bangladesh for investigation is that supply risk is one of the main problems that Bangladeshi SMEs are facing (Rashid 2012). Although in Bangladesh, SMEs contribute substantially in different areas (Table 1.2), the contribution of SMEs to GDP is only 25 per cent, while in many economies of the world SMEs contribute to 50 per cent of GDP on average (Ardic, Mylenko & Saltane 2012). The government of Bangladesh has initiated a policy, National Industrial Policy 2010, to increase the share of SMEs in GDP from 25 per cent to 40 per cent by 2021. Rashid (2012) and Abdin (2018) recommend that proper strategies must be formulated to mitigate the supply risk faced by SMEs in order to achieve the Vision 2021. Through the understanding of the relationship between buyer–supplier social capital, cluster social capital, supplier integration, cluster cooperation, and SMEs' supply risk, this research aims to facilitate the formulation of appropriate supply risk mitigation strategies that may contribute to the attainment of the above vision.

SMEs in the apparel industry were chosen as the subject for two main reasons. First, this industry has contributed substantially to the Bangladeshi economy (Ahmed, Greenleaf & Sacks 2014; Chowdhury, Umme & Nuruzzaman 2018). More specifically, apparel export stood at 28.15 billion US dollars in the fiscal year 2016–2017, which is 80.78 per cent of the total export of the country (*Bangladesh Economic Review* 2017). Moreover, the Bangladesh Garments Manufacturers and Exporters Association (BGMEA) claims that the apparel sector contributes more than 10 per cent of the total GDP of the country and employs around five million workers (BGMEA 2018). Currently, Bangladesh holds second place behind China in the global export of apparel products (World Bank 2012; BGMEA 2018). Furthermore, 80 per cent of American and European brands are planning to move to Bangladesh from China because of the lower labour costs there (Berg *et al.* 2011). As shown in Figure 1.2, the monthly labour rate in Bangladesh is the lowest among the ten major apparel-exporting countries (Cowgill, Luebker & Xia 2015), suggesting a potential for the industry to expand.

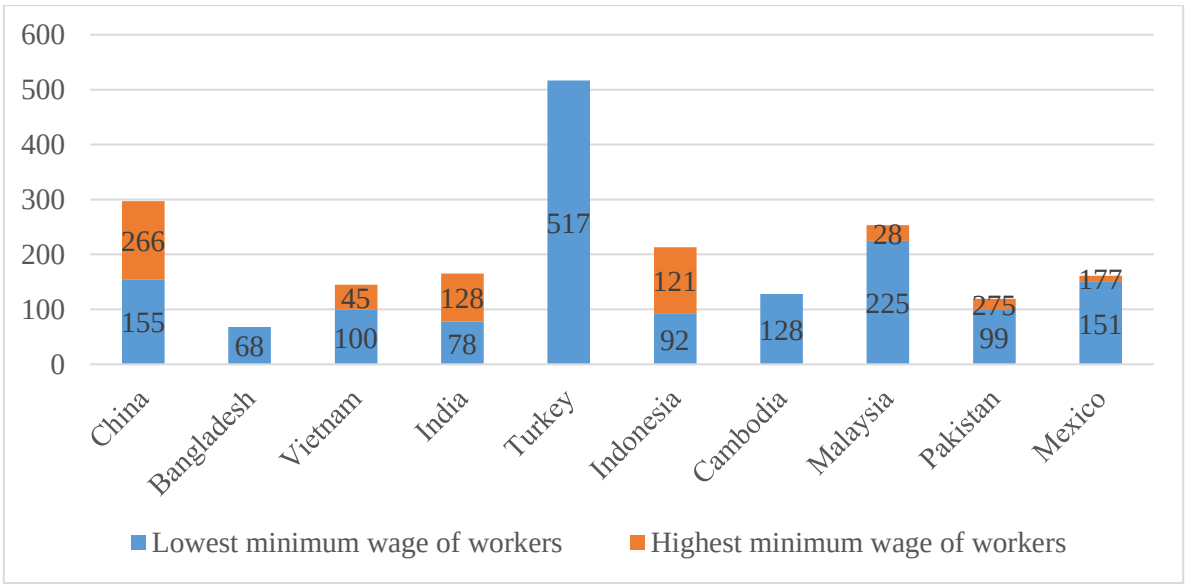


Figure 1.2: Monthly minimum labour rate (in USD) in major apparel-manufacturing countries
Source: Cowgill, Luebker and Xia (2015, p. 1)

The other reason for selecting the apparel industry is its vulnerability to supply risk. This industry is characterised by intense global competition, the short life cycle of products, and

complex supply chain structure (Venkatesh, Rathi & Patwa 2015), which results in higher supply risk incidents. The Bangladeshi apparel-manufacturing industry is also not an exception. Kader and Akter (2014) find that supply risk is one of the major problems of the industry that needs to be addressed in order to realise the potential for growth. Another two recent studies (Chowdhury & Quaddus 2015; Chowdhury, Umme & Nuruzzaman 2018) report several supply risk factors in the context of the apparel industry in Bangladesh. The impact of this risk is also huge. For example, Asia News Network (2013) reports that the industry loses 26.15 million US dollars per day due to supply chain risk (cited in Chowdhury & Quaddus 2015). Although these studies consider all apparel-manufacturing firms in Bangladesh, including large-sized firms, it is reasonable to assume that the findings apply to the manufacturing SMEs in general, in view of their greater level of vulnerability. Therefore, the findings of the study can serve as a guide for apparel SMEs to mitigate their supply risk.

As this study focuses on the mitigation of supply risk by using social capital, only manufacturing SMEs are sampled for this study. This is because supply risk and its mitigation are especially pertinent to manufacturing firms in which sourcing plays a critical role. In contrast, risks faced by the service industry are mainly from the demand side (Blome & Schoenherr 2011).

1.5 Justification of the Study

There has been an increase in the research on supply risk mitigation in recent years. However, the focus of these studies is mainly placed on large enterprises (Kim & Vonortas 2014; Niemann, Kotze & Mannya 2018). This study aims to supplement the inadequacy of research on SMEs by investigating the use of social capital to mitigate their supply risk. The reasons for the proposed study are summarised below:

i. The supply risk mitigation strategies proposed in previous studies can be broadly divided into four categories, namely, buffer oriented, supplier development oriented, formal process oriented, and social capital oriented. The first three approaches to supply risk mitigation are not suitable for SMEs for many reasons:

- Buffer oriented strategies refer to the use of safety stock, dual- or multi-sourcing, reserves at the supplier house, and strategic inventory reserve (Tang 2006). Using safety stock or strategic inventory requires additional capital to buy and hold surplus inventory (Giunipero & Eltantawy 2004). SMEs are at a disadvantage in implementing these strategies because of their shortage of resources. Likewise, buying the same item from multiple suppliers to lower risk (Norrman & Jansson 2004; Tang & Musa 2011) reduces the purchase volume for individual suppliers, thereby lowering the negotiating power of SMEs (Thun, Drüke & Hoenig 2011). Hence, dual- or multi-sourcing is also not suitable for them.
- Supplier development strategies refer to the upgrade of suppliers' processes such as the provision of supplier quality management programmes, supplier certification, and technical capability development (Matook, Lasch & Tamaschke 2009). Developing suppliers is not a possible option for SMEs because of their limited financial and managerial capabilities (Prasad, Tata & Guo 2012).
- Formal process strategies refer to the use of rigorous processes for optimising the sourcing processes of a firm (Christopher *et al.* 2011). This approach requires relatively high investment in technology and applications, thus forming an insurmountable obstacle to SMEs. Lack of technological skills (Faisal, Banwet & Shankar 2007) and the limited education of entrepreneurs and their employees (McKenzie & Woodruff 2015) are also reasons for the low applicability of the formal process strategies. Furthermore, use of formal contracts is very limited for SMEs (Shi,

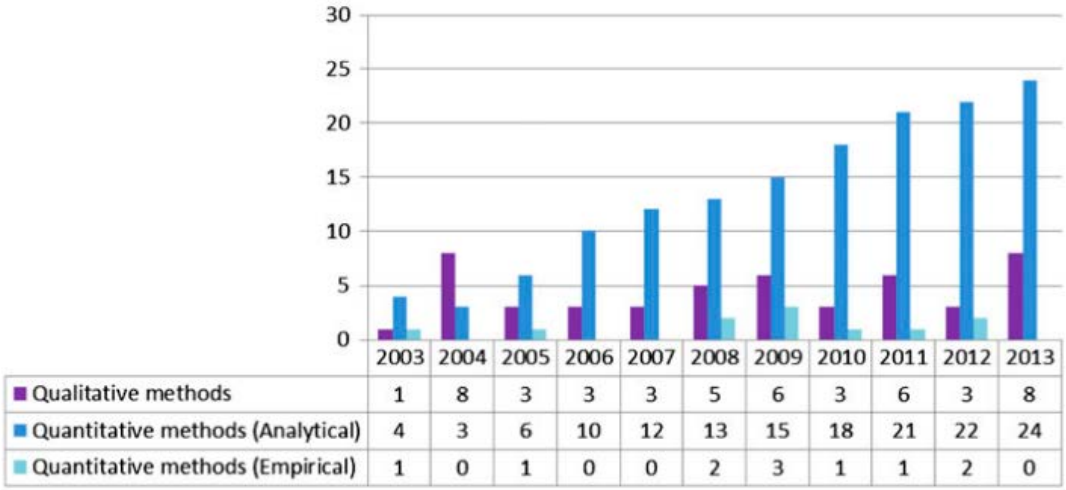
Shepherd & Schmidts 2015). This is because SMEs perceive supply risk mitigation using contractual governance as consuming too much time and resources (Ellegaard 2008). For all these reasons, the formal process alone provides trivial outcomes for manufacturing SMEs (Eze *et al.* 2013).

ii. The social capital approach is more suitable for SMEs. Although social capital can mitigate the supply risk of large enterprises to a certain extent (Cheng, Yip & Yeung 2012), evidence from the literature suggests that for SMEs, the capacity to mobilise social capital with their suppliers and peers is a key measure to mitigate their supply risk (Gao, Sung & Zhang 2011; Kaufmann, Carter & Rauer 2016). This capacity is related not only to the resource deficiencies of SMEs but also to the basic characteristics of their sourcing mechanisms. For example, SMEs mainly source their materials from a single supplier and typically do not use any formal contracts (Ellegaard 2008, 2009). In such situations, increased social capital with suppliers helps reduce the opportunistic behaviours of suppliers and fosters integration in the network, thereby playing a pivotal role in mitigating the supply risk of SMEs (Partanen *et al.* 2008; Prasad, Tata & Guo 2012). Due to their smaller size, SMEs source low volumes of material when they buy alone. A high social capital with peers inside a cluster can improve the cooperative sourcing of SMEs, which improves their sourcing power and supply management skills. The enhanced sourcing power and supply management skills, in turn, can reduce SMEs' supply risk (Hearnshaw & Wilson 2013).

iii. Extensive research on the first three approaches has been conducted (see for example, He and Yang (2018), Huang and Xu (2015), Kern *et al.* (2012), Kull and Closs (2008), and Yang and Yang (2010)) whereas investigation on the use of the social capital approach is relatively limited. A few studies in this area, for example, Mishra *et al.* (2016) and Cheng, Yip and Yeung (2012), mention that the literature on supply risk mitigation using a relational view or social capital approach is scarce although it might have an enduring

impact on supply risk. Integration with suppliers and cooperation with counterparts within an industrial cluster, which is achieved through the use of social capital, can be a feasible option for SMEs to minimise supply risk (Wiengarten, Pagell & Fynes 2013).

iv. The majority of previous studies on supply risk mitigation were based on mathematical modelling using simulated data (Fan & Stevenson 2018). There is a lack of survey-based empirical studies in this regard (Ho *et al.* 2015; Prakash, Soni & Rathore 2017). For example, Fan and Stevenson (2018) report that only 15.5 per cent of total studies in this area are survey-based. Similarly, Ho *et al.* (2015, p. 5053) report the status of the methodology used in the previous studies published during 2003–2013 (Figure 1.3), which shows the lack of empirical studies. Although leveraging social capital is considered a feasible risk mitigation strategy for SMEs, a large-scale survey is needed to enhance both the validity and generalisability of the proposed strategy.



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Qualitative methods	1	8	3	3	3	5	6	3	6	3	8
Quantitative methods (Analytical)	4	3	6	10	12	13	15	18	21	22	24
Quantitative methods (Empirical)	1	0	1	0	0	2	3	1	1	2	0

Figure 1.3: Distribution of studies based on methodology

Source: Ho *et al.* (2015, p. 5053)

v. Only a limited number of supply risk management studies used a theory in the investigation. For example, by reviewing the extant studies in this area, Fan and Stevenson (2018, p. 220) mention that ‘research at this end of the continuum is not taking full advantage of theory potential’. Moreover, Fan and Stevenson (2018) report that most of the previous studies

that used a theory in this area just provided a reference to the theory, but empirical findings are presented with little or no focus on the theory. As a result, it remains unclear in the literature how the theories were operationalised in the measurement, analysis, or design of these studies. Specifically, a study is suggested by Gualandris and Kalchschmidt (2015) and Fan and Stevenson (2018) that will first use the theoretical underpinning to design a framework and formulate the hypotheses of the study. Later, the research will collect the empirical data to test the framework and hypotheses to verify consistency between theory itself and the empirical results.

All the above issues warrant a study to provide a better understanding of supply risk mitigation of SMEs and empirically test the relationships between social capital, supplier integration, cluster cooperation, supply risk, and operational performances. Using the tenets of the Social Capital Theory and the Theory of Swift, Even Flow, this research examines a model that depicts the above relationships. Previous studies on supply risk management leveraging social capital are mainly limited to buyer–supplier social capital. This research examines the impact of both buyer–supplier social capital and cluster social capital on supply risk through a survey-based empirical study. Moreover, previous studies on social capital of SMEs mainly investigated the direct impact of social capital on firm performance. This study examines the mediating roles of supplier integration and cluster cooperation in the relationship between social capital and supply risk to understand the mechanism by which these network resources mitigate supply risk.

1.6 Research Question and Objectives

Taking the apparel SMEs of Bangladesh as the subject of investigation, this study aims to answer the following research question:

How do buyer–supplier social capital and cluster social capital mitigate supply risk under the influence of supplier integration and cluster cooperation to improve operational performance of SMEs?

To accomplish that, the following specific objectives are set:

i. To examine the effect of supply risk, in terms of occurrences of several supply variations, on the operational performance of SMEs.
ii. To investigate the direct and indirect roles of buyer–supplier social capital and cluster social capital in mitigating supply risk of SMEs.
iii. To explore the direct roles of supplier integration and cluster cooperation in mitigating supply risk of SMEs, as well as their mediating roles in the relationship between social capital and supply risk.

1.7 Methodology of the Study

To answer the research questions, a questionnaire survey was conducted to collect data from apparel-manufacturing SMEs in Bangladesh for analysis. The questionnaire was first developed following a systematic process adapted from Haynes, Richard and Kubany (1995), Straub, Boudreau and Gefen (2004), and Vogt, King and King (2004). Data were then collected from the individuals who were managing sourcing or operational activities of the selected SMEs using the drop-and-collect method (MacLennan, Langley & Kypri 2011). Next, the data were evaluated, examined, and assessed using appropriate statistical tests to ensure the representativeness of the survey population, the validity of the statistical assumptions needed for multivariate analysis, and the reliability of the scales of the latent constructs. Finally, a structural equation modelling (SEM) technique was used to test the model and verify the results.

1.8 Contributions of the Study

This study investigates the effect of supply risk on the operational performance of SMEs, and the roles of social capital, supplier integration, and cluster cooperation in mitigating this risk. In the process, the research contributes to both the existing knowledge on supply risk of SMEs and practice in managing the risk in several ways.

1.8.1 Academic Contributions

This research expands the body of literature of supply risk mitigation focusing on SMEs, which is relatively scarce at present. Moreover, the study collects data from the Bangladesh apparel industry for investigation to supplement the lack of research on supply risk mitigation of small firms in developing countries. The research also expands the scope of supply risk studies by combining antecedents and consequences of supply risk in the same framework. Furthermore, by applying the Social Capital Theory, this research makes the first attempt to examine the role of social capital in mitigating SMEs' supply risk from both the perspectives of buyer–supplier and cluster social networks. Such an innovative approach enables the study to develop a more comprehensive model of supply risk mitigation of SMEs. In addition, the study enhances the existing knowledge of social capital by looking at both the direct and the mediating effects through supplier integration and cluster cooperation of social capital on supply risk. Finally, the study extends the application of the Social Capital Theory and the Theory of Swift, Even Flow to the risk mitigation model focusing on SMEs.

1.8.2 Practical Contributions

The study offers an alternative way of mitigating supply risk by leveraging social capital, supplier integration, and cluster cooperation. The outcomes of this study can help practitioners of SMEs understand how these networks' related factors mitigate supply risk. The outcomes

also can assist them to develop and implement appropriate strategies leveraging these factors in lowering their supply risk. Furthermore, the study provides several indicators to measure these factors. The practitioners of SMEs can, therefore, use these indicators to assess the current state of social capital, supplier integration, and cluster cooperation in their firms, and develop appropriate strategies and action plans to improve them. Finally, the outcomes of the study can serve as a guide for practitioners of SMEs and policy makers to enhance awareness on the importance of mitigating supply risk and the use of network resources in achieving this mitigation.

1.9 Thesis Structure

This thesis contains eight chapters, each of which is designed to address the research questions. Figure 1.4 exhibits the organisation of the thesis by chapters. Chapter 1 introduces the research topic with the background of the study, offers the context, motivations, and justifications for the study, develops the research questions and research objectives of the study, and outlines the contributions of the research.

Chapter 2 presents a comprehensive literature review of the existing literature in the area of this research. The chapter begins with a discussion of the theoretical concepts and previous studies related to the topic. Then, two underpinning theories, the Social Capital Theory and the Theory of Swift, Even Flow are discussed. Finally, the conceptual framework, derived from theories and extant literature, is presented with the hypotheses.

Chapter 3 discusses the methodology used in this research with the justifications. It includes the research paradigm, data collection methods, an overview of instrument design stages, sampling techniques, the survey technique, and the data analysis methods. Finally, ethical considerations are discussed at the end of the chapter.

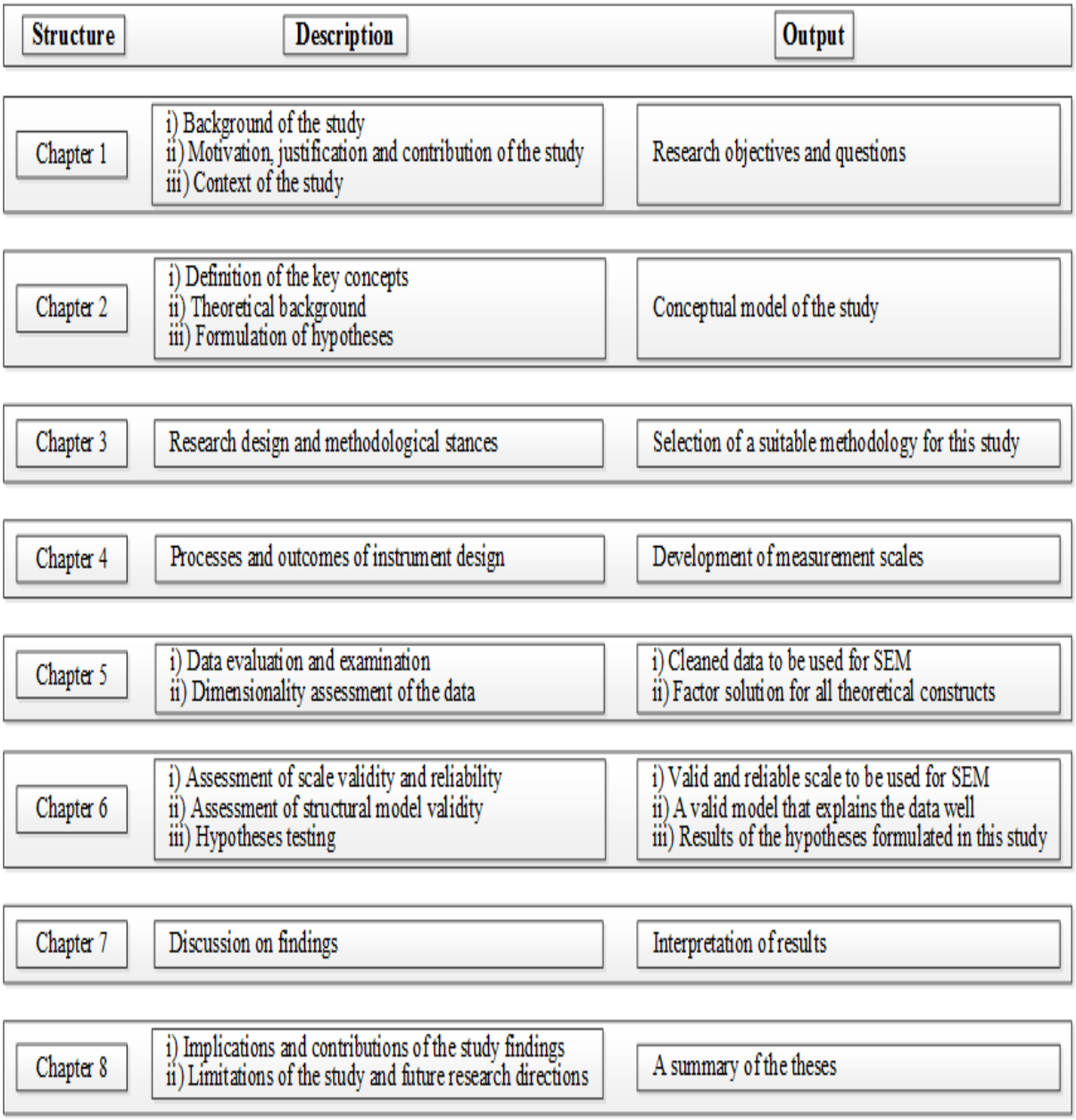


Figure 1.4: Summary of the thesis structure

Chapter 4 highlights the systematic process of designing the survey instrument of this study. It presents the description and findings of the four stages of instrument design mentioned in Chapter 3. The instrument finalised in this chapter is used for the large-scale survey.

Chapter 5 and 6 present the results of the data analysis. Chapter 5 offers a discussion of the profile of the survey respondents and their firms, as well as the screening of the collected data. It also reports and discusses the results of the dimensionality assessments of the theoretical constructs. Chapter 6 initially presents the results of the scale validity and reliability tests. Then,

the chapter reports the results of the common method bias tests. Finally, it demonstrates the results of the validity assessment of the structural model and presents the findings of hypothesis testing.

Chapter 7 discusses the findings of the statistical analysis in conjunction with the research questions and the research objectives. The chapter discusses the hypothesised relationships among the constructs. Moreover, it offers a discussion of the measures of all these constructs.

Finally, Chapter 8 provides a brief discussion of the three specific research objectives presented in Chapter 1. Based on the research findings, it also highlights the implications and the contributions of the research. Finally, the chapter concludes by pointing out the limitations of the study and offering suggestions for future research.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter provides an extensive review of the existing literature in this area of research, to formulate the research hypotheses that address the research questions and achieve the research objectives. It is organised into eight sections. After the introduction in Section 2.1, the concept of supply risk is discussed in Section 2.2, followed by the approaches and strategies of supply risk mitigation in Section 2.3. Then, Section 2.4 reviews the existing studies on supply risk mitigation of SMEs. Next, the concepts and dimensions of social capital are presented in Section 2.5, followed by the concepts of supplier integration and cluster cooperation in Section 2.6. After this, the Social Capital Theory and the Theory of Swift, Even Flow, which are used to underpin this research, are discussed in Section 2.7. Finally, Section 2.8 provides the development of the research hypotheses and presents the conceptual model of this study, before a summary of the chapter is given in Section 2.9.

2.2 Supply Risk

In classical decision theory, risk is conceptualised as ‘variation in the distribution of possible outcomes’ (March & Shapira 1987, p. 1404). These variations can be both positive (opportunity) and negative (danger) in outcome (Mitchell 1995). The initial concept of risk itself is neutral, which takes account of both gain and loss outcomes (Douglas 1990). Although different definitions of risk include both positive and negative variations in outcomes (see Table 2.1), managers usually only consider the negative deviations (Miller & Reuer 1996; Zsidisin 2003a). For instance, a survey conducted by Shapira (1986) finds that eighty percent

of managers sampled only considered negative outcomes in regard to risk (cited in March & Shapira 1987). As a result, the word 'risk' currently means only negative outcomes or danger. For example, Douglas (1990, p. 3) reports that 'whereas originally a high risk meant a game in which a throw of the die had a strong probability of bringing great pain or great loss, now risk refers only to negative outcomes'.

Table 2.1: Definitions of risk in the literature

References	Definition	Outcome Aspect
Crowe and Horn (1967, p. 462)	Risk is the possibility that a sentient entity will incur loss.	Negative
Rowe (1975, p. 1)	Risk is the potential for realisation of unwanted, negative consequences of an event or combination of events.	Negative
Davidshofer (1976, p. 153)	Possibility of gain or loss, depending upon the outcomes of the decisions.	Positive and Negative
March and Shapira (1987, p. 1404)	The variation in the distribution of possible outcomes, their likelihoods and their subjective values.	Positive and Negative
Miller (1992, p. 311)	Unanticipated variation or negative variation in business outcome variables.	Negative
Yates and Stone (1992, p. 23)	Risk is the possibility of loss.	Negative
Simons (1999, p. 87)	Errors or breakdowns that could threaten the company's franchise or strategy.	Negative

In the field of supply chain management and operations management, risk is mainly associated with variations that have negative outcomes (Shafiq *et al*. 2017). For example, Tang and Musa (2011, p. 26) define supply chain risk as the 'events that bring substantial negative consequences to the system'. The Theory of Swift, Even Flow, which postulates that the productivity of a process reduces with increases in the variability related to the flow of the process, supports this negative deviation view of risk, and attempts to strike a balance between the theoretical and managerial perspectives of risk (Schmenner & Swink 1998).

In the supply chain context, risks are generally classified into two groups: operational risks and disruption risks (see Figure 2.1) (Kleindorfer & Saad 2005; Tang 2006). The first group of risk

arises from management problems and inadequate or failed processes (Chen, Sohal & Prajogo 2013; Lockamy & McCormack 2010; Tang 2006), while the second group arises from sudden events, such as natural disasters, labour strikes, terrorist attacks, war, road or port strikes, and regulatory and political instability (Chopra & Meindl 2007; Guertler & Spinler 2015; Kouvelis, Chambers & Wang 2006). Disruption risks have a low probability of occurrence and they are less predictable (Gunessee, Subramanian & Ning 2018; Skipper & Hanna 2009), thus they are difficult to manage (Zhao *et al*. 2013). On the other hand, operational risks are more frequent and more controllable (Chen & Wu 2013). For example, firms more frequently face a quality or lead time problem than an earthquake or terrorist attack. Relatively speaking, operational risk is more critical, as firms are often faced with more controllable risks in their supply chain, which degrade their performance (Byrne 2007; Chen, Sohal & Prajogo 2013).

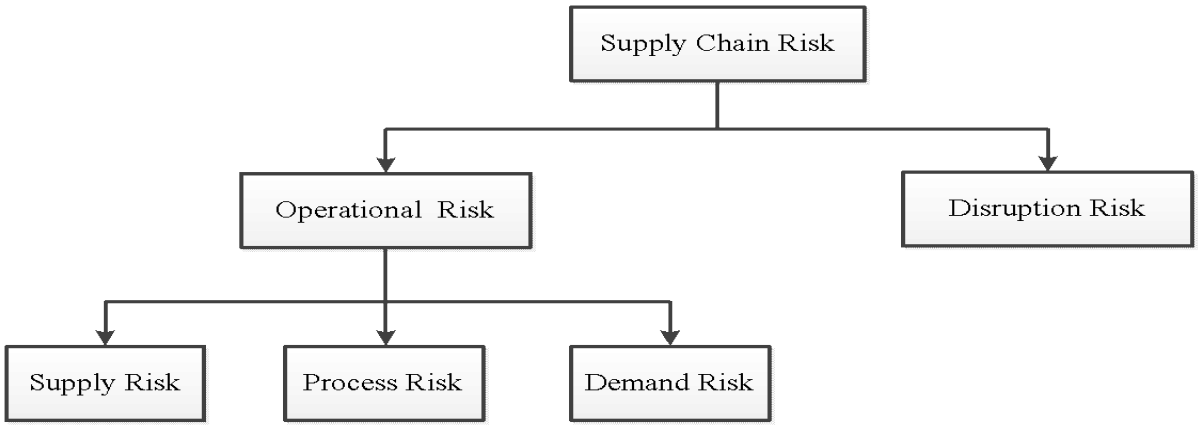


Figure 2.1: Classification of supply chain risk

Source: Adapted from Chen, Sohal and Prajogo (2013) and Guertler and Spinler (2015)

Operational risks include supply risk, process risk and demand risk (Ho *et al*. 2015). Supply risk is the potential deviation in the outcome of inbound supply; process risk is the possible deviations from manufacturing the expected volume and quality; and demand risk is the possible variation of the forecasted demand from the actual demand (Kumar, Tiwari & Babiceanu 2010; Chen, Sohal & Prajogo 2013). Management approaches for each of these

operational risks are quite distinct and need a different set of measurement items and mitigation strategies (Kern *et al*. 2012). In general, supply risk is the most common, and has the biggest impact on firm performance, due to the ripple effect (Hillman & Keltz 2007). Therefore, this research only focuses on supply risks.

Previous studies on supply risk, as on overall supply chain risk, mostly share the negative deviation view of risk. For example, Harland *et al.* (2003, p. 52) define supply risk as the 'chance of danger, damage, loss, injury or any other undesired consequences' in a supply network. This study, therefore, adopts the negative deviation view of risk in defining supply risk. Following the variation based definition of Kumar, Tiwari and Babiceanu (2010) and Chen, Sohal and Prajogo (2013), this research defines supply risk as *the potential variations in the actual supply from the expected values of certain measures of supply performance, which may result in incomplete or unfinished orders.* In other words, this definition considers all deviations in upstream supply from the initial objectives as supply risks, which may have negative outcomes. Deviations can occur in the quality of material, quantity of material, lead times for delivering material, capacity of suppliers and overall requirements. Table 2.2 shows a summary of the different aspects of supply risk and their respective meanings in this study. Each of these aspects has consequences on other activities of the firm (Shafiq *et al.* 2017).

Table 2.2: Aspects of supply risk

Aspect	Description	References
Quality	Deviation in the delivered material from the specified quality	Chen (2018); Chen, Sohal and Prajogo (2013); Christopher *et al*. (2011)
Quantity	Deviation in the delivered material from the specified volume	Cheng, Yip and Yeung (2012); Fan *et al*. (2017); Yoon *et al*. (2018)
Lead time	Deviation in the actual supply from the specified delivery time	Ganguly (2014); Hallikas and Lintukangas (2015); Zsidisin (2003b)
Capacity constraint	Changes in supplier capacity that reduce the ability of the supplier to meet the demand of the buying firms	Chen, Sohal and Prajogo (2013); Shafiq *et al*. (2017); Tang and Musa (2011); Wagner and Bode (2008)
Overall requirement	Deviation in the actual supply from the specified overall requirements	Chen, Sohal and Prajogo (2013); Thun and Hoenig (2011); Zsidisin (2003a)

2.3 Supply Risk Mitigation Strategies

Since total elimination of supply risk is not possible (Christopher *et al*. 2011), prior studies have recommended certain mitigation strategies, including several response actions, that may help firms reduce the occurrence and effects of supply risk events (Chen, Sohal & Prajogo 2013; Kaufmann, Carter & Rauer 2016). The mitigation strategies suggested in these studies are either based on the agency perspective or the relational perspective (Cheng, Yip & Yeung 2012; Li *et al*. 2015). The agency perspective is concerned with the study of problems that arise when one party, the principal, delegates work to another party, the agent (Zsidisin & Ellram 2003). This perspective investigates the agency problems in a situation where two parties have dissimilar goals and risk preferences (Li *et al.* 2015). Studies using the agency perspective offer several supply risk mitigation strategies where the purchasing organisation is considered as the principal and the supplier as the agent. The strategies suggested in these studies can be categorised into a buffer oriented or behaviour oriented approaches (Cheng, Yip & Yeung 2012; Zsidisin & Ellram 2003). While the buffer-oriented approach is reactive in nature, the behaviour-oriented approach is proactive and focuses on processes. It reflects the extent to which a buying firm emphasises 'tasks and activities' that lead to a reduction of supply risk events or their associated impacts (Zsidisin & Smith 2005). The processes include improvement of the buying firm's sourcing processes and developing the abilities of suppliers to meet the buyer's requirements (Li & Barnes 2008).

Although the majority of studies in this area are mainly based on the agency perspective, several recent studies investigate supply risk mitigation strategies using the relational perspective (Chen, Sohal & Prajogo 2013; Cheng, Yip & Yeung 2012; Li *et al.* 2015; Mishra *et al.* 2016). The relational perspective focuses on leveraging social capital with network members to achieve supply risk mitigation (Cheng, Yip & Yeung 2012; Li *et al.* 2015). This also emphasises the enhancement of integration or cooperation between the network members,

which is achieved through the use of social capital (Chen, Sohal & Prajogo 2013; Min, Kim & Chen 2008). Since the relational perspective of supply risk mitigation is based on social capital, it is popularly termed the social capital oriented approach in previous studies (Gao, Sung & Zhang 2011; Johnson, Elliott & Drake 2013; Prasad, Tata & Guo 2012). Combining both the agency perspective and the relational perspective, supply risk mitigation strategies can be broadly divided into four approaches, namely, buffer oriented, supplier development oriented, formal process oriented and social capital oriented. While the first three are based on the agency perspective, the last one is based on the relational perspective.

Buffer oriented approach, the first approach, is most commonly used for managing detrimental supply risk events (Zsidisin & Ellram 2003). This approach recommends holding either a reserve inventory or additional suppliers, or both (Mishra *et al*. 2016). Although these strategies cannot reduce the occurrence of supply risk events directly, they assist in reducing the associated impacts (Ellegaard 2008). For example, by adopting a multi-sourcing strategy, Nokia suffered little in 2000 when its major supplier, Philips, was unable to supply materials due to a fire in the factory (Tang 2006). Mitigation strategies related to holding reserve inventory include the use of safety stock and supplier-managed inventory (Park, Min & Min 2016; Zsidisin, Panelli & Upton 2000). Safety stocks, involve the buying firm holding additional inventory, provide the initial protection of a supply variation. This can greatly minimise the impact of the supply risk, especially if the stocks are held in, or in close proximity to, the manufacturing facilities (Son & Orchard 2013; Zsidisin & Ellram 2003). However, this strategy, by its nature, increases holding costs and storage space, and reduces the competitive advantage of the buying firms, since the additional sourcing cost makes the business less efficient (Giunipero & Eltantawy 2004). On the other hand, with supplier-managed inventory, the supplier is required to hold the material for the buying firms. Although this strategy reduces the storage cost for the buying firm, often the cost is passed to the buying firm in the form of

an increased price (Zsidisin & Ellram 2003). This strategy carries additional risk associated with the transportation of the material (Monczka *et al*. 2015).

Mitigation strategies related to using additional suppliers include the use of dual or multiple sources, backup suppliers and supply intermediaries (Guo, Zhao & Xu 2016; Iakovou *et al*. 2014). The dual or multiple sourcing strategy is the use of more than one active supplier for material purchasing (Zhu 2015). Many reasons for using this strategy are noted in the literature, including creating a competitive supply environment, reducing the risk of price escalation and excessive control by a single supplier, and combating a lack of innovation from a single supplier (Lu, Huang & Shen 2011; Su & Liu 2015). However, the problem with this strategy is that it divides the purchasing volume of the buying firm and thus reduces the buying power. To overcome this problem, several other studies recommend the use of backup suppliers (Chen, Zhao & Shen 2015; Hou, Zeng & Zhao 2010). If one supplier fails to provide the required materials, backup suppliers are used to procure the materials. The management of backup suppliers is challenging and incurs additional costs, such as coordination cost, for the buying firm (Giri & Bardhan 2014). As an alternative option, Vedel and Ellegaard (2013) suggest the use of a sourcing intermediary, who is responsible for delivering the required materials. This strategy substantially mitigates supply risk, especially in global sourcing. However, the absence or lack of direct communication between the buying firm and its suppliers is the main drawback of this strategy, which results in a lack of visibility in the supply chain.

Supplier development, the second approach, is a long-term process that requires efforts by the buying firm to improve supplier performance and competencies, so that suppliers can meet the buying firm's requirements (Gualandris & Kalchschmidt 2015; Krause 1999). Supply risk mitigation strategies using the supplier development approach include the provision of supplier quality management programmes, supplier certification and providing technical support (Chan & Kumar 2007; Matook, Lasch & Tamaschke 2009; Zsidisin & Smith 2005). Several supplier

quality management programmes, such as supplier education and training, providing feedback on supplier performance and raising performance expectations, can be implemented to improve the abilities and efforts of suppliers to meet the expectations of the buying firm (Zsidisin & Ellram 2003). Instead of organising direct quality management programmes, some other studies (Giunipero & Eltantawy 2004; Zsidisin *et al*. 2004) suggest implementing a supplier certification strategy. In this strategy, a certificate is awarded to a supplier who consistently meets the buyer's requirements. This strategy is effective in reducing the expensive and time-consuming inspections of incoming materials, and in enhancing the motivation of suppliers to continue with best practice (Zsidisin & Ellram 2003). Finally, initiatives by the purchasing organisation to support suppliers in dealing with technical or design issues are suggested (Li & Barnes 2008). The initiatives can consist of sending the buying firm's own engineers to the suppliers' premises, employing a dedicated team at suppliers' premises and investing capital to improve supplier technical abilities.

The objective of these supplier development strategies is to establish a long-term viable supplier base for a buying firm, to reduce the occurrence of supply risk events (Matook, Lasch & Tamaschke 2009). However, substantial human and financial resources, together with the extensive efforts of the buying firm, are required (Zsidisin & Smith 2005). Moreover, an empirical study (Sanchez-Rodríguez, Hemsworth & Martinez-Lorente 2005) finds that only basic supplier development initiatives, such as providing feedback and adoption of supplier quality qualifications, help achieve the expected supply performance. On the other hand, the study finds that moderate-to-advanced supplier development initiatives, such as supplier certification and supplier training, fail to improve supplier performance, as firms implement these moderate to advanced initiatives to a lesser extent. A similar finding is noted by Arroyo-Lopex, Holmen and Boer (2012), who report that widely used supplier development initiatives only marginally improve the performance of suppliers.

A ***formal process***, the third approach, typically demands systematic steps to standardise the sourcing processes of the buying firm (Kern *et al*. 2012). Several strategies related to the formalisation of the sourcing processes are suggested for optimising these processes and for reducing the occurrences of supply risk events and their associated impacts. These include business continuity planning, optimisation of sourcing processes and rigid contracts (Christopher *et al*. 2011; Micheli, Cagno & Zorzini 2008; Yoon *et al*. 2018). Business continuity planning is a formalised system that provides guidance for the actions required to create awareness of, prevent, mitigate and recover from a supply risk event (Zsidisin, Melnyk & Ragatz 2005). The elements of the system may include risk identification, assessment and mitigation procedures, and risk performance analysis techniques (Kern *et al*. 2012). This continuity planning is decided based on a contingency plan that considers all potential supply risk events and their mitigation strategies (Ketkar & Vaidya 2018), or on mapping out the entire critical path of a product to identify where the risk could be and what actions are required to mitigate their occurrences and impacts (Christopher *et al*. 2011).

Several studies, such as Chen and Wu (2013), Mohammaddust *et al*. (2017), Park, Min and Min (2016) and Safaei *et al*. (2018), suggest optimising the sourcing processes, so that the buying firm experiences less risk from suppliers. In this regard, the studies recommend improving or re-designing the sourcing processes. More specifically, rigorous systems in supplier selection (Micheli 2008; Yoon *et al*. 2018), supplier monitoring (Sreedevi & Saranga 2017) and implementation of signal-based (market demand) dynamic forecast of material (Gao *et al*. 2017) are suggested to optimise the overall sourcing process. Firms need the support of technology to properly apply these sorts of application-oriented formal steps. Another formal approach suggested in the literature is the use of a formal and stringent contract in sourcing (Eckerd & Girth 2017; He & Yang 2018; Hoffmann, Schiele & Krabbendam 2013; Tang 2006; Thun & Hoenig 2011). Stringent contractual governance assists in reducing the impacts of

supply risk on buying firms' operations, as it includes details on the risk recovery mechanism. Buying firms can add risk sharing clauses, and can specify several potential situations of inbound supply, such as over-supply and under-supply, in a formal contract, to specify the roles of each party in different scenarios (Fan *et al*. 2017; Ghadge *et al*. 2017; He 2017). A formal contract can also reduce the probability of potential supply risk events, as suppliers strive to meet the requirements of the contract to minimise their loss (He & Yang 2018). Firms need managerial skills for preparing a formal contract with necessary clauses (Ellegaard 2008).

The ***social capital*** approach, the last approach, is a way of minimising deviation in the inbound supply through interaction, understanding and relationship maintenance with members of the network (Cheng, Yip & Yeung 2012; Johnson, Elliott & Drake 2013). It is believed that social capital can be critical for supply performance, as well as for operating flexibility and responsiveness in sourcing (Prasad, Tata & Guo 2012). Since supply risk originates from the upstream suppliers, previous studies suggest improving social capital with key or main suppliers (Cheng, Yip & Yeung 2012; Kilubi & Rogers 2018; Mishra *et al*. 2016). Improved social capital with key suppliers enhances the suppliers' efforts to meet the buyer's requirements, thus reducing variation in the delivered material. Other studies recommend improving supplier integration in an strategic manner, to reduce supply risk (Chen, Sohal & Prajogo 2013, 2016; Giunipero & Eltantawy 2004; Gunasekaran, Subramanian & Rahman 2015; Li *et al*. 2015; Mishra *et al*. 2016; Ritchie & Brindley 2000). These studies propose several integrative practices, including information sharing, resource sharing and collaboration with key suppliers. Recently, some studies, such as Hearnshaw and Wilson (2013), Johnson, Elliott and Drake (2013) and Pomponi, Fratocchi and Tafuri (2015), recommend improving horizontal cooperation to mitigate supply risk.

These social capital oriented strategies have recently been advocated by scholars, as they are considered effective in both reducing the occurrences and impacts of supply risk (Cheng, Yip

& Yeung 2012; Mishra *et al*. 2016). Social capital oriented strategies can also improve knowledge of the potential risk events (Ellegaard 2008). Compared with the buffer oriented approach, Mishra *et al*. (2016) find that the effects of social capital oriented strategies on minimisation of supply risk are substantially higher (55 per cent higher) than the effects of buffer oriented strategies.

All these supply risk mitigation approaches and strategies have their own benefits and requirements. Each of these strategies can be either a substitute for, complementary to or independent of other strategies (Gao *et al*. 2017). Therefore, firms need to carefully select a strategy or combination of strategies to mitigate their supply risk. Table 2.3 summarises the supply risk mitigation approaches and strategies.

Table 2.3: Supply risk mitigation approaches and strategies

Perspective	Approaches	Benefit	Strategies	References
Agency	Buffer oriented	Reduces impacts of risk events	Safety stocks	Mishra *et al*. (2016)
			Supplier managed inventory	Zsidisin and Ellram (2003)
			Multi sourcing (Dual or multiple sourcing)	Norrman and Jansson (2004)
			Backup suppliers or shifting suppliers	Kırılmaz and Erol (2017)
			Using supply intermediaries	Vedel and Ellegaard (2013)
	Supplier development oriented	Reduces occurrences of risk events	Supplier quality management programmes	Matook *et al*. (2009)
			Supplier certification	Giunipero and Eltantawy (2004)
			Providing technical support	Li and Barnes (2008)
	Formal process	a) Reduces impacts of risk events b) Reduces occurrences of risk events	Business continuity planning	Zsidisin *et al*. (2005)
			Sourcing processes optimisation	Yoon *et al*. (2018)
			Contractual governance	Tang and Musa (2011)
Relational	Social capital	a) Reduces impacts of risk events b) Reduces occurrences of risk events c) Increases knowledge of risk events	Buyer–supplier social capital	Cheng, Yip and Yeung (2012)
			Supplier integration	Chen, Sohal and Prajogo (2013)
			Horizontal cooperation	Pomponi, Fratocchi and Tafuri (2015)

2.4 Supply Risk Mitigation of SMEs

Although there has been a lack of research on supply risk in the context of SMEs, a number of articles, such as Adams *et al*. (2016), Kaufmann *et al*. (2016), Park, Min and Min (2016) and Thun, Drüke and Hoenig (2011), conduct a comparative supply risk analysis between SMEs and large enterprises. These articles conclude that SMEs are more vulnerable to supply risk than large firms, as reported in Chapter 1. In addition to these comparative studies, Kozaryn and Wasilewski (2012), Kumar, Singh and Shankar (2014) and Niemann, Kotze and Mannya (2018) explore supply risk events in the context of SMEs. Kozaryn and Wasilewski (2012) report that SMEs frequently experience poor quality in sourcing materials, delays in receiving materials and commodity price fluctuations. Kumar, Singh and Shankar (2014) and Niemann, Kotze and Mannya (2018) also agree that supply risk is one of the main concerns for SMEs, since they face several variations in their inbound supply, in the form of the quality or quantity of material, lead times of material delivery and overall requirements. As a result, mitigation of supply risk is important for SMEs. This is especially crucial for manufacturing SMEs, as supply costs usually represent their largest budgetary portion (Thakkar & Deshmukh 2008).

Proper identification and assessment of probable supply risk can help in this regard, as these practices lead to suitable supply risk mitigation strategies for SMEs (Aghapour *et al*. 2017). Gao, Sung and Zhang (2011) contend that, owing to resource constraints, the major capability of SMEs to reduce risk is to establish networks with different groups. Social capital can be the main facilitator in such a network building process (Partanen *et al*. 2008). Ellegaard (2008) reports that SMEs mainly adopt defensive strategies to mitigate supply risks, and use social capital with their key suppliers to achieve this mitigation. Other studies (Kam, Chen & Wilding 2011; Niemann, Kotze & Mannya 2018; Prasad, Tata & Guo 2012; Riccobono, Bruccoleri & Perrone 2013) also agree that SMEs could leverage social capital with their key suppliers to mitigate supply risk.

SMEs tailor their sourcing practices to fit with the social capital oriented approach of supply risk mitigation. For example, Ellegaard (2006) and Lavastre, Gunasekaran and Spalanzani (2012) report that, as a supply risk mitigation strategy, SMEs source from local suppliers to ensure common perspectives between buyer and suppliers (cognitive dimension of social capital). Moreover, SMEs source from a small supplier base, mostly from a single supplier, so that they can ensure improved social capital with them (Mikalef *et al*. 2015). Other studies, such as Faisal, Banwet and Shankar (2007a) and Mikalef *et al*. (2015) report that SMEs improve integrative behaviours, such as information sharing and collaboration, with key suppliers to reduce supply risk. Faisal, Banwet and Shankar (2007a) also mention that SMEs consider the ability to share timely and symmetric information with their key suppliers as the highest priority for a supply risk mitigation strategy.

On the other hand, using grounded theory, Riccobono, Bruccoleri and Perrone (2013) find that SMEs develop networks with their peers (competitors) to tackle supply risk. More specifically, SMEs cooperate with their peers located in a geographical cluster to reduce supply risk (Albino, Carbonara & Giannoccaro 2007). Based on articles published between 1985 and 2015, a recent study (Asgari *et al*. 2016) reports that SMEs develop horizontal cooperation, vertical integration and long-term relationships to manage their supply chain efficiently. They also practice the same strategies for managing supply risk, as demonstrated in Table 2.4. The mindsets or orientations of SMEs play an important role in practicing these strategies, as most SMEs prefer to practise the type of supply risk mitigation strategy that would assist them in networking with suppliers and peers. These SMEs believe that, through networking, they can ensure information symmetry and cooperation with their key suppliers and peers, which, in turn, will mitigate supply risk (Ellegaard 2009; Prasad, Tata & Guo 2012).

Table 2.4: Literature on supply risk mitigation of SMEs

Study	Method used	Use of theory	Focus	Key findings/Mitigation strategies
Niemann, Kotze and Mannya (2018)	Case study	None	Yes	SMEs manage sourcing risk informally by enhancing face-to-face interactions and relationships with key suppliers.
Aghapour *et al*. (2017)	Survey	Contingency Theory	Yes	Proper supply risk assessments lead to an appropriate risk mitigation plan for SMEs.
Mikalef *et al*. (2015)	Case study	Contingency theory	No	SMEs source material from a small supplier base to ensure tight bonds with them through integration.
Riccobono, Bruccoleri and Perrone (2013)	Case study	Grounded	Yes	SMEs can mitigate supply risk by networking with their key suppliers and peers (competitors).
Prasad, Tata and Guo (2012)	Conceptual	Social capital	Yes	Different dimensions of social capital, including structural, relational and cognitive, protect SMEs from supply risk.
Lavastre, Gunasekaran and Spalanzani (2012)	Survey	None	No	SMEs tend to source more from local suppliers than large firms, to ensure common understandings with key suppliers.
Kam, Chen and Wilding (2011)	Case study	None	No	Building trust and Guanxi (a term used in China to refer to social capital) with key business partners improves the supply risk management capabilities of SMEs.
Thun, Drüke and Hoenig (2011)	Survey	None	(Yes)	SMEs implement supplier development strategies substantially less than large firms. They mostly depend on reactive strategies to manage supply risk.
Ellegaard (2008)	Case study	None	Yes	SMEs practice defensive strategies, such as knowledge improvement and relationship management with key suppliers, to reduce supply risk.
Albino, Carbonara and Giannoccaro (2007)	Case study	None	Yes	Horizontal cooperation in an SME cluster reduces the supply risk for SMEs.
Faisal, Banwet and Shankar (2007a)	Analytical	None	Yes	Information sharing and feedback is the most important criterion in selecting supply risk mitigation strategies.
Ellegaard (2006)	Case study	None	Yes	SMEs source from local suppliers to ensure shared understandings with the suppliers.

No = Focused on all firms, in general, which also includes some SMEs; Yes = Focused on SMEs only; (Yes) = Focused on a comparison between SMEs and large enterprises.

Ellegaard (2008) also reports that SMEs do not implement any of the buffer, supplier development or formal process oriented strategies, due to their limited internal resources, weak

positional power in the supply chain, and informal structure of management. This observation is consistent with the finding of Faisal, Banwet and Shankar (2007a), that SMEs generally do not practise any inventory-focused supply risk mitigation strategies, such as holding buffer stock, due to lack of inventory modelling skills. Inventory build-up increases other complexities, such as blockage of the scarce working capital of SMEs and pilferage and obsolescence of the materials (Sharma, Singh & Matai 2018). Thun, Drüke and Hoenig (2011) report that adoption of any supplier development strategies to mitigate supply risk is less common in SMEs than in large firms.

Although a few studies support that SMEs can implement social capital oriented strategies to mitigate their supply risk, it is evident in the literature, as demonstrated in Table 2.4, that no study has tested the notion empirically. While Lavastre, Gunasekaran and Spalanzani (2012) and Thun, Drüke and Hoenig (2011) employed surveys to gather their data, their focus was neither particularly on SMEs nor on supply risk. Lavastre, Gunasekaran and Spalanzani (2012) only used descriptive statistics (average and standard deviation) to reveal the distribution of techniques used by manufacturing firms for managing all types of supply chain risks, including supply risk. Thun, Drüke and Hoenig (2011) investigated and confirmed that large firms and SMEs vary significantly in implementing supply chain risk management strategies. However, the study did not test to what extent a particular supply chain risk management strategy mitigates the risk. Another survey-based study (Aghapour *et al*. 2017) also did not test the suitability of any particular supply risk mitigation strategy. Instead, it just investigated if a culture of risk assessment helps SMEs in implementing a mitigation plan for any supply chain risks.

Moreover, the studies that discuss social capital oriented strategies recommend different strategies for risk mitigation. While some studies suggest social capital with key suppliers or supplier integration, others suggest cooperation with peers who located within a geographical

cluster (see Table 2.4). These studies do not consider the relationship between social capital and network integration or cooperation, although according to the Social Capital Theory, they are interrelated (Adler & Kwon 2002). This is probably due to the fact that none of the empirical studies applied the Social Capital Theory to underpin their research. Although Prasad, Tata and Guo (2012) applied the theory, the study is conceptual in nature, and propositions are provided based on the findings of previous studies. Therefore, a survey-based empirical study is needed to investigate the roles of all social capital oriented supply risk mitigation strategies and their structural relationships, by employing the tenets of the theory to provide a comprehensive view of the role of social capital approach. This is vital for enhancing both the validity and the generalisability of the proposed social capital oriented strategies in mitigating the supply risk of SMEs. This study attempts to address these issues, with a focus on revealing suitable supply risk mitigation strategies for SMEs.

2.5 Social Capital

This section discusses the meaning and dimensions of social capital in this study. It also details the social capital studies conducted in the supply chain management context.

2.5.1 Concept of Social Capital

Social capital has been argued as a valuable resource that is available through a social network (Granovetter 1992). It plays a large role in improving firm performance, through sharing the information and resources, and ensuring cooperation among network members (Min, Kim & Chen 2008). There are a number of definitions of social capital, with broad similarities and differences (Inkpen & Tsang 2005). As shown in Table 2.5, these definitions can be grouped into three classes based on their foci: external ties or bridging social capital, internal ties or bonding social capital, and mixed (Adler & Kwon 2002; Wu 2008).

Table 2.5: Different views of social capital

Views	Main theme	References
Bridging social capital	External ties or interactions are the source of potential resources.	Borudieu (1986); Burt (2000)
Bonding social capital	Internal features within the network, such as relational cohesiveness, facilitate the common goals.	Coleman (1988); Putnam (1995)
Mixed	Firms benefit from either or both.	Inkpen and Tsang (2005); Nahapiet and Ghoshal (1998)

The first view of social capital argues that important resources can be acquired through the ties with other people or organisations in the network. For example, Borudieu (1986) defines social capital as the actual or potential resources that one obtains through membership of a specific group or interactions with other members. The second view of social capital—bonding social capital—focuses on internal characteristics, such as collective cohesiveness or relationships that facilitate the collective goals of the network. Using this view, Putnam (1995, p. 67) defines social capital as 'features of social organisation, such as networks, norms or social trust, that facilitate coordination and cooperation for mutual benefit'. These features or entities facilitate the actions of individuals within the network (Coleman 1988).

The third view of social capital is neutral on the bonding or bridging focus. Following this view, Nahapiet and Ghoshal (1998, p. 243) define 'social capital [a]s the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit.' This research adopts the definition of social capital given by Nahapiet and Ghoshal (1998), because it focuses on both bridging and bonding, and it accommodates both individual and organisational resources (Inkpen & Tsang 2005). From the perspective of small businesses, combining both individual and organisational social capital is necessary (Chang & Chuang 2011). This is because owners and managers of SMEs often use their personal contacts in forming business relationships with different groups. Furthermore, the bonding and bridging views are not mutually exclusive, because firms are

influenced by both internal and external ties (Adler & Kwon 2002). Several previous studies on social capital in the supply chain context (Carey, Lawson & Krause 2011; Villena, Revilla & Choi 2011) also adopt the mixed view of social capital.

As discussed in the previous section, prior studies report that SMEs leverage resources from two types of networks, with their key suppliers and with their peers in the same geographical cluster, to mitigate supply risk. Therefore, this study investigates SMEs' social capital leveraged from these two networks. In this study, buyer–supplier social capital refers to the resources *embedded within, available through, and derived from the network of buying SMEs with their key suppliers*. In this study, key suppliers refer to the suppliers who deliver a critical material of production to SMEs. On the other hand, cluster social capital refers to the resources *embedded within, available through, and derived from the network of similar SMEs located within the same geographical cluster*. A cluster is the sectoral and geographical concentration of firms (United Nations Industrial Development Organisation 2001). Adopting the definition of cluster given by the Bangladesh SME Foundation (2013, p. 22), this study defines a cluster as the 'concentration of enterprises producing similar products or services and is situated within the adjoining geographical location, having common strengths, weaknesses, opportunity and threats'.

2.5.2 Dimensions of Social Capital

Based on the mixed view, Nahapiet and Ghoshal (1998) and Tsai and Ghoshal (1998) synthesise social capital in three dimensions: structural, relational and cognitive. This three-dimensional view is also adopted in this study, to provide a comprehensive picture of social capital. The structural dimension of social capital refers to the pattern of connections, such as who to reach and how to reach them, among the different actors of the network (Nahapiet & Ghoshal 1998). This dimension has been examined in a number of ways, including

investigations of network features (Burt 2000), network uses and network appropriateness (Yim & Leem 2013), as well as the strength of social interactions (Bolino, Turnley & Bloodgood 2002; Chang & Chuang 2011; Gao, Sung & Zhang 2011). Previous studies in the supply chain management area investigating the structural dimension of social capital have adopted the latter approach, the strength of social ties, to conceptualise this dimension (Carey, Lawson & Krause 2011; Li, Ye & Sheu 2014; Villena, Revilla & Choi 2011). As such, this study defines the structural dimension of social capital (hereafter referred to as structural capital) as *the strength of the social interactions existing between the network members*. Examples of social interactions include organised social and family events, intensive interactions between personnel, site visits and interactions at co-location. These social interactions help to facilitate the exchange of information and experience in network relationships (Johnson, Elliott & Drake 2013). Rewards of such connections, such as cooperation, are derived from the appropriate network within a given social structure (Villena, Revilla & Choi 2011).

The relational dimension of buyer–supplier social capital (hereafter referred to as relational capital) is defined as the extent of personal relationships that members of a network have developed with each other (Nahapiet & Ghoshal 1998). Relational capital includes trust, commitment, reciprocity, friendship and mutual respect (Villena, Revilla & Choi 2011). Trust is a firm's confidence in its partners' reliability and behaviour (Min, Kim & Chen 2008). Commitment is a pledge, either implicit or explicit, of relational continuity between network members (Coleman 1988), whereas reciprocity is the perception of fairness to work mutually in a network (Chang & Chuang 2011). Firms also enjoy mutual respect and personal friendship with one another through relational capital (Carey, Lawson & Krause 2011). These relational aspects help develop the mutual confidence of all the parties in the network that none would

exploit the vulnerability of others, thereby improving the perception of fairness among the network members (Johnson, Elliott & Drake 2013).

Finally, the cognitive dimension of social capital (hereafter referred to as cognitive capital) refers to the resources that provide shared representations, interpretations and systems of meaning among the network members (Coleman 1988; Johnson, Elliott & Drake 2013). Cognitive capital includes several common attributes and collective ideologies, such as shared goals, ambitions and values (Krause, Handfield & Tyler 2007; Tsai & Ghoshal 1998), language and codes (Bolino, Turnley & Bloodgood 2002; Chiu, Hsu & Wang 2006), and business philosophies and approaches (Kale, Singh & Perlmutter 2000; Villena, Revilla & Choi 2011), among the parties. These common attributes and collective ideologies in a network relationship foster the exchange of information and ideas within the network, as all parties can see the synergistic potential of the relationship (Carey, Lawson & Krause 2011).

In sum, structural capital refers to the strength of social interactions among the different members of the network. Relational capital is the strength of interpersonal relationships, whereas cognitive capital focuses on common attributes and collective ideologies among the network members.

2.5.3 Social Capital Studies in Supply Chain Management Context

Social capital plays a crucial role in supply chain management. There has been an increase in the literature investigating the relationship between social capital and other related variables in the supply chain management context, although most of the studies have focused on large enterprises. A positive relationship is proposed between supply chain social capital and supply chain performance for manufacturing firms (Autry & Griffis 2008; Min, Kim & Chen 2008) and for service firms (Avery & Swafford 2009), using the findings of previous studies. Yim and Leem (2013) later tested the validity of these arguments in the context of large

manufacturing firms and found support. Several studies (see Table 2.6) examined the impact of social capital separately, based on buyer's performance and supplier's performance in different aspects, such as cost, quality, delivery, flexibility, design, innovation and responsiveness. Relationships of social capital are also investigated with supply chain integrative behaviours, such as information sharing, knowledge sharing and supply chain collaboration (Li, Ye & Sheu 2014; Min, Kim & Chen 2008; Yim & Leem 2013). Previous studies have also revealed a positive association between social capital and supply chain resilience (Johnson, Elliott & Drake 2013), and conceptually propose a negative association between social capital and supply risk occurrences (Kilubi & Rogers 2018; Prasad, Tata & Guo 2012). In general, social capital is considered as the glue for relationship and cooperation maintenance with other members in the supply chain (McGrath & Sparks 2005). Table 2.6 summarises the previous research on supply chain management, focusing on social capital.

Table 2.6: Social capital studies in supply chain management context

Relationship proposed/tested	Nature of investigation	References
Supply chain integration	Relationship tested and confirmed	Li, Ye and Sheu (2014); Min, Kim and Chen (2008); Song *et al*. (2016); Yim and Leem (2013)
Knowledge creation and exchange	Relationship proposed conceptually	Autry and Griffis (2008); Min, Kim and Chen (2008)
Supply chain performance	Relationship tested and confirmed	Avery and Swafford (2009); Autry and Griffis (2008); Min, Kim and Chen (2008); Odongo *et al*. (2016); Yim and Leem (2013)
Supplier performance	Relationship tested and confirmed	Kim, Lee and Lee (2017)
Firm (buyer) performance	Relationship tested and confirmed	Cousins *et al*. (2006); Cousins and Lawson (2007); Krause, Handfield and Tyler (2007); Lawson *et al*. (2008); Bernardes (2010) Carey, Lawson and Krause (2011); Srinivasan *et al*. (2011); Villena, Revilla and Choi (2011)
Supply chain resilience	Relationship revealed using qualitative study	Johnson, Elliott and Drake (2013)
Increase sales	Relationship tested and confirmed	Cousins *et al*. (2006)
Customer responsiveness	Relationship tested and confirmed	Bernardes (2010)
Supply risk management	Relationship proposed conceptually	Kilubi and Rogers (2018); Prasad, Tata and Guo (2012)

2.6 Supplier Network Integration and Cluster Cooperation

Using the tenets of the Social Capital Theory, this study argues for two direct impacts of social capital. First, it hypothesises the direct impact of buyer–supplier social capital on supplier integration. Second, it postulates the direct impact of cluster social capital on cluster cooperation. This study also proposes the mediating roles of supplier integration and cluster cooperation in the relationship between social capital and supply risk. This section discusses the meaning of supplier integration and cluster cooperation in this study.

2.6.1 Supplier Integration

Supply chain integration is defined as the process of 'connecting entities through coordinating or sharing information and resources' (Droge *et al*. 2012, p. 251). Following this definition, this study defines supplier integration as the *process of SMEs connecting with their key suppliers by sharing information and resources, and coordinating key business functions to gain mutual benefits* (Min, Kim and Chen 2008; Yim & Leem 2013). A three-dimensional concept of supplier integration, proposed by Min, Kim and Chen (2008) and Yim and Leem (2013), has been adopted in this study. The three dimensions include information sharing, resource sharing and supplier collaboration. This conceptualisation considers and synthesises the various measurement aspects of supplier integration (Vaart *et al*. 2012; Yim & Leem 2013). The adoption of this multi-dimensional view allows for consistency with previous studies of social capital and supplier integration.

Information sharing between SMEs and their key suppliers is essential for efficiently managing supply (Chen, Paulraj & Lado 2004). It refers to the exchange of quality information, such as production schedules, forecasting and supplier cost data, in a timely, accurate and complete manner that might facilitate the other party (Flynn, Huo & Zhao 2010). Resource sharing is the exchange of resources between SMEs and their key suppliers when required (Yim & Leem

2013), and can include both tangible resources, such as financial resources, and intangible resources, such as business experience and technical know-how (Min, Kim & Chen 2008). Finally, supplier collaboration is conceptualised as the coordinated or joint activities performed by the SMEs and their key suppliers to create unique value that neither party could achieve alone (Yim & Leem 2013). In a collaborative culture, both SMEs and their key suppliers work together to solve problems, help each other improve quality and include the other party in key business activities (Droge, Vickery & Jacobs 2012; Tangpong *et al.* 2015).

2.6.2 Cluster Cooperation

More than half of the alliances are formed between competitors of business (Harbison & Pekar 1998 cited in Gnyawali & He 2006). The cooperation of competitors is popularly known as horizontal cooperation (Zeng, Xie & Tam 2010). Cluster cooperation is also a form of horizontal cooperation, where peer firms within a cluster build networks and coordinate with each other to tackle several common problems. The uniqueness is that all members of a cluster network are located in the same geographical cluster. In line with Oprime *et al*. (2011), this study defines *cluster cooperation as the situation whereby homogeneous firms within the cluster share timely and quality information, tangible and intangible resources, and undertake cooperative or joint actions*. Cooperation in an SME cluster has been investigated in several disciplines, including supply chain and operations management (Albino, Carbonara & Giannoccaro 2007; Oprime, Tristao & Pimenta 2011), product marketing (Lewis, Byrom & Grimmer 2015), tourism marketing (Wang & Fesenmaier 2007) and international business (Clarke, Chandra & Machado 2016).

Although the concept of cluster cooperation remains consistent in all these disciplines, the focus of cooperative activities varies depending on the fields and aims of the study. For example, in Lewis, Byrom and Grimmer (2015), cluster cooperation refers to the extent to

which members (peers) of a cluster network (1) share market oriented information, such as customer needs and behaviours, (2) exchange resources to facilitate marketing activities, such as marketing and advertising know-how and finance, and (3) undertake collaborative marketing to reach to a new market. The authors only focus on the marketing related issues, because their study investigates the significance of cluster cooperation in enhancing marketing efficiency. Since this study investigates the role of cluster cooperation in mitigating supply risk, information sharing in this study refers to the exchange of sourcing information, such as supplier and material information. Similarly, resource exchange includes supply management know-how and exchange of materials or finance to facilitate sourcing, and joint actions include cooperative sourcing or solving sourcing-related problems jointly with peers.

2.7 Underpinning Theory

The Social Capital Theory and the Theory of Swift, Even Flow have been used to underpin this research.

2.7.1 The Social Capital Theory

The main assumption of The Social Capital Theory is that interactions, relationships and understanding between people or organisations can be a valuable resource (Woolcock 1998). This resource provides mutual benefits to the member organisations (Putnam 1995b). Social capital can be used like other types of capital and can provide long-term benefits, such as network cooperation and pooling expertise (Coleman 1988). It can substitute or complement another resource (Adler & Kwon 2002) and play an influential role in reducing risk through social relationships (Woolcock 2001). Social capital can also increase the capability of SMEs to mitigate risks (Gao, Sung & Zhang 2011).

The application of the Social Capital Theory began in the strategic management and organisational behaviour disciplines (Inkpen & Tsang, 2005; Nahapiet & Ghoshal, 1998). In the area of operations management and supply chain management, however, researchers have only begun to use the Social Capital Theory since 2005, to explore an efficient way of managing a supply chain (Avery & Swafford 2009). Only recently have scholars considered applying the Social Capital Theory in supply risk mitigation (Cheng, Yip & Yeung 2012). This theory is suitable when a study investigates any, or a combination of, social capital oriented supply risk mitigation strategies. Kilubi and Rogers (2018) use this theory to predict that partnering capability positively mediates the relationship between supply risk management and organisational performance. Another study (Prasad, Tata & Guo 2012) uses this theory to argue that social capital reduces supply risk, by enhancing network cooperation and reducing the opportunistic behaviours of other network members. Since both studies are only conceptual, validity of their propositions has yet to be tested or confirmed.

In this study, the Social Capital Theory is used as a strategic lens to expect that social capital of SMEs with their key suppliers and with peers located in the same cluster would help reduce their supply risks. This is based on the view that social interactions, interpersonal relationships and shared understandings between network members are valuable resources, which can provide many benefits to the member organisations, including improvement of firm performance and reductions in risk events (Nahapiet & Ghoshal 1998). The theory is also used to predict that SMEs with higher social capital hold more authentic information, resources and engage more in collaboration with their partners, which, in turn, reduces their supply risks. Specifically, the theory is used to predict that social capital with key suppliers and with peers located within a geographical cluster will indirectly benefit SMEs, by enhancing supplier integration and cluster cooperation.

2.7.2 The Theory of Swift, Even Flow

The Theory of Swift, Even Flow postulates that 'the more swift and even the flow of materials through a process, the more productive that process is' (Schmenner & Swink 1998, p. 102). Productivity of the process rises with timely and consistent flow of the process, but falls with a variation of timing, quality or quantity. This theory is based on the following three assumptions:

(1) Any activity of a process can be classified as either value-added or non-value-added work. Swiftness of material movement can be enhanced if non-value added works can be greatly minimised or eliminated.

(2) In terms of swiftness, the lower the throughput time in a process, the more productive the process is. Therefore, firms need to monitor where the materials, semi-finished or finished products are impeded.

(3) In terms of evenness of a process, the narrower the variations of the process activities, the more productive the process is. Therefore, productivity or performance of a process reduces if any process activity has higher variability.

Based on the third assumption of the theory, this research assumes that the higher the variation in the quality, quantity or timing of the inbound supply (i.e. supply risk), the lower the operational performance of the SMEs. Moreover, the theory is based on the assumption of the 'law of variability', which only supports the downside-view of a variance – variations in an activity of a process reduce the productivity of the process. Since managers only view the negative variations as risk (March & Shapira 1987), the theory supports the managers' orientation. This downside-view of risk also strengthens the arguments that supply risk reduces the performance of SMEs. This theory is particularly relevant in supply chain management as all activities in a supply chain are sequenced (Schmenner & Swink 1998). Fredendall *et al*.

(2009) use this theory in a case study research to understand the benefits of coordination between internal units/departments of a hospital for ensuring smooth operation. Chen, Sohal and Prajogo (2013) also conceptualise the relationship between operational risks and supply chain performance based on this theory. However, the application of this theory has only limited to studies focusing on large companies.

2.8 The Theoretical Model and Hypotheses Development

This section focuses on formulating the hypotheses and developing the conceptual model to achieve the objectives of the study presented in Chapter 1.

2.8.1 Effect of Supply Risk on Operational Performance of SMEs

Operational performance is the ability of a firm to meet its customer requirements (Flynn, Huo & Zhao 2010). Beamon (1999) suggests that there should be a consistency between operational performance and supply chain performance measures. In other words, operational performance should refer to the ultimate performance of a supply chain, meeting customer requirements with high speed and reliability (Devaraj, Krajewski & Wei 2007). To maintain consistency with these arguments, operational performance of SMEs in the current research refers to their ability to meet customer requirements in terms of time, quality, delivery and flexibility.

Porter (1985) argues that the success of a firm depends on the seamless linkage of different activities in the supply chain, such as inbound and outbound logistics. When firms face greater deviations in inbound supply, their operational performance, such as meeting customer demand, deteriorates (Zsidisin 2003a). For example, a supplier's inability to deliver the required items at the right time with the right quality hampers other activities in the supply chain, because all activities in a supply chain are related to each other (Scannell, Vickery & Droge 2000). This is especially true for SMEs, since they do not use formal contracts, which

could reduce the impacts of supply risk on operations, when sourcing their materials (Ellegaard 2008). In addition, unlike large enterprises, the internal manufacturing processes of SMEs are usually unstructured (Faisal, Banwet & Shankar 2007a), reducing their abilities to rectify variations in the inbound supply within their production systems (Chen, Sohal & Prajogo 2013). Furthermore, most SMEs rely on single sourcing and are usually unable to find alternative suppliers when their key suppliers fail to deliver as promised (Thun, Drüke & Hoenig 2011). This then impacts on related or sequenced activities in the supply chain. Consequently, in the event of substantial supply variations, SMEs often fail to achieve the desired product quality or meet the delivery time and cannot respond to the changing competitive environment in a speedy manner. These arguments are also consistent with the Theory of Swift, Even Flow, which postulates that performance of a process reduces with increases in variability in the flow of material through the process (Schmenner 2004). As such, the following hypothesis about the operational performance of SMEs as buyers is proposed:

H1: *Supply risk has a negative effect on operational performance of SMEs.*

The first specific objective of this research is to examine the effect of supply risk on the operational performance of SMEs. The hypothesis formulated in this section (H1) aims to achieve this objective.

2.8.2 Effect of Buyer–Supplier Social Capital on Supply Risk of SMEs

The study hypothesises both direct and indirect impacts, through supplier integration, of buyer–supplier social capital on supply risk of SMEs which are discussed below.

2.8.2.1 Direct Effect of Buyer–Supplier Social Capital on Supply Risk of SMEs

Since supply risk is the number one risk factor in a supply chain, dealing with supply risk is a major challenge for manufacturing SMEs (Chen, Sohal & Prajogo 2013). As discussed earlier, limitations in resources and a lack of formal processes prevents SMEs from adopting the conventional risk mitigation strategies commonly used by large firms (Chen, Sohal & Prajogo 2013; Kaufmann *et al*. 2016). Nevertheless, SMEs can utilise and leverage the social capital derived from networking with their key suppliers to mitigate supply risk (Gao, Sung & Zhang 2011; Gilmore, Carson & O'Donnell 2004). Improved social capital with key suppliers encourages suppliers to meet the requirements of the buying SMEs, which reduces variations in actual supply (Riccobono, Bruccoleri & Perrone 2013). This is because a 'debt/favour' relationship is created between an SME and its key supplier with a high social capital (Lee & Humphreys 2007). In other words, one party considers a favour received from the other party as a debt and attempts to return it by performing a future job without any variation. With high social capital, both parties do not generally display any opportunistic behaviour, but help one another to avoid risky situations. For instance, Uzzi (1997) contends that higher levels of social capital between SMEs and their key suppliers can reduce the probability of opportunistic actions of the suppliers, and can enhance their efforts to meet SME requirements. This drive of suppliers to fulfil obligations helps reduce deviations in outcomes and mitigates the supply risk of SMEs.

In a buyer–supplier network with improved social capital, SMEs and their suppliers have frequent and multiple social interactions, improved interpersonal relationships and similar understandings. Social interactions with key suppliers enhance the awareness of potential risks of inbound supply (Ellegaard 2008). As a result, SMEs can take proactive steps to reduce the occurrences of supply risk. Social ties with key suppliers also help SMEs detect and reduce the opportunistic behaviours of suppliers (Burt 2000, 2001). Similarly, interpersonal relationships

and similar understandings can foster communication and strengthen the willingness of both parties to build tighter networks to ensure success (Nahapiet & Ghoshal 1998). As such, variation in the inbound supply for SMEs are reduced.

SMEs are generally loyal customers, and will continue to source from the same suppliers unless opportunistic behaviours of the suppliers are discovered (Ellegaard 2009). Such commitment puts pressure on the suppliers to behave reciprocally, by providing consistent and deviation-free materials. It is not uncommon that, through the personal efforts of managers and employees, SMEs can develop high-quality social capital with their key suppliers (Arregle *et al*. 2007). Such high-quality social capital diminishes the variations in network outcomes (Poba-Nzaou & Raymond 2011; Yli-Renko, Autio & Sapienza 2001). SMEs usually source from known and local suppliers (Lavastre, Gunasekaran & Spalanzani 2012). This sourcing mechanism enables both parties to build interpersonal relationships through social interactions, and share common language and ideologies. This can create a sense of shared responsibility between the network members, thereby reducing occurrences of variation in supply. In light of the above, the following hypothesis for a direct relationship between buyer–supplier social capital and supply risk in the context of SMEs as buyers is formulated:

H2: *Buyer–supplier social capital has a negative direct effect on supply risk of SMEs.*

2.8.2.2 Indirect Effect of Buyer–Supplier Social Capital on Supply Risk of SMEs

The study proposes an indirect impact of buyer–supplier social capital on supply risk of SMEs, through supplier integration. This section details the hypotheses related to this indirect impact.

Buyer–Supplier Social Capital and Supplier Integration

Previous studies have established a positive impact of buyer–supplier social capital on supplier integration in the context of large firms (Li, Ye & Sheu 2014; Yim & Leem 2013). This research argues that buyer–supplier social capital can also enhance supplier integration of

SMEs. Capó-Vicedo, Mula and Capó (2011) report that a lack of confidence and motivation in building integrative relationship are the key problems that SMEs face when integrating with their key suppliers. Higher levels of social capital can serve as a powerful weapon for SMEs to enhance their confidence and motivation to improve supplier integrative practices, such as the exchange of information and resources, and collaborative activities (Jansen *et al*. 2013). SMEs generally have limited access to costly information technology infrastructure. Therefore, they mainly rely on improved social capital, characterised by personal and social interactions, interpersonal relationships and common understandings, to exchange information and knowledge, and to coordinate key activities (Spence, Schmidpeter & Habisch 2003).

Improved buyer–supplier social capital reduces the need for formal monitoring and contracting. It allows SMEs to invest more effort in information and knowledge exchange, and joint problem solving with their suppliers (Yli-Renko, Autio & Sapienza 2001). High-quality social capital enables both parties to more freely undertake actions on behalf of each other, to enhance collaborations (Riccobono, Bruccoleri & Perrone 2013). It also facilitates sharing of confidential information that would otherwise remained unachieved (Dyer & Chu 2003; Johnston *et al*. 2004). In addition, owing to geographical proximity, local sourcing increases the intensity, frequency and breadth of information and resource sharing between SMEs and their key suppliers, through frequent face-to-face contact and other social interactions (Partanen *et al*. 2008). For example, in the context of SMEs, Yli-Renko, Autio and Sapienza (2001, p. 590) mention that 'talking over customers' requirements for the next fiscal year in a local pub may lead to understanding of customer needs not usually exchanged in the ordinary course of business.' The presence of higher level social capital between SMEs as buyers and their suppliers promotes coordination and reduces information asymmetry, by ensuring common understandings and improved interpersonal relationships (Masiello, Izzo & Canoro 2015). Therefore, this study proposes the following hypothesis:

H3: *Buyer–supplier social capital has a positive effect on supplier integration of SMEs.*

Supplier Integration and Supply Risk

In an integrative relationship, SMEs and their suppliers share required and relevant information, and assist each other by sharing resources and solving problems jointly. Information symmetry with suppliers is a necessary condition for SMEs to mitigate supply risk (Gunasekaran, Subramanian & Rahman 2015; Prasad, Tata & Guo 2012). For example, Ellegaard (2008) demonstrates that exchange of information and experience between SMEs and their key suppliers can reduce supply risk by creating a knowledge-based network. By working together, both parties can help each other attain their business objectives respectively and minimise opportunistic behaviours (Droge, Vickery & Jacobs 2012; Tangpong *et al*. 2015). Joint actions also allow SMEs to monitor suppliers, thereby reducing variations in upstream supply (Mikalef *et al*. 2015). A mutual dependency is created when SMEs and their key suppliers work in an integrative manner. As such, both parties value each other's requirements and perform their jobs without variation.

Supplier integration also can reduce supply risk through improved responsiveness and enhanced flexibility (Chen, Paulraj & Lado 2004; Johnston *et al*. 2004). By being tightly integrated with their key suppliers, SMEs are able to make last minute modifications to their orders when needed and ensure quick order fulfilment (Ellegaard 2009). Since sourcing and supplier integration in SMEs is usually managed by the same person, they are more cohesive, thereby providing better outcomes in terms of reduced variations in supply (Partanen *et al*. 2008). Taking advantage of the short travelling distance, SMEs can invite local suppliers to their production plants, to see how the sourced materials are used. This enables the suppliers to better understand the manufacturing processes of the buying SMEs and to participate in collaborative actions to solve problems related to the sourced materials (Chen, Sohal & Prajogo

2013; Spence, Schmidpeter & Habisch 2003). This also reduces the supply risk of the SMEs, as suppliers can meet buyers' requirements without any variation when they understand the buyers' operations (Flynn, Huo & Zhao 2010; Zhao *et al*. 2013). Based on the above arguments, this study proposes the following hypothesis:

H4: *Supplier integration has a negative effect on supply risk of SMEs.*

Supplier Integration as a Mediator

This study contends that buyer–supplier social capital also impacts indirectly on supply risk of SMEs via supplier integration. A number of previous studies have reported that the impact of social capital on an SME's performance is more indirect than direct. For instance, through a comprehensive literature survey on social capital and SMEs, Arregle *et al*. (2007) report that social capital has a more indirect effect, by ensuring network cooperation, than a direct effect on an SME's performance. In a recent study on female-owned SMEs, Mamun *et al*. (2016) report that social capital improves the abilities of SMEs to exchange information and other resources, which, in turn, can affect their performance. However, both studies have not empirically examined the mediated impact of supplier integration in the relationship between social capital and SME performance.

In contrast, other studies find that the impacts of social capital on firm performance are mediated by supply chain integration in the case of large enterprises (Patnayakuni, Rai & Seth 2008; Wu 2008; Yim & Leem 2013). The argument is that the influence of social capital on firm performance increases when social capital is used to facilitate coordination among network entities. Although the meditation impact was not tested, literature in the context of large firms suggests that buyer–supplier social capital is the direct antecedent of supplier integration (Vijayasarathy 2010), and supplier integration has a negative impact on supply risk (Chen, Sohal & Prajogo 2013; Giunipero & Eltantawy 2004). These findings suggest that

supplier integration may mediate the relationship between buyer–supplier social capital and supply risk. In the same vein, this study argues that SMEs as buyers can strengthen the effect of buyer–supplier social capital on supply risk, by improving supplier integration. Therefore, the study proposes the following mediation hypothesis:

> ***H5:*** *Supplier integration mediates the relationship between buyer–supplier social capital and supply risk.*

Hypotheses H2 to H5 are formulated to achieve the second and the third objectives of this research. The second objective of this research includes investigating the direct and indirect roles of buyer–supplier social capital in mitigating supply risk of SMEs. While H2 tests the direct role of buyer–supplier social capital in mitigating supply risk, other three hypotheses (H3, H4 and H5) test the indirect role. The third objective of the study includes examining the direct role of supplier integration in mitigating supply risk of SMEs, as well as its mediating role in the relationship between buyer–supplier social capital and supply risk. H4 tests the direct role of supplier integration in mitigating supply risk of SMEs, and H5 tests the mediating role in the above-mentioned relationship.

2.8.3 Effect of Cluster Social Capital on Supply Risk of SMEs

The study proposes an indirect impact of cluster social capital on supply risk of SMEs, through cluster cooperation. This section discusses the hypotheses related to this indirect impact.

Cluster Social Capital and Cluster Cooperation

Inter-firm cooperation within an SME cluster builds on the base of a high level of cluster social capital, characterised by frequent interactions, interpersonal relationships and similar understandings (Morris & Barnes 2006). With improved social capital, all SMEs in a cluster network consider themselves as members of a group (Lewis, Byrom & Grimmer 2015). Such

a feeling encourages all SMEs to engage in more cooperation, including sourcing or supply related cooperation. They all consider it fair to share relevant supply information, experiences, knowledge and resources because they all enjoy the benefits of information and resources from other firms (Chang & Chuang 2011; Wang & Fesenmaier 2007). The information and resources exchanged in an SME cluster are considered as local public goods, which can be obtained and applied by all network members (Bellandi 2002; Camison & Fores 2011). With high social capital, all SMEs in a cluster network also undertake joint sourcing actions for mutual benefits (Albino, Carbonara & Giannoccaro 2007).

Entrepreneurs of SMEs within a cluster generally gather at social events. Interactions at social events help enhance cooperation and build trust, by breaking down boundaries between organisations (Molina-Morales & Martinez-Fernandez 2010). Consequently, greater social interactions with other firms increases the opportunity to access more information and resources. Frequent interactions also motivate firms to work together to solve problems (Mohannak 2007). Improved interpersonal relationships, such as trust, mutual respect, and personal friendship in a cluster network, reduce the fear of SMEs in sharing information and knowledge with peers. This is because high-quality relationships reduce the chance of using information by peers in an opportunistic manner. SMEs operating in the same locality generally share a common language, codes, myths and belief. This common cognition enhances the quality and quantity of information and knowledge shared amongst members within the community (Chiu, Hsu & Wang 2006). This congruence in the network relationship also substantially reduces misunderstandings among members and enhances joint actions within the cluster (Molina-Morales & Martinez-Fernandez 2010). Based on the above arguments, this study proposes the following hypothesis:

> ***H6:*** *Cluster social capital in an SME cluster has a positive effect on cluster cooperation.*

Cluster Cooperation and Supply Risk

Marshall (1961) opines that the cooperation of homogeneous SMEs that are geographically clustered provides ample advantages, including access to suppliers and improved services from suppliers (cited in Morris & Barnes 2006). Studying in the context of tourism marketing, Wang and Fesenmaier (2007) also find that cooperative relationships among the SMEs within a cluster provide benefits to all SMEs embedded in the relationship. This study argues that the benefits can include the reduction of supply risk. SME decision makers are influenced by the diverse pool of information that flows among other SMEs in the cluster (García-Villaverde, Parra-Requena & Molina-Morales 2018; Stam & Elfring 2008). SMEs communicate with their competitors to avoid risky transactions when they are doubtful about the creditworthiness of new customers (Gilmore, Carson & O'Donnell 2004). Similarly, when SMEs purchase raw materials from a new supplier, they can discuss the supplier with other firms to see whether there is any first-hand information about them. Cooperation among firms within the cluster facilitates the sharing of authentic information, which assists in mitigating supply risks. Firms tend to share information with their peers about their own suppliers if there is higher-level cooperation (Albino, Carbonara & Giannoccaro 2007; Pomponi, Fratocchi & Tafuri 2015).

Gnyawali and Srivastava (2013) report that firms working in the same cluster tend to share resources, tangible items, and intangible ideas and knowledge with one another. The authors also argue that it is not cost effective for firms to develop all resources internally. The inter-firm exchanges meet the sudden needs of firms and reduce risks (Gnyawali & He 2006). For example, an SME that is facing a sudden need for money to enter into a contract with a supplier may borrow money from other SMEs within the cluster, to help reduce the deviation of inbound supply in terms of time. Sharing intangible supply experience and knowledge also builds the individual skills and competence of the SME entrepreneurs (Camison & Fores 2011; Puig &

González-Loureiro 2017). As such, they can manage inbound supply activities in a more proficient way, which reduces variations in the supply outcomes.

Cooperation within the cluster allows SMEs to participate in joint activities, while remaining functionally independent (Best 1990). SMEs operating within a cluster may opt for a cooperative purchase (or form a buying group), to increase bargaining power when dealing with suppliers. As a result, suppliers offer better prices and provide improved services, as the buying volume is higher for cooperative purchases than when individual firms buy on their own. Suppliers tend to respond quicker to cooperative purchasing than to isolated buying (Chikan *et al*. 2008). In addition, cluster cooperation allows SMEs in the network to jointly solve common supply problems. This puts pressure on suppliers to solve problems in a more responsive way, to keep their reputation with all SMEs involved in the joint action (Hearnshaw & Wilson 2013). In view of the above arguments, this study proposes the following hypothesis:

H7: *Cluster cooperation has a negative effect on supply risk of SMEs.*

Cluster Cooperation as a Mediator

This study argues that cluster social capital impacts indirectly on the supply risk of SMEs through cluster cooperation. It is opined that the quality of the social capital in a cluster network determines the quality of exchange or cooperation within the network, which, in turn, assists in further actions (Gronum, Verreynne & Kastelle 2012; Jansen *et al*. 2013; Westlund & Bolton 2003). For example, Parra-Requena *et al.* (2015) reveal that cluster social capital enhances cluster cooperation, but cannot improve the innovative performance of the SMEs directly. Through a mediation test, the authors find that cluster social capital indirectly improves the innovative performances of SMEs. Based on the tenets of the Social Capital Theory, Adler and Kwon (2002) also contend that social capital would first improve network cooperation, which,

in turn, provides other benefits, including performance improvement and risk mitigation, to participating firms.

However, the effect of cluster social capital is not always positive (Flap, Kumcu & Bulder 2000; Warren 2008). Sometimes, negative outcomes may occur if there is a cooperation failure (Gabbay & Leenders 2002). For example, when members of a cluster network are determinative of individual resources, they alter certain relationships to achieve their individual goals (Granovetter 1985). In other words, cluster social capital in an SME cluster can bring positive outcomes, including lower supply risk, through successful cluster cooperation. This argument implies that inter-firm cooperation may mediate the relationship between cluster social capital and supply risk, the effect of which has yet to be investigated. Therefore, the following hypothesis is formulated:

> ***H8:*** *Cluster cooperation mediates the relationship between cluster social capital and supply risk of SMEs.*

Similar to Section 2.8.2, hypotheses H6 to H8 formulated in this section aim to achieve the second and the third objectives of this research. The second objective of this research investigates the indirect role cluster social capital in mitigating supply risk of SMEs. All the three hypotheses test this indirect role. The third objective of the study examines the direct role of cluster cooperation in mitigating supply risk of SMEs, as well as its mediating role in the relationship between cluster social capital and supply risk. While H7 tests the direct role of supplier integration in mitigating supply risk of SMEs, H8 tests the mediating role in the aforementioned relationship.

Based on the relationships discussed above, a conceptual model showing all the constructs and hypotheses put forward is shown in Figure 2.2. This framework serves as a guide for data collection and analysis.

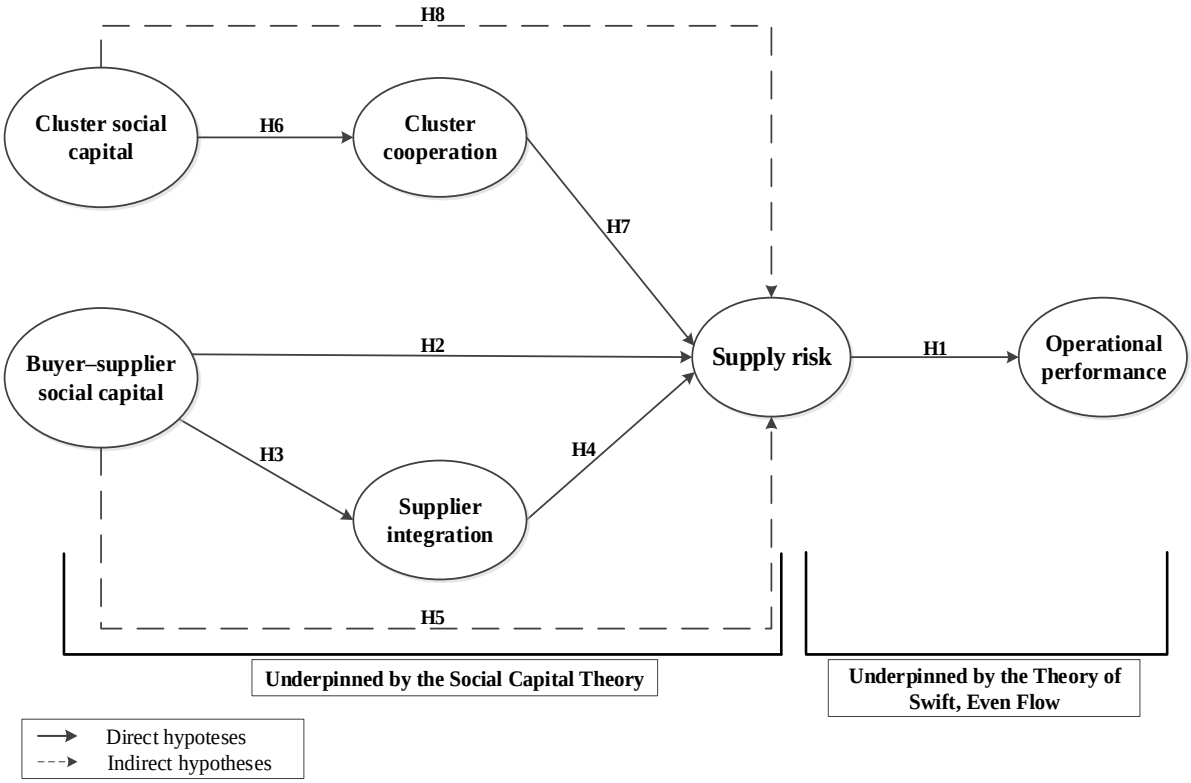


Figure 2.2: Conceptual model of the study

2.9 Summary

This chapter reviewed the extant literature related to the study area. It defined supply risk, by clarifying the differences between the theoretical and managerial perspectives of the concept of risk. It summarised four supply risk mitigation approaches and presented the existing literature on supply risk of SMEs to justify the current research. The chapter also discussed the concept of the constructs included in the conceptual model. Moreover, it proposed eight research hypotheses based on the tenets of two theories – the Social Capital Theory and the Theory of Swift, Even Flow. The next chapter discusses the research design and methodology used to investigate the hypotheses.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

The quality of a research project depends on the selection of an appropriate research design (Bhattacherjee 2012; Zikmund *et al*. 2013). Therefore, developing a proper research plan is vital to ensure that the research correctly addresses the research question. In this regard, this chapter examines the extant literature on the methodological choices and applications in order to select the appropriate research design and methodology for this study. The chapter is organised into nine sections. After the introduction in Section 3.1, the research paradigm adopted for this study is discussed in Section 3.2, followed by the method of data collection in Section 3.3. Then the survey instrument design, sampling design, survey administration method, and data analysis procedure of this study are discussed in Section 3.4, 3.5, 3.6 and 3.7, respectively. Section 3.8 then discusses the ethical issues considered in this research, before a summary of the chapter is given in Section 3.9.

Figure 3.1 depicts the research process of this study. Stages 2 to 7 show the research design and methodology of collecting and analysing the needed data to answer the research questions of this study. Stages 1 and 8 are not discussed in this chapter because Stage 1 has already been discussed in detail in Chapters 1 and 2, and Stage 8 is covered in Chapters 7 and 8.

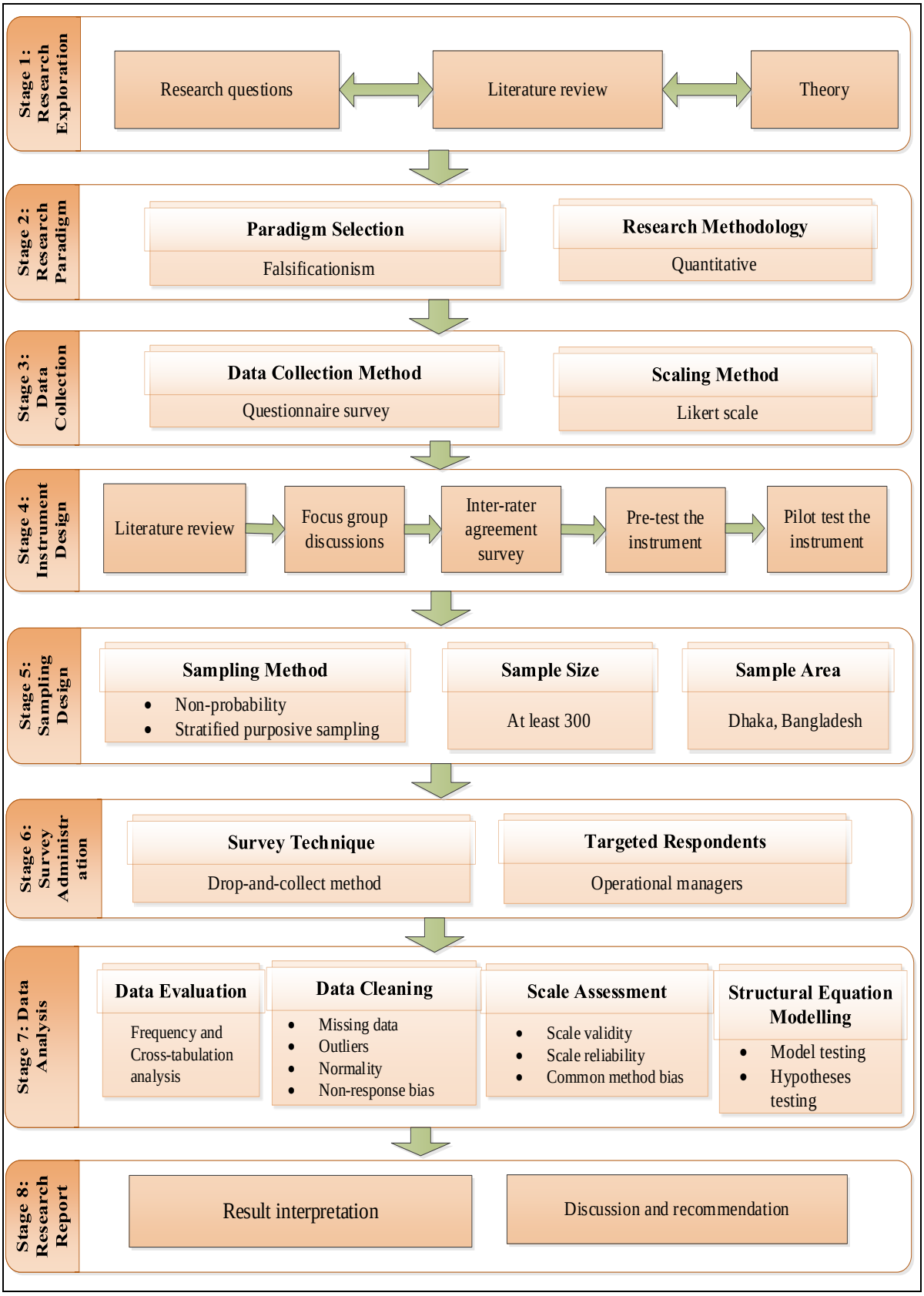


Figure 3.1: Research process of the study

3.2 Research Paradigm

A research paradigm guides the researchers in deciding how the research should be conducted (Collis & Hussey 1997). While a number of research paradigms are discussed in the literature, this study adopts falsification – a post-positivist paradigm – to carry out the research. This paradigm is based on the belief that the phenomena under investigation has a critical realism, with replicated findings that are probably true but always subject to falsification (Guba & Lincoln 1994). This section gives an overview of the different types of research paradigms and the justifications for the one selected for this research.

3.2.1 Concept and Aspects of Research Paradigm

A research paradigm is defined as a 'set of linked assumptions about the world which is shared by a community of scientists investigating that world' (Deshpande 1983, p. 101). A clear understanding of these assumptions enables a researcher to determine what problems are worthy of exploring, as well as what methods are best suited to explore them. Although research paradigms are not discussed in many research texts, all researches adopt one of the research paradigms, which directs the researchers to select the appropriate data collection and analysis techniques (Creswell 2013). A research paradigm relates to three fundamental aspects: (1) the ontological aspect, (2) the epistemological aspect, and (3) the methodological aspect (Guba & Lincoln 1994). These aspects guide, inform and shape how a researcher views the world and performs accordingly.

Ontology, a branch of metaphysics, is concerned about the existence and nature of reality (Mertens 2007). It focuses on the questions relating to the reality of things, such as 'what things really are? and how things really work?' (Guba & Lincoln 1994, p. 108). With an ontological assumption, a researcher can take the stance that the phenomenon under investigation has an objective reality that is external to the researcher and independent of the researcher's method

of inquiry or has a subjective reality that is socially constructed and exists in relation to human actions (Collis & Hussey 2003).

Epistemology is concerned about the nature of the relationship between the knower or would-be knower (researcher) and the known or would-be known (which is being researched) (Guba & Lincoln 1994). It focuses on the question of how a researcher needs to relate to the people from whom data will be collected in order to know the phenomena (Mertens 2007). The epistemological view of a researcher frames his or her interactions with that being researched. In particular, it determines whether a researcher requires active or close interactions to investigate the phenomena or whether they should maintain a distance to ensure neutrality. This epistemological viewpoint of a researcher relies on his or her ontological viewpoint, thus they both merge together (Marsh, Ercan & Furlong 2018).

The third and final aspect of a research paradigm is research methodology, which focuses on the selection of an appropriate approach for systematic enquiry (Mertens 2007). It answers the question of how a researcher should gather data about the reality that gives confidence to the researcher that he or she has indeed captured that reality. Selection of a research methodology depends on the ontological and epistemological viewpoints of a researcher. For example, Guba and Lincoln (1994, p. 108) mention that ‘a “real” reality pursued by an “objective” inquirer mandates control of possible confounding factors, whether the methods are qualitative (say, observational) or quantitative (say, analysis of covariance)’.

3.2.2 Research Paradigm Classification

A number of terms are used in the literature to discuss the theoretical paradigms, such as positivist and post-positivist, interpretivist, critical, normative, naturalistic, pluralistic, objectivist, etc. (see Mackenzie and Knipe (2006, p. 198) for the full list). However, there are

four main types of research paradigms: (1) positivist/post-positivist, (2) interpretivist/constructivist, (3) transformative and (4) pragmatic (Mackenzie & Knipe 2006). The first paradigm (positivist/post-positivist) is based on the rationalistic, empiricist philosophy which aims at testing a theory based on empirical evidence (Guba & Lincoln 1994). The interpretivist/constructivist paradigm intends to understand the world of human experience, and the researchers of this paradigm tend to depend on the participants' views of the phenomena being studied (Creswell 2013). The transformative paradigm, which arose in the 1980s and 1990s because of a dissatisfaction with the existing paradigms, believes that there exist multiple realities that are socially constructed. Nonetheless, it is important to be explicit about the many values, such as social, cultural, economic, ethnic, racial, gender, age and disability, that define realties (Mertens 2007). Finally, the pragmatic paradigm, which is not committed to any one reality and focuses on the 'what' and 'how' aspects of a research question, believes that the research problem is 'central' to deciding and applying approaches to understand the problem (Mackenzie & Knipe 2006). Each of these paradigms dictates a researcher's view of the world to conceptualise a problem, as well as to offer guidance to the researcher on an appropriate methodology to resolve the research problem (Sethi, Smith & Park 2001).

3.2.3 Research Paradigm Selection

While the positivist/post-positivist paradigm examines the relationships/hypotheses that are developed based on theoretical assumptions, the other three main paradigms demand researchers to participate in real-world research to explore and understand the phenomena (Healy & Perry 2000). As the objective of this study is to investigate certain propositions of relationships between social capital, supplier integration, cluster cooperation, supply risk and operational performance of SMEs which are based on the Social Capital Theory and the Theory

of Swift, Even Flow, a positivist/post-positivist paradigm seems most appropriate for this study. Positivist and post-positivist paradigms hold the same assumptions. However, they are different when it comes to the theory of truth (Henderson 2011). The former believes that truth is uncovered and the model is proven if the hypotheses fail to be rejected while the latter believes that truth can never be uncovered (Tullberg 2011). Investigation of a model through structural equation modelling (SEM) does not confirm the veracity of the model because the model is only tested using some data of a particular context (Bollen & Pearl 2013; Kline 2015). At most, a study through SEM can claim that the model is consistent with the data, but cannot conclude that the model is proven (Kline 2015). This argument can also be found from Bollen (1989, p. 68) where the author mentions that 'if a model is consistent with reality, then the data should be consistent with the model. But if the data are consistent with the model, this does not imply that the model corresponds to reality.'

As this study is investigating a model using data from a particular context, a post-positivist paradigm is adopted for this research. In line with this, a falsification paradigm, which is a post-positivist paradigm, seems most appropriate as a way of interpreting results because this research is guided by two theories (Willis, Jost & Nilakanta 2007). In a falsification paradigm, if it fails to reject a model it can be concluded that the model is supported by the facts. Rejection of the model, on the other hand, implies that the theories used to conceptualise the model are not true under such conditions (Mulaik & McDonald 1978; Popper 2005). This paradigm also provides the advantage of modifying the model, if required, thereby improving the model (Caldwell 2003; Mulaik 1998).

3.2.4 Research Methodology Selection

Selection of a research methodology depends on the research paradigm and the objectives of the study (Guba & Lincoln 1994). In general, there are two types of research methodologies:

qualitative and quantitative (Creswell 2013). Mackenzie and Knipe (2006) summarise the research methodologies used under different research paradigms, which are presented in Table 3.1.

Table 3.1: Paradigms, predominant methodology and data collection tools

Paradigm	Predominant methodology	Data collection tools
Positivist/post-positivist	Quantitative	Experiments Quasi-experiments Tests Scales
Interpretivist/constructivist,	Qualitative	Interviews Observations Document reviews Visual data analysis
Transformative	Qualitative methods with quantitative and mixed methods	Diverse range of tools – a particular need to avoid discrimination, e.g. sexism, racism and homophobia.
Pragmatic	Qualitative and/or quantitative methods	May include tools from both positivist and interpretivist paradigms.

Source: Mackenzie and Knipe (2006, p.199)

A falsification paradigm uses a quantitative statistical model to recognise the facts and causal relationships (Mackenzie & Knipe 2006; Mulaik 2009). Since this research aims at developing a model with testable hypotheses and adopts the falsification paradigm to test it, quantitative methodology is considered most appropriate for such occasions (Collis & Hussey 2003; Creswell 2013). A quantitative approach uses statistical and mathematical techniques to examine the causal relationship within a known level of error (Zikmund *et al*. 2013). Such statistical and mathematical techniques can also verify the reliability and validity of the data, which improve the precision of the findings. Therefore, the quantitative research methodology has the edge of generalising the findings to a larger population (Creswell 2009).

A survey methodology, which is an accurate, scientific and efficient way of data collection (Zikmund *et al*. 2013), together with quantitative techniques for data analysis, has been adopted

in this study. Such methodology enables the researcher of this study to remain neutral in data collection since in a survey study, the investigator is considered external to the actual research. This benefit in collecting data ensures that the findings are replicable regardless of who conducts the research (Bryman & Bell 2011). Moreover, survey methodology enables this research to gather data from a large number of participants, which would not otherwise have been possible (Bryman & Bell 2011).

3.3 Data Collection

Selection of a method of data collection depends on the methodological choice of the study (Creswell 2013). This section discusses the data collection method of the study. It also explains the scaling method of the study.

3.3.1 Data Collection Method

This research used a questionnaire to collect the primary data because it is the most commonly used data collection method in survey research (Zikmund *et al*. 2013). A questionnaire survey enables the respondents to reply in their own time and reduces the interviewer effect (Collis & Hussey 2003). To enhance the content validity of the survey instrument prior to using it to collect data from the sample firms for hypothesis testing, three focus group meetings were conducted with some members of the target population (O'Brien 1993; Powell, Single & Lloyd 1996). This additional step to validate the constructs revealed in the literature as well as to identify any new constructs and measurement items that are specific to the study population helps improve the validity of the research findings (Vogt, King & King 2004). The final questionnaire (Appendix B) was translated into *Bangla*, the mother language of Bangladesh, for easy understanding by the respondents using forward and backward translation techniques (Brislin 1976; McGorry 2000).

3.3.2 Scaling Method

A scale is a multi-indicator measure of a theoretical construct that is not readily observable by direct means (DeVellis 2003; Gerbing & Anderson 1988). A number of scaling techniques have been used in operations management research, such as the Likert scale, semantic differential scale, staple scale and comparative scale (Flynn *et al*. 1990). However, the Likert scale is most widely used in the operations and supply chain management research (Gimenez, Large & Ventura 2005). This type of scale has huge advantages including reliability, ease of development (Boone & Boone 2012) and ease of interpretation (Laerhoven, Zaag-Loonen & Derkxr 2004), and it can also be applied to any kind of survey research (Cooper & Schindler 2011). This study also used a Likert scale for measuring the items of the constructs.

Upon selecting the questionnaire as the method of data collection and deciding on the Likert scale to measure several indicators of a construct, the research then determined the optimal number of response categories in a scale. There are a lot of debates in determining the optimal number of response categories since Garner (1960) mentions that 20 response categories are required to collate the complete information. However, all the previous studies that discussed the optimal response categories suggested that the response alternatives need to be easily distinguishable to the respondents (Wakita, Ueshima & Noguchi 2012). In this regard, an odd number of scale categories is considered more preferable (Cox 1980). However, any categories that have more than nine options are not considered because respondents will find them difficult to comprehend when there are more than nine options. Scales with less than five response options are also not considered as they cannot capture sufficient information (Cox 1980). Several previous studies find that seven is the optimal number of response categories for the Likert scale (Cox 1980; Dawes 2008; Matell & Jacoby 1972; Preston & Colman 2000) because respondents can comprehend and distinguish the alternatives clearly (Cox 1980; Preston & Colman 2000), and a seven-point scale also produces an acceptable level of

reliability (Dawes 2008; Matell & Jacoby 1972). Therefore, a seven-point scale was used in this study to measure all the constructs of the conceptual model proposed in Chapter 2.

3.4 Instrument Design

As discussed in the previous section, this study used a questionnaire to gather the data from the respondents. The questionnaire was divided two sections: one to collect demographic profile of the survey respondents and their firms, and the other to operationalise the constructs of the conceptual model. This section discusses the contents of the questionnaire and the process of the questionnaire development.

3.4.1 Respondents Profile

In a survey-based questionnaire, questions on the respondent profile provide rich information about the demographics of the respondents and their firms. They also provide valuable information for mapping the attitudes of the samples towards the main constructs of the study (Hair *et al*. 2010). The demographic questions are also useful to assess whether the sample is representative of the population (Bhatnagar & Ghose 2004), and that the data are free from non-response bias (Armstrong & Overton 1977). Therefore, the questions on the demographic profile of the respondents and their firms were carefully designed in this study. A total of 11 multiple choice questions were used in this study to gather the demographic profile of the respondents and their firms, and the sourcing behaviours of these firms (see Appendix B). While designing the multiple choice questions, the study carefully reviewed previous reports that captured the profile of the population using the same questions, and aligned them with the choice options of those studies. Such an effort in designing the respondents' profile enabled this study to compare the sample against the population to ensure that the sample is representative of the population and free from sample-selection bias (Bhatnagar & Ghose

2004). The questions on the demographic profile of the respondents were designed in such a way that ensured the anonymity of the respondents and complied with the ethical requirements.

3.4.2 Constructs Operationalisation

Since the measurement items of the six constructs included in this research are seldom explored in the context of SMEs in developing countries, a systematic process was undertaken to develop the survey instrument of the study. This rigorous step-by-step process in designing the instrument assist ensures that the collected data correctly reflects the underlying phenomena (Straub, Boudreau & Gefen 2004). It also assists in ensuring the content validity of the instrument (Straub, Boudreau & Gefen 2004). The process was adapted from Haynes, Richard and Kubany (1995), Straub, Boudreau and Gefen (2004) and Vogt, King and King (2004), and includes the following stages:

i. First, measurements of all the constructs were initially developed by reviewing the facets of similar constructs from the previous studies. At this stage, the domain of each construct was defined and measurement items to operationalise the constructs were identified (Straub, Boudreau & Gefen 2004).

ii. Next, three focus group meetings with some members of the target populations, operation managers of apparel-manufacturing SMEs in Bangladesh, were organised to help validate and modify measurements of the constructs to enable a better fit in the context of the research (Vogt, King & King 2004). Sections 3.4.2.1, 3.4.2.2 and 3.4.2.3, respectively, discuss the reasons of using focus group meetings, data collection methods of focus group meetings, and analysis techniques of the obtained data from focus group meetings.

iii. Next, the items were screened using quantitative approaches, i.e. the inter-rater agreement analysis, to ensure the content validity. This analysis assists in judging the relevancy and

representativeness of the developed instrument in terms of the domains and facets of the constructs (Haynes, Richard & Kubany 1995).

iv. Finally, the questionnaire was reviewed by academic experts, members of the target population and SME experts, to further confirm content validity of the instrument (Haynes, Richard & Kubany 1995). Eight academics and two SME experts commented on the questions in the questionnaire in terms of their relevancy, adequacy and clarity. In addition, the questionnaire was presented to the five respondents who were requested to review the questions in terms of meaning and clarity.

Details of the scale development stages along with their qualitative and quantitative outcomes are presented in Chapter 4. In designing the scale for operationalising the constructs, several *ex-ante* approaches were adopted to reduce the likelihood of common method variance (CMV) (Chang, Witteloostuijn & Eden 2010). The *ex-ante* approaches included the use of different anchor types (e.g. never–always, not at all–to a great extent, very different–very similar, very poor–very good), a pre-test of instruments, and the inclusion of a cover page to assure the anonymity of the responses.

3.4.2.1 Focus Group Design

Estimates of causal relationships and the validity of the inferences drawn from the research result greatly depend on the degree to which the components of a survey instrument are appropriate for and are representative of the targeted constructs (Haynes, Richard & Kubany 1995). Focus group meetings, which are more than the sum of the individual interviews (Morgan 1997), are very helpful in enhancing the content validity of existing instruments as the discussion provides the opportunity to include the concerns held by both the researchers and the participants that would otherwise have been ignored (O'Brien 1993; Powell, Single & Lloyd 1996). Discussion via focus group meetings with the survey participants helped this

research to confirm the key constructs developed through a comprehensive literature review and specifying the facets and items of the constructs (Vogt, King & King 2004). It also assisted in identifying other constructs that were not mentioned in the literature or were specific to the target population of this study. Focus group meetings also allowed this research to understand the meaning of the constructs from the perspective of the research context, apparel-manufacturing SMEs of Bangladesh, thereby ensuring the relevance and representativeness of the items (Vogt, King & King 2004). Moreover, focus group meetings helped in obtaining more accurate information on the practices of leveraging social capital and supplier integration and cluster cooperation of SMEs as participants generally would provide less misleading information in group consultations (Basch 1987). Finally, this context-oriented construct confirmation and exploration design helped this research in finalising the wording of survey items to convey the intended meaning to the respondents (Morgan 1996).

3.4.2.2 Focus Group Data Collection Method

Three focus group meetings were conducted whereby participants were purposefully selected based on the location and size of the firms from the same sampling frame of the main questionnaire survey (Morgan 1997). Purposive sampling helps in reducing the sample bias and achieves more meaningful discussion by ensuring homogeneity within the group (Morgan 1997). In this research, the size of each focus group was five, which allowed the participants to be more involved in the discussion, as recommended in other studies (Kitzinger 1995; Neumark-Sztainer *et al*. 1999). Nevertheless, a total of six participants were recruited for each focus group discussion to cover in the event of a no-show (Morgan 1997). The additional member of each focus group helped to reduce the likelihood of loss of information due to a sudden withdrawal by a participant of the focus group, and maintained the original plan of having five members in each group meeting.

The participants in the focus group meetings, same as the survey participants, were individuals who managed the sourcing or operational activities of the selected SMEs. In order to seek the consent of the participants to participate in the focus group discussion, this research used the contact details of the SMEs from the SME Foundation of Bangladesh, again identical to that of the main survey. The selected participants were initially contacted by telephone to seek their consent to participate in the focus group discussion. During the first contact, participants were informed of the details – group size, time and venue of discussion – of the focus group discussion, as well as being informed that the discussion would be audio recorded. After obtaining the preliminary consent from the participants to participate in the discussion, a letter was sent to the mailing address of each participant to confirm the date, time and location of the focus group meeting.

The meetings were conducted in a cosy and comfortable setting with members sitting round a circular table complete with refreshments to foster a relaxed atmosphere (Kitzinger 1995). Participants' convenience to reach the site, the proper atmosphere for the discussion and the recording facilities were ensured during the site selection for the meeting. All the sessions were audio recorded with the permission of the participants in order to facilitate the coding and analysis of the data (Kidd & Parshall 2000; Owen, Fox & Bird 2016).

3.4.2.3 Focus Group Guide and Data Analysis

A guide, prepared based on the constructs identified from the literature review, was used to carry out the focus group consultation (Vogt, King & King 2004). This guide was used to help maintain the flow from topic to topic during the discussions (Frankland & Bloor 1999; Morgan 1996). Participants were guided to discuss how social capital in both the buyer–supplier network and their network of peers located within the cluster could play an influential role in mitigating the supply risk of SMEs. An abridged transcription was prepared from the audio-

recorded discussion where the relevance of the discussion was determined by (a) whether it had included any construct or item already identified from the literature or by (b) whether it had introduced a new construct or item not initially identified from the literature (Vogt, King & King 2004). All responses were kept anonymous during analysis and reporting, and any personal data that might disclose the identity of the participant were not processed further and were stored in different places (Veal 2005). The obtained data from the focus group meetings were analysed manually because (a) the main purpose of the focus group was to provide input to refine the survey instrument (Morgan 1997), and (b) the analysis only dealt with a small amount of transcript material (Frankland & Bloor 1999).

3.5 Sampling Design

Sampling is an important aspect in a survey-based quantitative research to ensure that adequate and representative data have been collected to conduct several tests (Zikmund *et al*. 2013). Therefore, this study has carefully addressed the many issues related to sampling, such as sampling method, sample size and sample area. The following sub-sections provide the details on these issues.

3.5.1 Sampling Method

A sampling method comprises two types: probability and non-probability sampling. In probability sampling, every unit of the population has a known, non-zero probability of being selected, while in non-probability sampling, the probability of any unit of the population being chosen is unknown (Zikmund *et al*. 2013). Although probability sampling is more appropriate, non-probability sampling is recommended for use in situations where a sampling frame does not include all necessary information to use probability sampling, and selection of statistically representative sampling is difficult, time-consuming and expensive (Blaikie 2010; Salganik &

Heckathorn 2004). Data used in this research were collected from the apparel-manufacturing SMEs in Bangladesh, sampled from a database held by the Bangladesh SME Foundation. As the sampling frame used in this research does not include all necessary contact information of the respondents to adopt probability sampling, a non-probability sampling technique was used in this study. Non-probability sampling includes different types such as convenient sampling, purposeful sampling, stratified purposeful sampling, judgement sampling, quota sampling and snowball sampling (Bryman & Bell 2011). In this research, stratified purposeful sampling was used to collect the primary data. This sampling method provides the advantage of getting representative information, although it is a non-probability sampling technique (Sandelowski 2000). Data were collected proportionately from all the apparel-manufacturing clusters, which is considered as strata, of the sample area to ensure representativeness (Bryman & Bell 2011).

3.5.2 Sample Size

Though there is no clear-cut rule for minimum sample size (Sivo *et al.* 2006), structural equation modelling (SEM) requires a comparatively large sample in order to obtain stable variance and correlations (Tabachnick & Fidell 2007). However, if the anticipated effects are constant and the measures are reliable, a smaller sample is considered sufficient (Iacobucci 2010). In general, a sample size of 100 is considered sufficient for convergence and a sample size of 150 is sufficient for a convergent and proper solution (Anderson & Gerbing 1984). In order to obtain reliable result in SEM, the sample size should be at least 100 (Hair *et al.* 2006). With a sample size of less than 100, any kind of SEM model is untenable unless the model is very simple (Kline 2015). Through a systematic literature review, Shah and Goldstein (2006) find that the median and the mean sample sizes of the studies that used SEM in the area of operations management are 202 and 246, respectively. As a simple rule, Hoe (2008) recommends that any number more than 200 would produce sufficient power for data analysis

in SEM. In light of the above, this research initially aimed to obtain a valid sample of at least 300 cases.

3.5.3 Sample Area

The study context of this research is Bangladesh. The Bangladesh SME Foundation (2013) has identified 21,682 apparel-SMEs in 22 geographical clusters in Bangladesh with an average of around 986 firms per 'cluster'. According to the Bangladesh SME Foundation (2013), 50 or more similar SMEs operating within a five-kilometre radius is considered to be a cluster. Around 56 per cent (12,067 firms) of total apparel-SMEs and 59 per cent (13) of the total apparel-SME clusters are located in the Dhaka Division. Therefore, participants of this study have been selected from the apparel-SMEs operating in the Dhaka Division of Bangladesh. In Figure 3.2, small green triangles show the position of the 22 apparel-SME clusters across the country, and those that fall within the red line are located in the Dhaka Division.

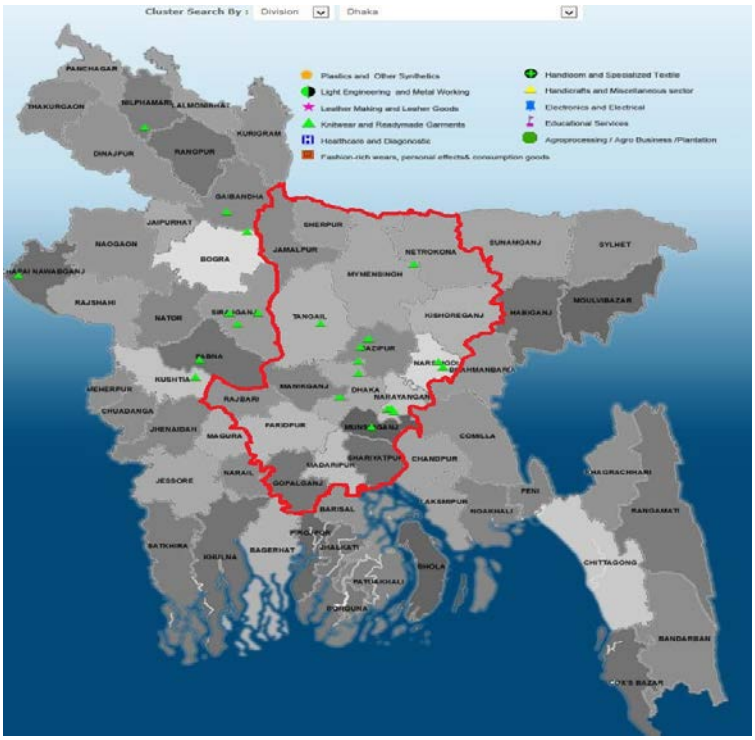


Figure 3.2: Map of apparel-SME clusters in Bangladesh

Source: Bangladesh SME Foundation

Eight of the 13 apparel-SME clusters in the Dhaka Division are involved in manufacturing apparel products while the remaining five provide logistical support to the apparel manufacturers. As this study is investigating the supply risk of manufacturing SMEs, data have been collected from the eight apparel-manufacturing SME clusters in the Dhaka Division.

3.6 Survey Administration

This section details the survey administration method which include the time of survey data collection, techniques of survey administration and unit of analysis.

3.6.1 Time Horizon

A survey study can be classified as either cross-sectional or longitudinal, depending on the time period of data collection. While a longitudinal study gathers the repeated data from a respondent over a period of time, a cross-sectional study gathers the data from a respondent at a specific point of time (Rindfleisch *et al.* 2008). Although both have their own merits, cross-sectional studies are the most popular in survey research since they are less expensive, easy to administer and able to collect data from large number of participants (Zikmund *et al.* 2013). This study also gathered cross-sectional data from the apparel-manufacturing SMEs in Bangladesh between June and August 2016. The questionnaire, along with the information document explaining the research, was dropped to 1,193 sample firms. All responses were anonymous in the questionnaire to ensure the privacy and confidentiality of the respondents.

3.6.2 Survey Technique

A number of modes such as online, postal, telephone and face-to-face, are available to administer the questionnaire survey (Zikmund *et al.* 2013). Each of these modes has its own pros and cons, and response rate varies across the different modes (Elisabeth *et al.* 2004;

Sheehan 2001). Therefore, it is important to carefully select the right mode(s) for administering the survey. This research used the drop-and-collect method to conduct the questionnaire survey for a couple of reasons. First, the context of the study did not permit online or postal surveys since most of the SMEs in Bangladesh are not information technology savvy enough to take online surveys, and the sampling frame does not include all necessary information to enable a postal survey. Adaptation of information and communication technology is, in fact, one of the major challenges of the SMEs of Bangladesh (Bakht & Basher 2015) since only 18 per cent of the population of Bangladesh currently have access to the internet, and less than 4 per cent have the access to broadband (World Bank 2018b). During the time of data collection (June–August 2016), only 14.4 per cent of the population had access to the internet (World Bank 2018b). The other reason for using the drop-and-collect method is that it provides a fast and reliable means of data collection by blending the strengths and avoiding the weaknesses of face-to-face and postal surveys (Brown 1987). Moreover, the drop-and-collect method usually achieves a higher response rate than postal or online surveys (MacLennan, Langley & Kypri 2011). This method increases response rates and provides good chances to collect completed questionnaires.

3.6.3 Unit of Analysis

The unit of analysis is "the person, collective or object that is the target of the investigation" (Bhattacherjee 2012, p. 9). Typical units of analysis include individuals, groups, organisations and objects (Zikmund *et al.* 2013). This research investigates the supply risk of buying SMEs and their social capital with key suppliers and with peers located within a geographical cluster. Therefore, the unit of analysis of this research is the buying SME and its relationships with key suppliers and peers.

To ensure that a rich amount information has been collected, individuals who manage sourcing or operational activities of the selected SMEs have been considered as the participants of this

study because they have the relevant knowledge regarding the questions on the questionnaire. As the SMEs are mainly owned and operated by the owners, the majority of the survey questionnaires were filled in by the owners. However, all of the survey respondents are managing the operational/sourcing activities of the selected firms, although they do not hold the operation manager position as most of the SMEs do not have such positions.

3.7 Data Analysis

Analysis of the survey data was conducted in four stages: data evaluation, data examination, assessment of validity and reliability of the scale, and assessment of the structural model and hypotheses testing. The following sub-sections discuss the data analysis techniques of this research.

3.7.1 Data Evaluation

The analysis started with the evaluation of the demographic profiles of the respondents and their firms using descriptive statistics and cross-tabulation analysis. This stage also evaluated some basic sourcing behaviours of the sample SMEs. This diagnosis helped understand the distribution of the obtained data and, by comparing with the population distribution, ensured that the sample is representative of the population (Bhatnagar & Ghose 2004). The Statistical Package for the Social Sciences (SPSS), in particular SPSS (v.24), was employed in this stage to evaluate the data. The results of the data evaluation are presented in Chapter 5.

3.7.2 Data Examination

At this stage, collected data were examined and cleaned before conducting further analysis. The data cleaning stage includes assessing and handling incomplete cases, identifying and tackling outliers, and verifying the normality assumption and non-response bias of the obtained

data. In multivariate analysis, this stage is vital for ensuring the validity of the statistical assumptions underpinning the method used to analyse the data (Hair *et al.* 2010). Similar to the data evaluation stage, SPSS (v.24) was employed to examine the data – the results of which are presented in Chapter 5.

3.7.3 Validity and Reliability Assessment

Validity and reliability of the scale were assessed soon after cleaning the data. Several essential and well-recognised scale validity tests were conducted (Figure 3.3) which began with the assessment of the dimensionality of the scale by employing exploratory factor analysis (EFA) using SPPS (v.24) (DeVellis 2003; Li *et al.* 2005). Then, confirmatory factor analysis (CFA) using AMOS (v.24) was employed to assess the convergent, discriminant, nomological and factorial validity of the scale. The result of dimensionality assessment is presented in Chapter 5, and the results of the other validity tests are presented in Chapter 6.

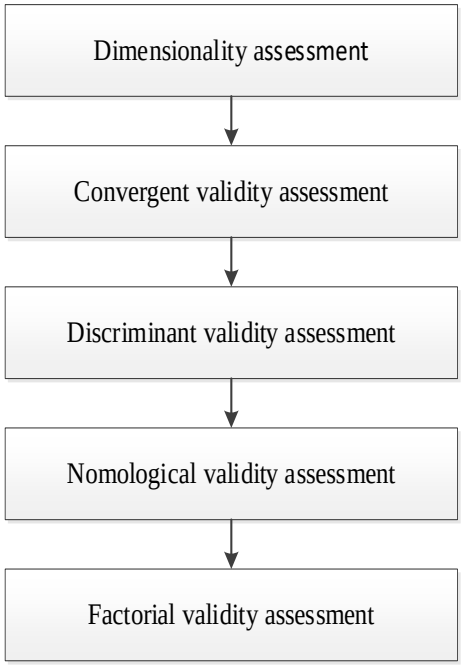


Figure 3.3: Validity tests used in this study

Upon assessing the validity of the scale, Coefficient *H*, Cronbach's alpha (α) and construct reliability (CR) were employed to assess the internal consistency reliability of the scale (Bryman & Bell 2011; Hancock & Mueller 2001). Finally, the study assesses the presence of common method bias in the collected data using CFA (Podsakoff *et al.* 2003). Chapter 6 provides the results of the assessments of reliability and common method bias. In this research, the above-mentioned reliability and validity tests were undertaken to ensure that the scale can be used to assess the structural model, and estimate the relationship among the constructs (Hair *et al.* 2010).

3.7.4 Structural Equation Modelling

The study used structural equation modelling (SEM) to estimate and develop the model and to test the hypotheses proposed in Chapter 2. SEM is a 'multivariate technique' that examines the structure of interrelationships among the variables in a series of equations, and estimates a series of separate, but interdependent, relationships simultaneously (Hair *et al.* 2006). In this research, SEM is employed for a number of reasons. First, SEM is considered as the appropriate survey analysis tool to generalise the findings to a larger population when the causal relationships of the constructs is being understood (Healy & Perry 2000). Gimenez, Large and Ventura (2005) mention that SEM is a very powerful tool in analysing the causal relationship type model because it blends measurement models and structural models into a simultaneous statistical test. Since a conceptual causal model based on literature review underpinned by the Social Capital Theory and the Theory of Swift, Even Flow was developed, the study used SEM to examine the relationships depicted in the model.

Second, SEM is considered as the most suitable technique of data analysis of this research since the structural model involves both first-order and higher-order latent factors (Kline 2015). Third, SEM provides an opportunity to examine both the direct and mediating effects of a

variable on another variable (Alavifar, Karimimalayer & Anuar 2012). The benefits of SEM enable this research to investigate the mediating impact of social capital on supply risk through network cooperation/integration. Finally, SEM allows this research to modify the model until the best-fit model is determined to account for the relationships between the variables of this study (Gimenez, Large & Ventura 2005).

SEM follows a logical sequence (Figure 3.4) to specify, estimate and modify the model, and continues repeating the estimation until an adequate fit is achieved. The appropriate fit of the proposed model is addressed at two levels: first for the individual construct level and then, separately, for the full measurement and structural model (Gimenez, Large & Ventura 2005). Finally, the hypotheses are tested to investigate the causal relationships among the constructs and the results are presented in Chapter 6.

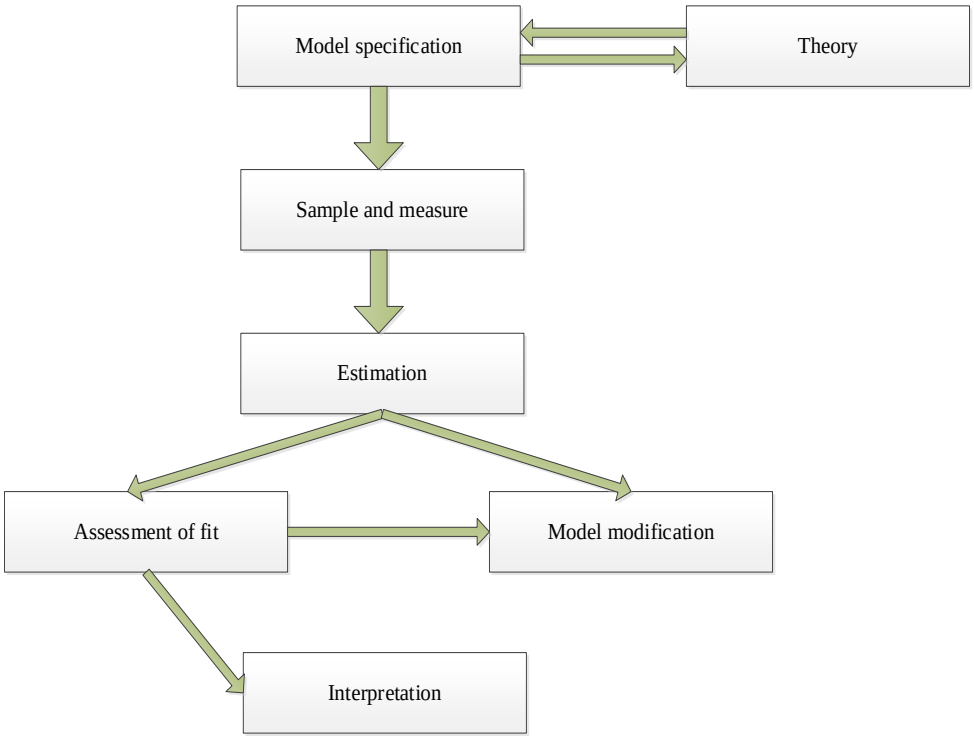


Figure 3.4: Conventional approach of SEM
Source: Adapted from Gimenez, Large and Ventura (2005, p. 159)

3.8 Ethical Considerations

As the research involves discussions with focus group members and surveying human participants, ethical approval from the Business College Human Ethics Advisory Network (BCHEAN) at RMIT University was sought prior to collecting the primary data. The ethics approval letter is shown in Appendix A. The researcher strictly adhered to the ethical requirements in designing the instrument, administering the survey and storing the collected data. Moreover, following the ethics requirements, the researcher strictly maintained the confidentiality of the information provided by the participants and ensured anonymity in presenting the information in this study. Respondents were also assured of their confidentiality, anonymity, privacy and the ability to withdraw from this project via a participant information sheet. The participant information sheet used in this research is attached in Appendix B with the questionnaire.

3.9 Summary

This chapter discussed the many paradigms available for conducting the research and justified the need for a falsification paradigm in achieving the research objectives of this study. Following the research paradigm, this chapter explained the data collection and analysis methods used for this research. A survey methodology, together with the quantitative approach of data analysis, has been adopted in this study. The survey was conducted using a questionnaire developed using a rigorous step-by-step process and administered through the drop-and-collect method. Participants of this study were chosen from the apparel-manufacturing SMEs of the Dhaka Division of Bangladesh. SEM was chosen for validating the model and for investigating the hypothesised associations among the constructs. The next chapter discusses in detail the procedures and the results of the stages of scale development.

CHAPTER FOUR
SCALE DEVELOPMENT

4.1 Introduction

This chapter explains in detail the process of developing the survey instrument for operationalising the constructs to investigate the hypotheses that have been put forward on the basis of the theoretical prediction made in Chapter 2. As the validity of conclusions that are drawn from statistical analysis of a survey research depends on a reliable and valid measurement tool (DeVellis 2003; Zikmund *et al.* 2013), developing a valid survey instrument through a systematic process is vital to ensure that the data gathered are correctly reflecting the underlying phenomena. Moreover, the systematic process in designing the survey instrument ensures its content validity, which assesses how adequately and appropriately a measure represents the domain of a concept of interest (Singleton & Bruce 2010; Wagner & Kemmerling 2010).

In this regard, this study followed a rigorous step-by-step process adapted from Haynes, Richard and Kubany (1995), Straub, Boudreau and Gefen (2004) and Vogt, King and King (2004) in designing an instrument to minimise errors. The process includes four stages and six steps, as depicted in Figure 4.1. This chapter discusses the outcomes of the process to finalise the instrument of the study. The chapter is organised into six sections, with an introduction in Section 4.1. After this, Section 4.2 discusses the development of the preliminary instrument, while Section 4.3 presents the method of contextualisation of the instrument. The relevancy of the items is validated in Section 4.4, whereas Section 4.5 details the instrument review process. Finally, Section 4.6 gives a summary of the chapter.

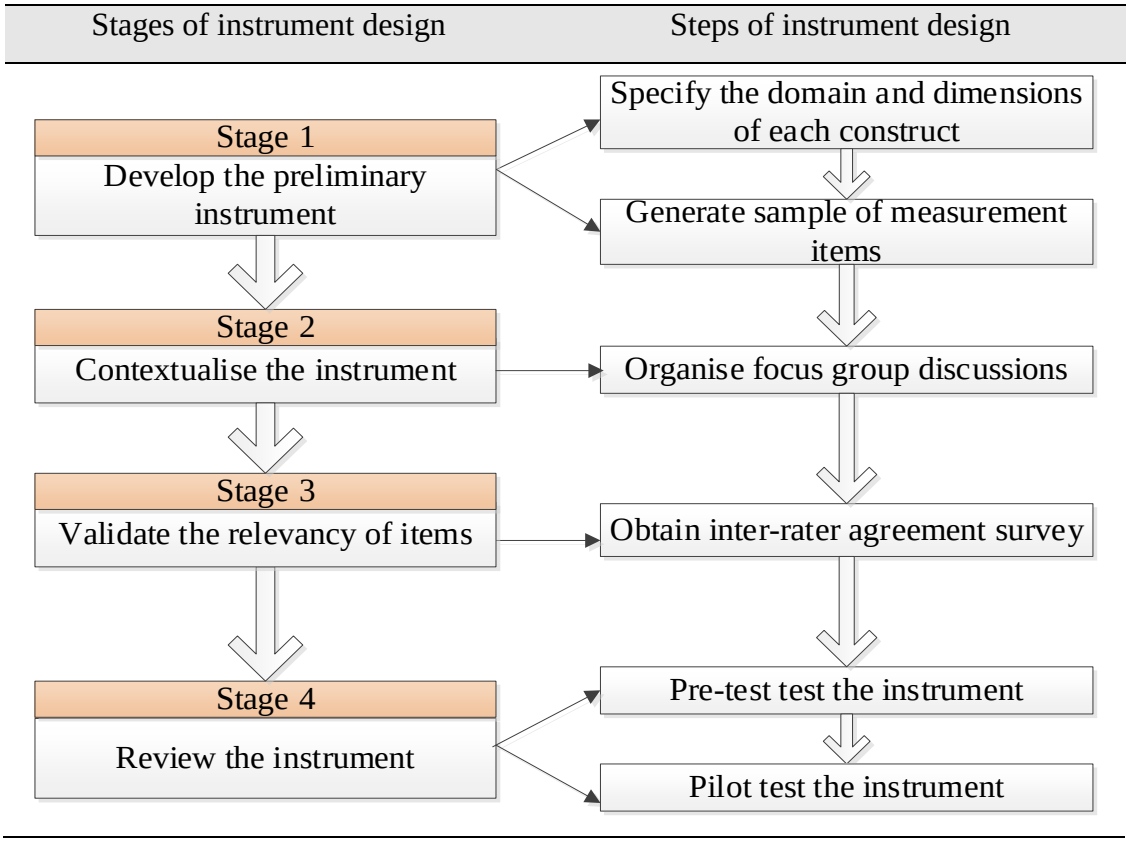


Figure 4.1: Stages and steps of the survey instrument development

4.2 Develop the Preliminary Instrument

The stages of designing the survey instrument for this study began with an attempt to compile a preliminary instrument through a review of the extant literature. Measurement items of all the constructs were initially developed by reviewing the facets of similar constructs from previous studies. At this stage, the domain and dimensions of all the constructs were first defined. Then measurement items were pulled to operationalise the constructs.

4.2.1 Specify the Domain and the Dimensions of Each Construct

The purpose of this step was to define the constructs clearly and to provide each of them with a list of dimensions representing the elements of the corresponding construct (Haynes, Richard & Kubany 1995; Lewis, Templeton & Byrd 2005). A construct is defined as ‘a conceptual term used to describe a phenomenon of theoretical interest’ (Edwards & Bagozzi 2000, pp. 156-7).

In general, it is abstract in nature and cannot be measured directly. Hence, to operationalise a construct it is important to specify its domain and dimensions (Tharenou, Donohue & Cooper 2007). Domain of a construct is usually a brief yet reasonable and acceptable representation of the concept of interest (Lewis, Templeton & Byrd 2005). It can be specified from a variety of sources, such as pre-existing philosophies (Bailey & Pearson 1983), empirical studies (Smith, Milberg & Burke 1996) and extant literature (Byrd & Turner 2000; Lewis & Byrd 2003). Reviewing the literature to identify the domain and the dimensions of a construct is a more appropriate technique because it considers the previous contribution of researchers who have labelled or explained the concept (Lewis, Templeton & Byrd 2005). Moreover, domain and dimensions of a construct identified from the literature can be verified through empirical research, such as case studies or focus group meetings at a later stage (Vogt, King & King 2004). Considering these benefits, the domains and the dimensions of the constructs involved in this study were initially specified through the literature review.

The definitions of the six higher-order constructs of the conceptual model proposed in this study, including buyer–supplier social capital, supplier integration, cluster social capital, cluster cooperation, supply risk, and operational performance, are provided in the literature review in Chapter 2. A summary of the meanings of these constructs is also provided in Table 4.1. Social capital is reflected in this study on the level of structural, relational and cognitive capital (Carey, Lawson & Krause 2011; Li, Ye & Sheu 2014; Villena, Revilla & Choi 2011). These three dimensions are used in this research to measure both buyer–supplier social capital and cluster social capital to provide a comprehensive picture (Johnson, Elliott & Drake 2013). Therefore, buyer–supplier social capital is reflected in this study on the level of (1) buyer–supplier structural capital, (2) buyer–supplier relational capital and (3) buyer–supplier cognitive capital. Similarly, there are three dimensions of cluster social capital including (1) cluster structural capital, (2) cluster relational capital, and (3) cluster cognitive capital. Supplier

integration is conceptualised as a second-order factor reflected through three first-order factors including information sharing, resource sharing and supplier collaboration (Min, Kim & Chen 2008; Yim & Leem 2013). Three further constructs, namely cluster cooperation, supply risk, and operational performance, are conceptualised as first-order factors. Table 4.1 summarises the domains and dimensions of the constructs, and their respective meanings in this study.

Table 4.1: Specification of domains and dimensions of constructs

Domain of construct	Dimension of construct	Definition/meaning	Key references
Buyer–supplier social capital	Buyer–supplier structural capital	The strength of the social interactions/ties existing between SMEs and their key suppliers.	Carey, Lawson and Krause (2011)
	Buyer–supplier relational capital	The extent of personal relationships that SMEs and their key suppliers have developed with each other.	Kale, Singh and Perlmutter (2000)
	Buyer–supplier cognitive capital	The extent to which SMEs and their key suppliers share a common perspective and collective ideologies.	Nahapiet and Ghoshal (1998)
Supplier integration	Information sharing	The exchange of required and relevant information between SMEs and their key suppliers to gain mutual benefits.	Prajogo and Olhager (2012)
	Resource sharing	The exchange of both tangible and intangible resources between SMEs and their key suppliers when required.	Min, Kim and Chen (2008); Yim and Leem (2013)
	Supplier collaboration	The extent to which SMEs and their key suppliers perform coordinated or joint activities to create unique value that neither party could achieve alone.	Chen, Sohal and Prajogo. (2013); Li *et al.* (2005)
Cluster social capital	Cluster structural capital	The strength of the social interactions/ties existing between/among the member organisations of a particular SME cluster.	Carey, Lawson and Krause (2011)
	Cluster relational capital	The extent of personal relationships that member organisations of a particular SME cluster have developed with each other.	Nahapiet and Ghoshal (1998)
	Cluster cognitive capital	The extent to which member organisations of a particular SME cluster share a common perspective and collective ideologies.	Nahapiet and Ghoshal (1998)
Cluster cooperation	The situation where firms of a particular SME cluster share information and resources, and undertake cooperative or joint actions.		Li and Geng (2012); Schmitz (2000)
Supply risk	Reflecting variations in the actual supply of SMEs from the expected values of supply performance measures.		Kumar, Tiwari and Babiceanu (2010)
Operational performance	The abilities of the SMEs to meet their customer requirements in terms of time, quality, delivery and flexibility.		Flynn *et al.* (2010)

4.2.2 Generate Sample of Measurement Items

This step provides the initial items generated through the literature review to operationalise the constructs of this research. Due to the fact that constructs cannot be measured directly, it is necessary to have one or more indicators that measure the construct (Bryman & Bell 2011). An indicator is an observed variable of a latent construct (Edwards & Bagozzi 2000). A single indicator measure, which uses only one observed variable to obtain the value of the latent construct, is not considered for two main reasons. First, it is hard to capture all the dimensions of a construct through a single indicator (Tharenou, Donohue & Cooper 2007); and second, resorting to a single indictor has low statistical validity (DeVellis 2003). On the other hand, multi-indicator measures, whereby several indicators are joined to form a composite value of the latent construct, have higher reliability and validity (Tharenou, Donohue & Cooper 2007). Therefore, all the constructs in this study are operationalised using multi-indicator measures.

4.2.2.1 Generate Sample of Measurement Items for Social Capital

Social capital has already been investigated in diverse disciplines and practical arenas (Lin 2005; Min, Kim & Chen 2008). Studies that investigate social capital from two or more social networks generally use the same items for different networks (Mesquita & Lazzarini 2008; Schmitz 1999). As this study investigates two types of social capital, namely buyer–supplier social capital and cluster social capital, initially it also pulled the same items to measure both types of social capital. However, they were referred to in separate questions so that the respondents could report separately their dyadic social capital with key suppliers and network social capital with peers within a geographical cluster. The items of buyer–supplier social capital measured the social interactions, interpersonal relationships and shared understandings between a sampled buying SME and its key supplier. Accordingly, respondents were requested to provide information about the relationships of their firms with their key suppliers. On the

other hand, cluster social capital was investigated through the network of similar SMEs within the same geographical cluster who maintained close social relations with each other. Therefore, the items of cluster social capital referred to the network capital in a network of similar SMEs located within a geographical cluster.

Upon reviewing the extant literature, the most suitable items were identified to measure the three dimensions of social capital – structural capital, relational capital and cognitive capital. Tables 4.2 and 4.3 summarise the items that were initially selected to measure the three dimensions of buyer–supplier social capital and cluster social capital, respectively.

Table 4.2: Measurements of buyer–supplier social capital

Dimensions	Measurement item	Sources
Buyer–supplier structural capital	*Our firm and our key supplier engage in the following interactions:*	
	Intensive interaction between the personnel	Villena, Revilla and Choi (2011)
	Interaction in the organised social and family events	Carey, Lawson and Krause (2011)
	Interaction in the joint workshops	
	Interaction between the personnel across different functions (e.g. logistics and marketing)	
	Interaction in the co-location	
	Interaction in the team building exercises	
Buyer–supplier relational capital	*Relationship between our firm and our key supplier is characterised by*	
	Trust	Carey, Lawson and Krause (2011); Kale, Singh and Perlmutter (2000); Villena, Revilla and Choi (2011)
	Mutual respect	
	Personal friendship	
	Reciprocity (feelings of fairness to work mutually)	
	Personal interaction	
	Commitment to working together for the foreseeable future	Krause, Handfield and Tyler (2007)
Buyer–supplier cognitive capital	*Our firm and our key supplier share similar*	
	Corporate values	Villena, Revilla and Choi (2011)
	Philosophies/approaches to business dealings and management styles	
	Business goals	
	Ambition and vision	
	Business codes and languages	Johnson, Elliott and Drake (2013)

For structural social capital, six items were initially selected: five of them were adopted from Carey, Lawson and Krause (2011) and one item was from Villena, Revilla and Choi (2011).

These items are mainly concerned with the strength of social interactions between the network members and include (1) intensive interactions between personnel, (2) interaction in social and family events, (3) interaction in joint workshops, (4) interaction across different functions, (5) interaction in co-location of network members, and (6) interaction in team building exercises.

Table 4.3: Measurements of cluster social capital

Dimensions	Measurement item	Sources
Cluster structural capital	*Our firm and some other firms in our cluster (with whom we maintain close relations) engage in the following interactions:*	
	Intensive interaction between the personnel	Villena, Revilla and Choi (2011)
	Interaction in the organised social and family events	Carey, Lawson and Krause (2011)
	Interaction in the joint workshop	
	Interaction between the personnel across different functions (e.g. logistics and marketing)	
	Interaction in the co-location	
	Interaction in the team building exercises in a cluster (e.g. cluster development meeting and conferences)	
Cluster relational capital	*Relationship between our firm and some other firms in our cluster (with whom we maintain close relations) is characterised by*	
	Trust	Carey, Lawson and Krause (2011); Kale, Singh and Perlmutter (2000); Villena, Revilla and Choi (2011)
	Mutual respect	
	Personal friendship	
	Reciprocity (feelings of fairness to work mutually)	
	Personal interaction	
	Commitment for helping for the foreseeable future	Krause, Handfield and Tyler (2007)
Cluster Cognitive capital	*Our firm and some other firms in our cluster (with whom we maintain close relations) share similar*	
	Corporate values	Villena, Revilla and Choi (2011)
	Philosophies/approaches to business dealings and management styles	
	Business goals	
	Ambition and vision	
	Business codes and language	Johnson, Elliott and Drake (2013)

In order to measure the relational social capital six items were selected that examine the extent to which the relationship between the network members is characterised by trust, mutual respect, personal friendship, reciprocity, interpersonal communication and commitment. Five of them were adopted from Carey, Lawson and Krause (2011), Kale, Singh and Perlmutter

(2000), and Villena, Revilla and Choi (2011) and one was from Krause, Handfield and Tyler (2007). Finally, five items, four adopted from Villena, Revilla and Choi (2011), and one based upon Johnson, Elliott and Drake (2013), were initially selected to measure the cognitive social capital. These items examine the extent to which network members are congruent in organisational cultures, business philosophies, goals, ambition and vision, and codes and languages.

4.2.2.2 Generate Sample of Measurement Items for Supplier Integration

A total of 13 initial items measuring three dimensions – information sharing, resource sharing and supplier collaboration – of supplier integration were initially selected to operationalise the supplier integration construct. The study selected four items from Chen and Paulraj (2004), Chen *et al.* (2004), and Prajogo and Olhager (2012) to measure the information sharing. These items measure the extent to which a manufacturing SME and its key supplier (1) share sensitive information, (2) share any information that might help the other party, (3) exchange information timely, accurately and/or completely, and (4) keep each other informed about events or changes that may affect the other party. However, this study excluded one item – 'we have face-to face communication with our key supplier' – from the original scale of information sharing for the reason that the item is more about interaction. The framework used in this study not only distinguishes between information sharing and interaction (structural capital) but also examines their relationship. Based on the Social Capital Theory, this research argues that interaction is not a part of information sharing but an antecedent of information sharing.

In order to operationalise the resource sharing, the study adopted four initial items from Yim and Leem (2013) that examine the exchange of tangible and intangible resources between SMEs and their key suppliers. These items measure the extent to which a manufacturing SME

and its key supplier share (1) business experience, (2) technical knowledge, (3) equipment when necessary, and (4) financial resources. Finally, five measurement items were adopted from Li *et al.* (2005) to examine the supplier collaboration. In line with Chen, Sohal and Prajogo (2013), this study excluded one item – 'we consider quality as our number one criterion in selecting suppliers' – from the original scale because this item is mainly related to supplier selection. The five items that were selected in this research to examine supplier collaboration are concerned with the extent to which SMEs (1) solve problems jointly with key suppliers, (2) help key suppliers to improve quality, (3) include key suppliers in improvement programmes, (4) include key suppliers in planning and goal-setting, and (5) involve key suppliers in product development. Table 4.4 displays all the items that were initially selected in this study to measure three dimensions of supplier integration.

Table 4.4: Measurements of supplier integration

Construct	Measurement item	Sources
Information sharing	Our firm and our key supplier share sensitive information (financial, production, research, and/or competition)	Chen *et al.* (2004); Chen and Paulraj (2004); Prajogo and Olhager (2012)
	Our firm and our key supplier share any information that might help the other party	
	Our firm and our key supplier exchange information timely, accurately and/or completely	
	Our firm and our key supplier keep each other informed about events or changes that may affect the other party	
Resource sharing	Our firm and our key supplier share business experience (e.g. process design, process improvement)	Yim and Leem (2013)
	Our firm and our key supplier share technical knowledge	
	Our firm and our key supplier share equipment when necessary (e.g. machine, computer)	
	Our firm and our key supplier share financial resources (e.g. extending credit period)	
Supplier collaboration	Our firm regularly solve problems jointly with our key supplier	Chen, Sohal and Prajogo (2013); Li *et al.* (2005)
	We have helped our key supplier to improve their product quality	
	We have continuous improvement programmes that include our key supplier	
	We include our key supplier in our planning and goal-setting activities	
	We actively involve our key supplier in new product development processes	

4.2.2.3 Generate Sample of Measurement Items for Cluster Cooperation

Eight items were initially selected to measure the cluster cooperation that examines the extent to which SMEs within the cluster share information and resources, and take cooperative or joint action to gain mutual benefits. Six of these items were based upon Schmitz (2000), and two items were adopted from Li and Geng (2012). These items reflect cooperation of surveyed SMEs with other SMEs within the cluster to (1) exchange souricng information, (2) share sourcing experience, (3) exchange resources, (4) follow up the activities of each other, (5) take joint action to improve product quality, (6) organise labour training jointly, (7) use cooperative sourcing, and (8) solve common supply-related problems jointly. Table 4.5 displays the items that were selected from the literature to operationalise the cluster cooperation.

Table 4.5: Measurements of cluster cooperation

Construct	Measurement item	Sources
Cluster cooperation	*Our firm and other firms in our cluster (with whom we maintain close relations)*	
	Exchange sourcing information (e.g. information about supply or suppliers)	Schmitz (2000)
	Exchange sourcing experience (e.g. experience about supply management)	
	Share resources (lending material and/or money)	Li and Geng (2012)
	Can follow up on each other's innovations	
	Take joint efforts to improve the quality of products	Schmitz (2000)
	Jointly organise labour training programmes to improve the skills (e.g. procurement skills) of employees	
	Use cooperative sourcing of material and/or parts (e.g. buying materials together)	
	Take joint actions to solve the supply-related problems	

4.2.2.4 Generate Sample of Measurement Items for Supply Risk

In accordance with Chen, Sohal and Prajogo (2013), this study used the variance-based view in defining supply risk, i.e. supply risk is the reflecting variation in the expected outcomes of the upstream supply. Chen, Sohal and Prajogo (2013) operationalised the construct of supply risk by six items derived from previous studies on the concept of risk. This research initially adopted these six items to measure variation in inbound supply demonstrated through (1)

quality, (2) lead time, (3) quantity, (4) overall requirements, (5) maintaining promise, and (6) capacity.

In general, it is difficult for respondents in a survey to understand negatively framed questions, particularly when they are asked to rate the questions in a Likert scale (Robson & McCartan 2016; Vaus 2014). Therefore, it is recommended to 'avoid questions in the negative' (Robson & McCartan 2016, p. 264). In order to avoid negatively framed questions, the measurement items of the supply risk construct were reverse-coded. This practice was commonly adopted in previous studies such as Chen and Paulraj (2004), Chen, Sohal and Prajogo (2013) and Zhao *et al.* (2013). Table 4.6 shows the items that were selected in this research to operationalise the supply risk.

Table 4.6: Measurements of supply risk

Construct	Measurement item	sources
Supply risk	Our key supplier consistently meets our quality specification requirements	Chen, Sohal and Prajogo (2013)
	Our key supplier consistently meets our required delivery lead times	
	Our key supplier consistently meets our volume requirements	
	Our key supplier consistently meets our overall requirements	
	Our key supplier always delivers our orders as promised	
	Our key supplier has the capacity to meet our requirements	

4.2.2.5 Generate Sample of Measurement Items for Operational Performance

The study initially selected seven items to measure the operational performance: six of them were adopted from Flynn *et al.* (2010), and one of them was from Wagner and Bode (2008). These items examine the ability of a SME to meet customer requirements in terms of (1) product modification speed, (2) product introduction speed, (3) response to market change, (4) on-time delivery, (5) delivery speed, (6) customer services, and (7) order fill capacity. Table 4.7 displays the items that were used to measure operational performance.

Table 4.7: Measurements of operational performance

Construct	Measurement item	Sources
Operational performance	Product modification speed (time required to modify products to meet customer's requirements)	Flynn *et al.* (2010)
	Product introduction speed (time required to introduce new products into the market)	
	Ability to quickly respond to changes in market demand	
	On-time delivery (meeting quoted or anticipated delivery dates on a consistent basis)	
	Delivery speed (the time which elapses between the receipt of customer's order and the delivery of the goods)	
	Customer service (providing required customer services)	
	Order fill capacity (meeting desired quantities on a consistent basis)	Wagner and Bode (2008)

In summary, a total of 68 items were initially pulled from the extant literature to operationalise the constructs of this study.

4.3 Contextualise the Instrument

At this stage, the preliminary instrument that was developed in the first phase through the literature review was reviewed using three focus group discussions with some of the members of the target population. The purpose of this stage is to revalidate the developed instrument and to capture any new constructs and measurement items that are specific to the study population. A focus group guide was used to conduct the discussions with the respondents. Five members from the apparel-SMEs in the study population, and who were involved in managing operational and sourcing activities participated in each of the focus group discussions. The three group discussions lasted for 55 minutes, 69 minutes and 71 minutes respectively.

The findings of the initial group meetings were used to moderate the subsequent discussions. As the same issues and topics identified in the first and the second meetings also emerged in the third meeting, the focus group discussions were considered to be complete at this point (Morgan 1997). The focus group meetings adequately covered the content domain as the same issues began to emerge (Vogt, King & King 2004). From the analysis of the focus group data,

13 new items and one additional dimension of supplier integration were identified. These 13 items are related to four constructs – buyer–supplier social capital, supplier integration, cluster social capital and supply risk – of this study. Respondents endorsed the measurement items of the other two constructs – cluster cooperation and operational performance – of this research, but did not provide any new items. The findings derived from the focus group data are summarised in the Table 4.8, and discussed in the following four sub-points, each of which relates to the constructs where new items were identified.

Table 4.8: Summary of the findings derived from focus group discussions

Construct	Dimension of construct	New item
Buyer–supplier social capital	Buyer–supplier structural capital	Face-to-face interactions (e.g. on-site visits to each other)
		Interactions via multiple channels (e.g. phone, email, and/or letter)
	Buyer–supplier relational capital	Togetherness
	Buyer–supplier cognitive capital	Similar resources/capabilities of the business
Supplier integration	Flexible sourcing	Key supplier allows the buying firm to make quick orders when necessary
		Key supplier allows the buying firm to modify the order specifications when necessary
		Key supplier allows the buying firm to modify the delivery time when necessary
		Key supplier takes necessary actions to fulfil the sudden needs of the buying firm
Cluster social capital	Cluster structural capital	Interaction in daily activities (e.g. prayers, lunch)
	Cluster relational capital	Togetherness
	Cluster cognitive capital	Common terms or jargon
		Similar professional or trade skills of employees
Supply risk		Key supplier always charges fair prices for the material

Buyer–supplier Social Capital: Firms are often interacted to the key suppliers to keep them updated and to build close relationship with them (Cousins *et al*. 2006; Singh, Shukla & Mishra 2018). Apparel-SMEs of Bangladesh also maintain intensive interactions with their key suppliers and interact with them quite frequently using different channels. Two new items, which are concerned with the interactions between the key suppliers and buying SMEs were

identified under the construct of buyer–supplier structural capital. These are: (1) SMEs interact with their key suppliers face-to-face, and (2) SMEs interact with their key suppliers via multiple channels. Respondents of all three focus group meetings mentioned these two items. For example, one of the participants of the first group meeting mentioned that '*we physically go to the supplier's house to buy the material, although we know it will be delivered to us if we order through mobile*'. Another respondent of the first group meeting said that '*in addition to the face-to-face interaction, we communicate with the key supplier in different ways: sometimes we call (the supplier), sometimes we use the social media to communicate (with the supplier), and sometimes we use the email to interact (with the supplier)'.*

Participants in the group meetings also endorsed the initial measurement items of buyer–supplier relational capital and buyer–supplier cognitive capital. For example, one of the respondents of the third focus group meeting mentioned that '*we value the relationship with our key supplier; we trust the supplier, respect each other and have very good personal friendship'*. One additional item was added in this stage to buyer–supplier relational capital. One of the respondents in the second group meeting mentioned that '*we always value the best interest of the relationship (with key supplier); we try to avoid any behaviour that may harm the other party*'. Thus, one item that relates to the togetherness in the relationship between SMEs and their key suppliers was added to the buyer–supplier relational capital. One item was also added to the buyer–supplier cognitive capital. Respondents in the first group meeting mentioned that '*Our key supplier is also small firms like us; hence we understand each other substantially'.* Similar discussions also emerged from the second group meeting; hence the measurement item – buying SMEs and their key suppliers share the similar resources/capabilities – was added to the buyer–supplier cognitive capital.

Supplier Integration: Three initial dimensions – information sharing, resource sharing and supplier collaboration – of supplier integration were supported as the dimensions of supplier integration by the respondents of the group meetings. For example, one of the respondents of the third group meeting mentioned that, '*We always share necessary information with each other, for example, our main supplier recently called me and informed me that the price of the material had reduced but may increase again soon. When I said I do not have the money to buy it now, the supplier agreed to send the material on credit and asked me to pay back in the later date*'. One more dimension – flexible sourcing – was identified at this stage, as respondents in all three group discussions mentioned about fulfilling sudden needs and modifying orders. For example, one of the respondents of the second group meeting mentioned that '*if we need something urgently we just make a call to our key supplier and the supplier takes all necessary actions to deliver the materials in our factory*'. Based on the discussion with the focus group participants, four items were identified to operationalise the flexible sourcing: (1) firms can make quick orders, (2) firms can modify the order specification, (3) firms can modify the delivery time, and (4) key suppliers take necessary actions to fulfil urgent needs.

Cluster Social Capital: Cluster social capital plays a very important role in the growth of SMEs across the world (Biswas, Roy & Seshagiri 2007; Villa & Antonelli 2009). Apparel-SMEs of Bangladesh are geographically concentrated meaning they also value networking with similar firms within a cluster. Discussions with the respondents revealed that they interact quite frequently in different ways with other firms within a cluster to build personal relationships as they share similar cultures and values. One of the respondents of the second group meeting mentioned that '*as we do the business in the same area, we frequently take the lunch together, go to the mosque together for the prayers; these types of social interactions improve the bonding between us'*. The same issue was also discussed in the third group meeting.

Consequently, one item that is concerned with the interaction in the different daily activities among the firms of a cluster network was added to the measurement of cluster structural capital.

One measurement item was also added to the cluster relational capital that relates to togetherness, as respondents in the second and the third focus groups clearly mentioned that they valued the collective benefits of the cluster network, and together with other firms they were trying to develop the whole cluster. For example, one of the respondents of focus group three mentioned that *'despite all of us (the firms) in this cluster are doing the same business, we work hard together to develop the image of this cluster. We believe if we can work together, we can improve the reputation of the cluster and can attract more buyers.'* Two further items were added to the cluster cognitive capital to measure the extent to which (1) firms (SMEs) of a cluster network use the same terms and jargons, and (2) employees of the firms of a cluster network have similar professional and trade skills. Respondents of the second and third group meetings mentioned the first item while respondents in all three groups mentioned about second item. For instance, in the second group meeting, one of the respondents mentioned that *'as we all are based in the same area, we always use the same terms and jargons*'. One of the respondents in the first group meeting mentioned that *'employees of all the firms in this area have similar skills because we are doing the same business and producing identical products'.*

Supply Risk: This construct is related to the variations in the inbound supply from the initial objectives (Kumar, Tiwari & Babiceanu 2010). In the focus group meetings, members of the apparel-SMEs concurred that the deviation may arise in different forms. In addition to the measurement items identified from the literature review, respondents of the group meetings mentioned about the deviation in price in sourcing. For instance, one of the respondents of the first group meeting mentioned that '*sometimes we face problem due to the frequent price increases by the suppliers. For example, I bought some materials from a supplier last week*

and when I returned a couple of days later to buy some additional materials the price had increased'. This deviation in price has an impact on other activities of the firm (Fischl, Scherrer-Rathje & Friedli 2014; Lee, Padmanabhan & Whang 1997). Therefore, it was added as a measurement item for supply risk.

In summary, through the focus group discussions, 13 new items were added to the instrument, giving a total of 81 items to operationalise the constructs of this research.

4.4 Validate the Relevancy of Items

This step of designing the survey instrument involved an agreement survey among some of the members of the target population. An inter-rater agreement is the extent to which the different judges agree on the same judgement about the rated subject (Tinsley & Weiss 1975). Whenever an analysis requires judges to provide value, scores or ratings on the subjects, the agreement among the judges establishes an important foundation of measurement precision (Gwet 2014; Lawshe 1975). A high level of consensus in the agreement of the judges is desirable while variation in the agreement of the raters indicates certain problems with the instrument (Davis 1992). The agreement on the judgement about the subject can be evaluated using a quantitative approach, i.e. inter-rater agreement analysis (Lindell, Brandt & Whitney 1999). This analysis assists in improving the content validity of the instrument by ensuring the relevancy and representativeness of all the constructs' domains and facets (Drost 2004; Haynes, Richard & Kubany 1995; Lindell & Brandt 1999).

A formal scaling is required to quantify the ratings of the judges for the inter-rater agreement analysis (Banerjee 1999). Lindell (2001) recommends the use of a five-point rating scale to measure the agreement of the judges. A five-point rating scale is generally perceived as easy and quick to complete by the respondents (Preston & Colman 2000). Based on such suggestions, this study adopted a five-point Likert scale ranging from 'not relevant' to

'absolutely relevant' for all 81 items of the instrument. Multiple judges or raters are recommended by Lebreton *et al.* (2005) and Tinsley and Weiss (1975) for rating the items. Using ten or more raters is suggested for the inter-rater agreement survey (Lindell, Brandt & Whitney 1999); however, a sample size of 20 judges tends to provide more valid and consistent results (Lindell 2001). Therefore, in this study 20 survey questionnaires were distributed and collected for the inter-rater agreement analysis. A cover letter, which included the purpose of the survey, definition of the key constructs and instructions for completing the questionnaire was attached with the questionnaire to assist the judges in understanding the questions and the statements. Similar to the main survey instrument, the study translated the inter-rater survey questionnaire into Bangla using forward and backward translation techniques (Brislin 1976; McGorry 2000). The demographic profile of the agreement survey respondents and their current firms are presented in Table 4.9.

Table 4.9: Profile of the agreement survey respondents and their firms

Respondent's position	Operational experience (in Year)	Age of current firm (in Year)	Number of employees	Annual sales revenue (in million BDT)	Use of formal contract
Owner	11–15	11–15	25–99	5–100	Never
Owner	≥ 16	≥ 16	≤ 24	< 5	Never
Manager	≤ 5	11–15	25–99	5–100	Never
Owner	6–10	6–10	≤ 24	< 5	Never
Owner	11–15	11–15	≤ 24	< 5	Never
Owner	11–15	11–15	25–99	< 5	Never
Owner	11-15	6–10	≤ 24	< 5	Never
Owner	6–10	6–10	≤ 24	< 5	Never
Operation Manager	6–10	≥ 16	100–250	100–300	Always
Owner	≥ 16	≥ 16	≤ 24	< 5	Never
Owner	≥ 16	≥ 16	≤ 24	< 5	Never
Owner	11–15	11–15	11–15	< 5	Never
Manager	11–15	≥ 16	100–250	5–100	Sometimes
Owner	≤ 5	≤ 5	≤ 24	< 5	Never
Manager	6–10	6–10	25–99	5–100	Never
Owner	11–15	11–15	11–15	< 5	Never
Owner	≤ 5	≤ 5	≤ 24	< 5	Never
Owner	≥ 16	≥ 16	≤ 24	< 5	Never
Owner	6–10	11–15	25–99	5–100	Sometimes
Owner	6–10	6–10	≤ 24	< 5	Never

Table 4.9 shows that more than half of the judges have at least 11 years of operational experience. Also, the majority of the surveyed firms have been operating in the industry for 11 years or more. Most of the respondents described their positions in the firms as being the owner. This is not surprising because SMEs are mainly operated and administered by their owners and they tend to report themselves as the only owner (Bah & Cooper 2015). Statistics on the number of employees and annual sales revenues indicate that this research has surveyed both small and medium enterprises for the agreement analysis. Firms with a maximum of 99 employees are defined as small firms, while firms with 100 to 250 employees are described as medium enterprises (Bangladesh SME Foundation 2013).

All of the 20 judges provided a rating score on the 81 items developed through the previous phases to measure the constructs. From the responses of the judges, a mean score was computed to represent the extent to which a particular item is relevant to a construct (Polit & Beck 2006). If the mean value is less than half of the maximum scale point (i.e. 2.5 in this case), it shows that the item is not substantially relevant to the construct (Davis 1992; Shoukri 2010); hence, the item should be dropped from the instrument (Lindell 2001). The mean score of all the items of the instrument in this study is more than 2.5, so all of them are retained for further analysis. If an item receives more than half of the maximum possible mean score, then it should be further analysed to investigate the power and the *p*-value of the items (Lindell & Brandt 1997; Preston & Colman 2000). In the situation when judges rate multiple items of a single target, Lindell (2001) has developed a mathematical equation to calculate the index of the inter-rater agreement $\left(r_{wg}^{*}\right)$. The recommended equation for calculating the inter-rater agreement is shown in equation 4.1:

$$r^{*}_{wg(J)} = 1 - \left(\frac{s_n^{-2}}{s^2_{EU}}\right) \quad \text{…….(4.1)}$$

where,

(J) is the number of items

s_n^{-2} is the variance of the ratings of judges

s^2_{EU} is the variance of the uniform distribution

Based on the index of the inter-rater agreement, the *p*-value and power of each of the items were calculated. An item which is sustained through the evaluation of the mean value is dropped from the instrument if the *p*-value of the item is more than 0.05 and/or the power is less than 0.8 (Ellis 2010; Lindell 2001; Sud-on *et al.* 2013). The results of the inter-rater agreement analysis (Table 4.10) demonstrate that a total of ten items in this study had a *p*-value of more than 0.05 and/or a power less than 0.8. These ten items were therefore dropped from the instrument. The remaining 71 items were retained in the instrument for further assessments.

Summarising the above discussion, ten items were dropped from the questionnaire upon the inter-rater agreement analysis. The decision regarding dropping the items was taken based on the following criteria:

1) Drop item when its mean value is less than the midpoint.
2) Drop items left from 1) when $p > 0.05$.
3) Drop items left from 2) when power < 0.8.

Table 4.10: Results of inter-rater agreement analysis

Constructs	Item labels	Item codes	Mean	*p*-value	Power	Decision*
Buyer–supplier Structural Capital (BSSC)	Intensive interaction between the personnel	BSSC1	4.40	0.000	1.00	√
	Interaction in the organised social and family events	BSSC2	3.75	0.001	0.95	√
	Interaction in the joint workshops	NA*	2.80	0.209	0.12	Dropped
	Interaction between the personnel across different functions (e.g. logistics and marketing)	NA*	3.35	0.024	0.56	Dropped
	Interaction in the co-location	BSSC3	4.10	0.004	0.86	√
	Interaction in the team building exercises (e.g. meeting)	NA*	3.40	0.071	0.32	Dropped
	Face-to-face interactions (e.g. on-site visits to each other)	BSSC4	4.25	0.000	0.99	√
	Interaction via multiple channels (e.g. phone, email and/or letter)	BSSC5	4.35	0.001	0.98	√
Buyer–supplier Relational Capital (BSRC)	Trust	BSRC1	4.50	0.000	1.00	√
	Mutual respect	BSRC2	4.05	0.001	0.97	√
	Personal friendship	BSRC3	3.90	0.004	0.86	√
	Reciprocity (feelings of fairness to work mutually)	BSRC4	4.40	0.006	0.81	√
	Personal interaction	BSRC5	3.65	0.005	0.82	√
	Commitment to working together for the foreseeable future	BSRC6	4.40	0.000	1.00	√
	Togetherness	BSRC7	4.00	0.004	0.85	√
Buyer–supplier Cognitive Capital (BSCC)	Similar corporate values	BSCC1	4.45	0.000	1.00	√
	Similar philosophies/ approaches to business dealings and management styles	BSCC2	4.20	0.000	1.00	√
	Similar business goals	NA*	3.70	0.021	0.58	Dropped
	Similar ambition and vision	NA*	3.40	0.071	0.32	Dropped
	Similar business codes and language	BSCC3	3.65	0.001	0.98	√
	Similar resources/capabilities of the business	BSCC4	3.25	0.004	0.87	√
Information Sharing (IS)	Buying SME and its key supplier share sensitive information (financial, production and/or competition)	IS1	3.85	0.001	0.98	√
	Buying SME and its key supplier share with each other any information that might help other party	IS2	4.35	0.000	1.00	√
	Buying SME and its key supplier exchange information timely, accurately and/or completely	IS3	4.65	0.000	1.00	√
	Buying SME and its key supplier keep each other informed about events that may affect the other party	IS4	4.10	0.000	1.00	√
Resource Sharing (RS)	Buying SME and its key supplier share business experiences (e.g. process design, process improvement)	RS1	4.45	0.000	1.00	√
	Buying SME and its key supplier share technical knowledge	RS2	4.00	0.000	1.00	√
	Buying SME and its key supplier share equipment when necessary (e.g. machine, computer)	NA*	3.40	0.013	0.67	Dropped
	Buying SME and its key supplier share financial resources (e.g. extending credit period)	RS3	3.85	0.002	0.92	√
Supplier Collaboration (SC)	Buying SME regularly solves problems jointly with its key supplier	SC1	4.40	0.000	1.00	√
	Buying SME has helped its key supplier to improve their product quality	SC2	4.00	0.004	0.85	√
	Buying SME has continuous improvement programmes that include its key supplier	NA*	3.35	0.012	0.69	Dropped
	Buying SME includes its key supplier in planning and goal-setting activities	SC3	3.95	0.001	0.97	√
	Buying SME actively involves its key supplier in new product development processes	SC4	4.05	0.002	0.91	√
Flexible Sourcing (FS)	Key supplier allows the buying SME to make quick order when necessary	FS1	4.10	0.001	0.95	√
	Key supplier allows the buying SME to modify the order specifications when necessary	FS2	4.55	0.000	1.00	√
	Key supplier allows the buying SME to modify the delivery time when necessary	FS3	3.90	0.004	0.86	√
	Key supplier takes necessary actions to fulfil the sudden needs of the buying SME	FS4	4.55	0.000	1.00	√
	Intensive interaction between the personnel	CSC1	4.25	0.001	0.95	√
	Interaction in the organised social and family events	CSC2	4.10	0.000	0.99	√

Cluster Structural Capital (CSC)	Interaction in the joint workshop/training	CSC3	3.80	0.000	1.00	√
	Interaction between the personnel across different functions	CSC4	3.65	0.005	0.82	√
	Interaction in the co-location (e.g. a common place such as cluster association house)	CSC5	4.00	0.001	0.94	√
	Interaction in the team building exercises in a cluster (cluster development meeting and conferences)	CSC6	4.45	0.000	1.00	√
	Interaction in the daily activities (e.g. prayers, lunch)	CSC7	3.35	0.002	0.92	√
Cluster Relational Capital (CRC)	Trust	CRC1	4.45	0.000	1.00	√
	Mutual respect	CRC2	4.05	0.002	0.91	√
	Personal friendship	CRC3	4.05	0.000	1.00	√
	Reciprocity (feelings of fairness to work mutually)	CRC4	4.10	0.001	0.95	√
	Personal interaction	CRC5	3.95	0.002	0.91	√
	Commitment to working together in the foreseeable future	CRC6	4.05	0.001	0.97	√
	Togetherness	CRC7	3.85	0.002	0.92	√
Cluster Cognitive Capital (CCC)	Similar culture and values	CCC1	4.45	0.000	1.00	√
	Similar philosophies/ approaches to business dealings and management styles	CCC2	4.50	0.000	1.00	√
	Similar business goals	CCC3	3.75	0.004	0.87	√
	Similar ambition and vision	NA*	3.25	0.171	0.15	Dropped
	Similar codes and language	CCC4	4.10	0.000	0.99	√
	Common terms or jargon	CCC5	3.90	0.000	0.99	√
	Similar professional or trade skills of employees	CCC6	3.95	0.001	0.97	√
Cluster Cooperation (CC)	Similar firms in the local area exchange sourcing information (e.g. information about supply or suppliers)	CC1	4.50	0.000	1.00	√
	Similar firms in the local area exchange sourcing experiences (e.g. experience about supply management)	CC2	4.55	0.000	1.00	√
	Similar firms in the local area share resources (lending material and/or money)	CC3	3.95	0.001	0.97	√
	Similar firms in the local area can follow up the innovations of each other	NA*	3.40	0.025	0.54	Dropped
	Similar firms in the local area take joint effort to improve the quality of products	NA*	3.50	0.014	0.66	Dropped
	Similar firms in the local area jointly organise training to improve the employees' skills (e.g. sourcing skills)	CC4	3.90	0.000	1.00	√
	Similar firms in the local area use cooperative sourcing of material and/or parts	CC5	4.10	0.001	0.95	√
	Similar firms in the local area take joint actions to solve the supply-related problems	CC6	4.10	0.000	0.99	√
Supply Risk (SR)	Deviation of quality	SR1	4.65	0.000	1.00	√
	Deviation of delivery lead times	SR2	4.60	0.000	1.00	√
	Deviation of volume/quantity	SR3	4.65	0.000	1.00	√
	Deviation of overall requirements	SR4	4.15	0.002	0.92	√
	Breaking of promises by key supplier in delivering material	SR5	3.95	0.001	0.97	√
	Fluctuation of the capacity of key supplier	SR6	3.95	0.001	0.97	√
	Inconsistent price of the material	SR7	3.75	0.001	0.95	√
Operational Performance (OP)	Product modification speed (time required to modify products to meet customer's requirements)	OP1	4.20	0.000	1.00	√
	Product introduction speed (time required to introduce new products into the market)	OP2	3.95	0.002	0.91	√
	Ability to quickly respond to changes in market demand	OP3	4.20	0.000	1.00	√
	On-time delivery (meeting quoted or anticipated delivery dates on a consistent basis)	OP4	4.65	0.000	1.00	√
	Delivery speed (time which elapses between the receipt of customer's order and the delivery of goods)	OP5	4.05	0.000	1.00	√
	Customer service (providing required customer services)	OP6	4.55	0.000	1.00	√
	Order fill capacity (meeting desired quantities on a consistent basis)	OP7	4.30	0.000	0.99	√

Note: √ in the decision column = the respective item was retained for the final survey.

NA* in the item codes column = no code was assigned to the respective item since the item was dropped from the final questionnaire.

4.5 Review the Instrument

In the final step, the questionnaire was reviewed by experts and members of the target populations to further confirm content validity of the instrument (Haynes, Richard & Kubany 1995; Vaus 2014). This stage is also useful to ensure that the survey instrument as a whole works well (Babbie 2015). Moreover, this stage helps reduce the ambiguity of the questions in the questionnaire which is particularly important for the survey research. This is because the survey is basically self-completed and there is no one to clarify any confusion, if it arises, during the filling out of the questionnaire by the respondents (Robson & McCartan 2016). Following the suggestions of Forza (2002), this study included three groups of people – academics (colleagues), the target population (industry people) and industry experts – for reviewing the questionnaire. This study uses the term 'pre-test' to refer to the review by academics and industry experts (Forza 2002), and 'pilot test' to refer to the review by the members of the target population (DeVellis 2003), although both terms have been used interchangeably in many studies.

4.5.1 Pre-test the Instrument

The instrument of this study was pre-tested by the academics because they can examine 'whether the questionnaire accomplishes the study objectives' (Forza 2002, p. 172). The instrument was pre-tested in two phases. First, the English version of the questionnaire was presented to three academics to ensure that the instrument measures all the constructs appropriately and adequately. Some modifications were done in this stage with the scaling and anchoring of the questions in the questionnaire. The questionnaire was then translated into *Bangla*, the mother language of Bangladesh, by a professional interpreter using forward and backward translation techniques (Brislin 1976; McGorry 2000). At the second phase, the translated questionnaire was presented to five local academics and two local SME experts to

comment on the questions in the instrument in terms of their relevancy, adequacy and clarity. Some minor modifications to the wording of the questions were also made at this stage.

4.5.2 Pilot Test the Instrument

Pilot testing of the instruments with members of the target population helps in gaining crucial information about whether the questions in the questionnaire are clearly understood and interpreted similarly by respondents (Singleton & Bruce 2010). At this stage, the researchers visited five participants of the target population, and the questionnaire was presented to them face-to-face. This study used face-to-face pilot testing because it provides the benefits of visual and auditory presentations, and enables better explanation and rich feedback (Schwarz *et al.* 1991). Table 4.11 presents the profile of the pilot test respondents and their firms. Similar to the inter-rater agreement survey, the respondents of the pilot test came from both small and medium enterprises, and had different levels of operational experience in the industry.

Table 4.11: Profile of the pilot test respondents and their firms

Respondent's position	Operational experience (in Year)	Age of current firm (in Year)	Number of employees	Annual sales revenue (in million BDT)	Use of formal contract
Owner	6–10	6–10	≤ 24	< 5	Never
Manager	≤ 5	11–15	25–99	< 5	Never
Owner	11–15	11–15	100–250	5–100	Never
Owner	6–10	6–10	25–99	5–100	Sometimes
Owner	≤ 5	≤ 5	≤ 24	< 5	Never

Respondents were asked to review whether (1) the definitions of the constructs are clear, (2) the wording and meaning of the questions are clear, (3) the instructions provided in all sections are clear, and (4) whether there are any likely problems in answering the questions. Based on the comments of the respondents, some minor revisions were made to ensure that the questions and instructions were clear and user friendly. Upon following all these instrument design steps, the measures of each construct were finalised using a seven-point Likert scale, which was found

to be the optimal number of response alternatives (Dawes 2008), as mentioned earlier in section 3.3.2 on page 68. The final questionnaire contains 71 items to measure the constructs of the conceptual model and 11 demographic questions to capture the profile of the survey respondents and their firms. Both the English and the *Bangla* versions of the final questionnaire used in this study are attached as Appendices B-1 and B-2).

4.6 Summary

This chapter discussed in detail the procedures and steps of developing the survey instrument. Initially, measures of all the constructs were developed by reviewing the dimensions and facets of similar constructs in the extant literature. Then, three focus group meetings with some of the members of the survey populations were conducted to validate the developed instrument and to reveal any new constructs or facets that are specific to the target population of the study. An inter-rater agreement survey was then carried out to determine the relevancy of the items to the constructs. Finally, the instrument was shown to academics, members of the target population and local SME experts to establish its appropriateness, adequacy and clarity. Following these steps, the scale for all the constructs of the conceptual model was finalised, which was used for the survey to investigate the relationships hypothesised in Chapter 2.

CHAPTER FIVE

DATA SCREENING AND DIMENSIONALITY ASSESSMENT

5.1 Introduction

The study gathered the survey data from the apparel-manufacturing SMEs in Bangladesh using a structured questionnaire, the development of which was discussed in Chapter 4. This chapter evaluates the profiles of the survey respondents and their firms, examines the survey data, and evaluates the dimensionality of the scale. The chapter is organised into five sections, with an introduction in Section 5.1. The results are then presented in three major sections:

- First, a demographic profile of the survey respondents and their firms is evaluated using frequency distribution and cross-tabulation analysis in Section 5.2. The statistics are used to discuss some basic behaviours of the surveyed SMEs in tackling supply risk. In addition, the descriptive statistics were used to assess the representativeness of the sample.
- Second, the data examination and preparation processes are discussed in Section 5.3. It includes assessment and handling of missing data, identification, assessment and tackling of outliers, verification of the normality assumptions of the data, and assessment of non-response bias.
- Finally, the dimensionality of the scale is verified using EFA, and reported the results in Section 5.4.

The chapter concludes with a summary in Section 5.5.

5.2 Data Evaluation

The survey questionnaire was distributed to 1,193 apparel-SMEs in the eight apparel-manufacturing SME clusters in Bangladesh. Altogether, 487 complete questionnaires were collected from the respondents with a response rate of 40.82 per cent comparable with that of other studies using the drop-and-collect method (Lovelock *et al*. 1976). Profiles of these 487 participants and their firms are evaluated in this section. A diagnosis of the profile of the respondents is useful for assessing the representativeness of the sample as it allows the comparison of the demographic profile of the respondents against the demographic profile of the populations of the study (Bhatnagar & Ghose 2004).

5.2.1 Profile of the Survey Respondents

This section investigates the demographic profile, which is summarised in Table 5.1, of the respondents of this study.

Table 5.1: Profile of the survey respondents

Characteristics	Frequency (n=487)	Percentage (%)
Position of the respondents		
Owner	351	72.1
Manager/operation manager	119	24.4
Director	17	3.5
Highest level of education		
Higher secondary	394	80.9
Diploma	37	7.6
Bachelor	38	7.8
Master's or above	18	3.7
Experience in the surveyed firm		
5 years or less	126	25.9
6–10 years	135	27.7
11–15 years	107	22.0
16 years or more	119	24.4
Experience in the apparel industry		
5 years or less	58	11.9
6–10 years	93	19.1
11–15 years	110	22.6
16 years or more	226	46.4

Position of the Respondents: Table 5.1 shows that the majority of the respondents (72.1 per cent) are the owners of the firms, while approximately one-quarter (24.4 per cent) are the manager/operation managers of the firm followed by directors at 3.5 per cent. Further investigation shown in Table 5.2, reveals that most of the respondents (82.4 per cent or 14 out of 17) who reported themselves as the directors come from medium enterprises, while none of them come from micro enterprises. This is because smaller firms are mainly operated by owners and they do not have such positions as directors.

Table 5.2: Cross-tabulation of position of the survey respondents and size of the firms

Position of the respondents	Number of employees			Total
	24 or less (Micro)	25 to 99 (Small)	100 to 250 (Medium)	
Owner	281	54	16	351
Manager/operation manager	89	18	12	119
Director	0	3	14	17
Total	370	75	42	487

Highest Level of Education of the Respondent: Table 5.1 demonstrates that the highest level of education of more than four-fifths of the respondents is higher secondary, equivalent to 12 years of education. A recent report (McKenzie & Woodruff 2015) published by the World Bank group also finds that the average amount of time that the SME owners in Bangladesh spent in education is approximately 10 years. Only 3.7 per cent of the survey respondents of this study have master's or higher educational qualifications, while 7.6 per cent have a work-related diploma and another 7.8 per cent have a bachelor's degree.

Experience of the Respondents in the Surveyed Firms: The experience levels of the respondents of the surveyed firms, as shown in Table 5.1, are almost equally distributed among the four categories. The largest category (27.7 per cent) represents those respondents who have been working at their current SME for 6–10 years, while the lowest category (22 per cent) denotes the respondents who have been managing the surveyed firms for 11–15 years. Analysis

also reveals that 24.4 per cent of the respondents have been working in the surveyed organisations over 16 years, while another 25.9 per cent of the respondents have been managing at the current firms for five years or less.

Experience of the Respondents in the Apparel Industry: Table 5.1 shows that the respondents have vast experience in the apparel industry. Sixty-nine per cent of the respondents have 11 or more years of operational experience in the apparel industry and another 19.1 per cent have between six and ten years' experience. The findings denote that some of the respondents have previously worked in other organisations as they have more years of experience in the industry than they do at their current firm. This suggests that some respondents might have started their own ventures upon gaining experience in other firms in the same industry, and are now managing their current firms (Terjesen & Sullivan 2011). This also suggests that some of them might have switched from other firms in the same industry to their current firms.

Summarising the discussion above, the majority of the surveyed respondents are the owners of their firms and they manage their sourcing activities themselves. They have limited education, with higher secondary at most for more than four-fifths of the respondents. However, most respondents have a long history of experience in both the surveyed firms and the apparel industry.

5.2.2 Profile of the Surveyed SMEs

Table 5.3 displays the profile of the surveyed SMEs in terms of age (years of establishment) of the firm, number of employees working in the firm, annual sales of the firm in BDT, and the selling market.

Age of Firms: The ages of the surveyed SMEs are diverse and almost equally distributed in the four categories. The highest numbers of respondents (27.7 per cent) come from the firms that have been operating for 16 years or more, while the lowest (23.2 per cent) are from the organisations that have been operating for 11–15 years. However, the differences across the different groups are minimal.

Table 5.3: Demographic profile of the surveyed SMEs

Characteristics	Frequency (n=487)	Percentage (%)
Age of firms		
5 years or less	117	24.0
6–10 years	122	25.1
11–15 years	113	23.2
16 years or more	135	27.7
Employee number		
10 or less	262	53.8
11–24	108	22.2
25–99	75	15.4
100–250	42	8.6
Annual sales (BDT millions)		
Less than 5	350	71.9
5–50	61	12.5
50–100	48	9.9
100 or more	28	5.7
Selling market		
Domestic	393	80.7
International	50	10.3
Both	44	9.0

Employee Numbers: Table 5.3 shows that the majority (53.8 per cent) of the surveyed firms have less than ten employees, and another 22.2 per cent of the respondents come from firms with 11 to 24 employees. Altogether, 76 per cent of the survey firms have less than 25 employees, which are micro firms according to the definition of the Ministry of Industry, Government of Bangladesh. Another 15.4 per cent of the respondents come from small firms with 25 to 99 employees, and 8.6 per cent are from medium enterprises with 100 to 250 employees. The Bangladesh SME Foundation (2013) reports that in Bangladesh around 80 per cent of the SMEs are micro enterprises, 15 per cent are small enterprises and five per cent are

medium enterprises. Hence, the distributions of the surveyed firms of this study closely align with the population distributions, suggesting that the collected sample is representative of the population.

Annual Sales: As shown in Table 5.3, the majority (71.9 per cent) of the respondents come from firms with an annual sales of less than BDT 5 million while only 5.7 per cent are from firms with more than BDT 100 million in annual sales. The rest of the respondents (22.4 per cent) come from firms with 5 to 100 million BDT in yearly sales.

Selling Market: Table 5.3 shows that over 80 per cent of the sampled SMEs only sell their products in the domestic market, while 10.3 per cent sell their products in the international market and 9 per cent sell in both domestic and international markets. The findings align with the results of the survey conducted by the Bangladesh SME Foundation (2013), which reveals that around 90 per cent of the SMEs sell their products in the domestic markets.

Summarising the discussion above, the surveyed firms have a diverse range of ages of operation and most of them sell their products in the domestic market. The distribution of micro, small and medium enterprises of the surveyed firms aligns with the population distribution, suggesting minimum bias in the sample selection.

5.2.3 Sourcing Strategies of the Surveyed SMEs

This section provides an overview of the sourcing strategies of the surveyed firms in terms of number of suppliers, sourcing market and use of contract, which are summarised in Table 5.4.

Number of Suppliers: Table 5.4 shows that 72.3 per cent of the sample firms depend on a single supplier for the procurement of critical material, while another 17.5 per cent of SMEs adopt the dual sourcing strategy, and only 10.2 per cent of firms go for the multi-sourcing (three or more suppliers) strategy. SMEs are mostly limited to a single-supplier strategy in sourcing

of critical materials because they find it difficult to manage many suppliers at the same time (Falkner & Hiebl 2015). Moreover, by using a single-supplier strategy, SMEs hope to gain better bargaining power, and thus, a reduced price of material as their total volume of purchase remains undivided (Ellegaard 2008; Thun, Drüke & Hoenig 2011).

Table 5.4: Sourcing strategies of the surveyed SMEs

Characteristics	Frequency (n=487)	Percentage (%)
Number of suppliers		
1 Supplier	352	72.3
2 Suppliers	85	17.5
3 Suppliers	30	6.1
4 Suppliers	17	3.5
5 Suppliers	2	0.4
6 Suppliers	1	0.2
Sourcing market of critical material		
Domestic	437	89.7
International	9	1.8
Both	41	8.4
Use of formal contract		
Never	425	87.3
Sometimes	44	9.0
Always	18	3.7

Sourcing Market: Table 5.4 shows that around 90 per cent of the sampled SMEs source from the local market. Only 1.8 per cent of the sampled SMEs procure the critical material from the international market and 8.4 per cent source from both home and abroad. Abdin (2018) also reports similar findings, mentioning that Bangladeshi apparel-manufacturing SMEs source their material from local traders/importers because of their resource deficiencies. Moreover, SMEs find it easier to manage the sourcing activities and to communicate with the key suppliers when they source the material from local suppliers (Nguyen & Enderwick 2016; Sonobe, Hu & Otsuka 2002). A further investigation through a cross-tabulation (Table 5.5) reveals that the SMEs who source solely from the international market depend on a single-sourcing strategy. SMEs who source from both the domestic and the foreign market have at least two suppliers, as expected.

Table 5.5: Cross-tabulation of sourcing market and number of suppliers

Number of suppliers	Sourcing market of material			Total
	Domestic	International	Both	
Single	343	9	0	352
Dual	69	0	16	85
Multi	25	0	25	50
Total	437	9	41	487

Use of Formal Contract: Table 5.4 shows that most of the sampled SMEs (87.3 per cent) do not employ a contract during the sourcing of materials. This implies that in this study, SMEs do not use formal contracts as a supply risk mitigation strategy, although using contracts could serve to limit the losses (Hallikas & Lintukangas 2015). Ellegaard (2008) also finds that SMEs do not use formal contracts in the procurement of materials because SMEs perceive contract preparation as consuming too much time and resources. Moreover, professionals working in the SMEs do not have sufficient skills to prepare and use formal contracts when sourcing materials (Faisal, Banwet & Shankar 2007b). In addition, SMEs have a lack of trust on the potential benefits of formal contracts (Shi, Shepherd & Schmidts 2015).

As shown in Table 5.4, only 3.7 per cent of the sampled companies always use formal contracts, and 9 per cent only occasionally use contracts when sourcing materials. A cross-tabulation (Table 5.6) with sourcing markets and use of formal contracts in buying materials finds that over 80 per cent of firms (50 out of 62) that use formal contracts (either sometimes or always), procure (either fully or partially) their materials from international markets. Only 2.7 per cent (12 out of 437) of SMEs that source solely from domestic market use formal contracts, either sometimes or always.

Table 5.6: Cross-tabulation of the use of formal contracts and sourcing markets

Sourcing market of material	Use of formal contract in buying material			Total
	Never	Sometimes	Always	
Domestic	425	11	1	437
International	0	0	9	9
Both	0	33	8	41
Total	425	44	18	487

Summarising the discussion above, the SMEs mostly depend on single-sourcing strategies and most of them do not use formal contracts in the procurement of materials. The majority of SMEs procure their materials from the domestic market. However, the SMEs that source material internationally use formal contracts in procurement.

5.3 Data Examination

At this stage, collected data for all the items of the constructs were examined thoroughly to ensure that the data are usable for investigating the hypotheses of this study (Tabachnick & Fidell 2007). Initially, missing data were identified and handled; then outliers were identified, assessed and treated. Next, normality assumptions of the survey data were verified, and finally, non-response bias assumption of the survey data was tested.

5.3.1 Missing Data

Missing data is one of the most common problems in a survey research (Dillman 2000; Tabachnick & Fidell 2007). Missing data can result from non-responses by the respondents or mistakes in data entry (Little & Rubin 1989). In this research, a total of 501 questionnaires were collected from the survey respondents. Through frequency distribution analysis, it has been revealed that 14 out of the 501 cases were incomplete. First, the questionnaires of these 14 cases were checked to determine if the missing values were errors in data entry. As no mistakes were found in data entry, all of them resulted from non-responses by the respondents.

There are several options, as shown in Table 5.7, for dealing with missing data (Schumacker & Lomax 2010). Selection of a technique depends on the extent of the missing value in an incomplete case (Hair *et al.* 2010), the extent of the missing data in the dataset (Hair *et al.* 2010; Tabachnick & Fidell 2007), and the characteristics of the missing data (Tabachnick & Fidell 2007).

Table 5.7: Options for dealing with missing data

Category	Options	Explanations
Deletion	Case-wise/List-wise	Deleting cases with missing data on any variable
	Pair-wise	Deleting cases with missing data on each pair of variables used
Estimation	Mean substitution	Replace the mean of a variable for the missing value
	Regression imputation	Replace a predicted value of a variable for the missing value
	Expectation maximisation	Reveal and replace an expected value based on expectation maximisation algorithm
	Matching response pattern	Determine a missing value by matching subjects with incomplete data to subjects with complete data

Source: Adopted from Schumacker and Lomax (2010)

Any one of the above techniques can be used for handling missing data if only a few cases have missing values (Hair *et al.* 2010; Tabachnick & Fidell 2007). Although there has been a debate in determining the percentage for specifying a few cases – for example Tabachnick and Fidell (2007) mention 5 per cent or less while Hair *et al.* (2010) mention 15 per cent or less, all of the authors agree that any technique of handling missing values would produce similar results if the missing cases are 5 per cent or less (Schumacker & Lomax 2010). As this study has only 14 incomplete cases out of 501, missing values for each variable is 2.8 per cent or less, which implies that any method of tackling missing values would produce similar results. Wooldridge (2009) mentions that if a particular case has missing responses for the dependent variable(s), the best strategy is to delete the case to avoid any artificial increase in associations with independent variables. In this research, all of the 14 incomplete cases with missing data have

missing values of the dependent constructs – operational performance and supply risk. Therefore, all the 14 cases were deleted from the dataset as suggested. As a result, the final number of valid observations becomes 487, which is more than the initial targeted sample size of 300. Table 5.8 summarises the reasons for adopting the case-wise deletion technique in this research, and the rules of thumb, provided by Hair *et al.* (2010), for adopting the case-wise deletion to handle missing values.

Table 5.8: Rules and reasons for adopting case-wise deletion in this research

Serial number	Rules of thumb	Reasons of adopting the technique in this research
Rule-1	Cases as little as 15%	Only 2.8% cases have missing values
Rule-2	Cases with missing data for dependent variable(s)	Cases with missing data have the missing value for the dependent construct
Rule-3	Deletion of cases does not create problem with minimum sample size requirement	After deleting the incomplete cases, valid observations have become 487, which is higher than the initial targeted sample size of 300

Source: Adapted from Hair *et al.* (2010)

After deleting the cases with incomplete responses, the minimum and maximum values of all the items of the 487 completely filled cases were checked through frequency distribution. The result of the frequency distribution statistics shows that the values of all the items are within the range of 1 to 7, which aligns with the seven-point scale used to measure the items of this study. Therefore, all the data are retained for further screening.

5.3.2 Outliers

An outlier is a case which is distinctly different from the other cases on one or more features (Hair *et al.* 2010). Since outliers could distort statistics and cause errors in fitting the model, identification and proper handling of outliers is necessary in survey-based empirical studies (Gallagher, Ting & Palmer 2008; Zhang & Shaw 2012). The following three sub-sections, therefore, identify, assess and handle the outliers before using the data for further analysis.

Figure 5.1 shows the steps, suggested by Aguinis, Gottfredson and Joo (2013), used in this study to address the outliers.

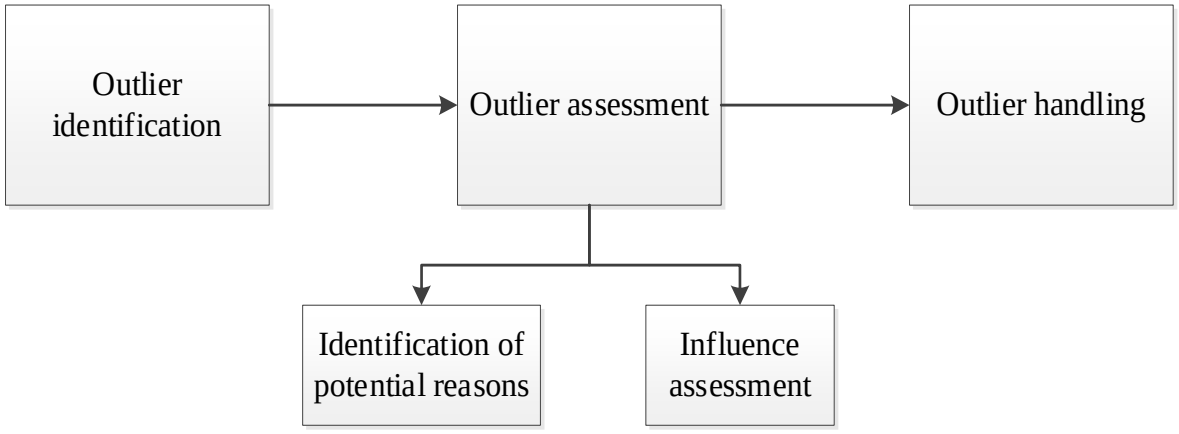


Figure 5.1: Outlier analysis process

5.3.2.1 Outlier Identification

Outliers can be identified from a number of perspectives, such as univariate, bivariate, or multivariate perspectives depending on the number of variables considered (Gallagher, Ting & Palmer 2008). While univariate and bivariate perspectives identify the cases with extreme values on one variable and the combination of scores on two variables respectively, a multivariate perspective detects outliers based on the distributions of each observation across a set of variables (Hair *et al.* 2010). Since this study is expected to use SEM for analysing the data, a multivariate test for outlier detection was adopted (Wieland & Wallenburg 2013). Moreover, a multivariate perspective is considered as a more stringent procedure for detecting outliers since it can detect an outlier based on the pattern of the scores even without having an extreme score on an individual variable (Kline 2015).

Although there are a number of multivariate outlier detection techniques, calculation of the squared Mahalanobis Distance (D^2) for each observation was used in this study since it is

widely used in prior research (Byrne 2010; Osborne & Overbay 2004). Moreover, most of these multivariate outlier detection techniques produce the same result, although they are based on different scales (Aguinis, Gottfredson & Joo 2013). The Mahalanobis Distance is 'the distance of a case from a distance from the centroid of the remaining cases where the centroid is the point created at the intersection of the means of all the variables' (Tabachnick & Fidell 2001, p. 68). Typically, a multivariate outlying case carries a D^2 value that stands substantially apart from that of all other cases (Byrne 2010). In order to detect the outlying cases, this study has evaluated D^2 of each observation using chi-square (χ^2) distribution with a *p*-value of less than 0.001 and the degree of freedom (DF) equal to the number of independent variables (Gallagher, Ting & Palmer 2008; Tabachnick & Fidell 2007). Any case that obtained a D^2 value greater than the critical χ^2 value was considered as an outlier (Tabachnick & Fidell 2007). Table 5.9 shows the critical χ^2 values with $p<0.001$ at different DFs.

Table 5.9: Critical value of chi-square distribution

Degree of Freedom (Number of independent variables)	Critical value at 0.001 Level of Significance
9	27.88
10	29.59
11	31.27
12	32.91
13	34.53

Source: Pearson and Hartely (1996)

Since this study has 12 first-order independent factors (three buyer–supplier social capital factors, three cluster social capital factors, four supplier integration factors, cluster cooperation and supply risk), a χ^2 value of 32.91 was used to evaluate the D^2 of each case. The analysis detected nine outlying cases in which the D^2 values are greater than the critical χ^2 value at *p*-value < 0.001 and DF = 12. The results of D^2 of these nine outlying cases are presented in Table 5.10.

Table 5.10: Multivariate outliers

Cases	Squared Mahalanobis Distance (D^2)	Cut-off value
91	44.87	
190	40.89	
401	38.43	
423	35.82	
33	35.38	<= 32.91
331	35.09	
309	35.02	
207	34.38	
247	33.79	

5.3.2.2 Outlier Assessment

Outlier assessment includes two basic steps: identifying the potential reasons for outliers and checking the influence of the outliers on the outcome variable (Aguinis, Gottfredson & Joo 2013). Tabachnick and Fidell (2001) mention four main reasons for the presence of one or more outliers, namely (1) entering incorrect data, (2) collecting data from outside the intended population, (3) including the missing value codes as real data, and (4) the existence of observations that provide a unique combination of values across the variables. All the responses of these outlying cases were double checked with the original paper version of the questionnaire. Since no mistakes were found in data entry the first reason – incorrect data entry – is not the potential cause for the presence of the outlying cases in this study. Moreover, the demographic questions of these cases were checked, which confirms that all of these outlying cases are members of the intended populations. Therefore, the second reason, collecting data from outside the intended population, is also not the potential cause of the presence of outlying cases in this study. Outlying cases did not also occur due to the third reason, including the missing value codes as real data, since all the missing cases were deleted prior to checking the D^2 and no missing code was used in this study. Therefore, the fourth reason, the existence of observations that provide a unique combination of values across the variables, could be a potential reason for the presence of outliers in this study.

In such a situation, a number of studies (e.g. Aguinis, Gottfredson & Joo 2013; Osborne & Overbay 2004; Tabachnick & Fidell 2007) have recommended checking the influence of an outlying case on the outcome variable before deciding how to handle it. Although there are a number of outlier assessment techniques recommended in the extant literature, such as Cook's distance (D_i), Difference in fits, standardised (DFFITSi), Difference in beta, standardised (DFBETASij), etc. (see Aguinis, Gottfredson and Joo (2013) for the full list), this study used Cook's distance (D_i) for assessing outlying cases for a couple of reasons. D_i can assess the influence of a data point on all regression coefficients as a whole (Aguinis, Gottfredson & Joo 2013); also, it is widely used in previous studies for assessing the outlying cases (Osborne & Overbay 2004). Any case with the D_i score larger than 1.00 (D_i >1.00) is considered as an influential outlier (Tabachnick & Fidell 2007). An influential outlier is defined as an "outlier whose presence affects the parameter estimates of the model" (Aguinis, Gottfredson & Joo 2013, p. 275). The results of the D_i of the outlying cases are presented in Table 5.11.

Table 5.11: Influence assessment of outlying cases

Cases	Cook's Distance (D^2)	Cut-off value
91	0.05	
190	0.06	
401	0.02	
423	0.02	
33	0.01	<=1
331	0.06	
309	0.11	
207	0.02	
247	0.05	

5.3.2.3 Outlier Handling

After the outliers are identified and assessed, the decision needs to be made whether to retain or delete the outlying cases (Hair *et al.* 2010). In general, it is recommended that the outlying cases are retained in order to ensure the generalisability of the findings; unless the cases are not members of the intended population and they have a significant influence on the outcome

variable with D_i >1.00 (Tabachnick & Fidell 2007). All the outlying cases of this study obtained a D_i score of much less than the suggested score of 1.00, with the highest value being just 0.11, as presented in Table 5.11. This implies that none of the outlying case of these study is individually influential enough to change the outcome variables. Moreover, all of these outlying cases are members of the target populations. Therefore, all the outlying cases are retained for further analysis.

5.3.3 Data Normality

Normality, which refers to the shape of the data distribution, is a fundamental assumption of many multivariate analyses, including SEM (Arbuckle 2016; Byrne 2010). A large deviation of the data from the normal distribution dampens the validity of all statistical results (Hair *et al.* 2010), unless appropriate remedies, such as Bootstrapping, are undertaken during the data analysis, or statistics are used that do not assume normal distribution (Byrne 2010; West, Finch & Curran 1995). Normality can be assessed through employing univariate or multivariate normality techniques (Looney 1995). Assessment and achievement of univariate normality is a must, as it is the prerequisite of assessing multivariate normality (Byrne 2010; DeCarlo 1997). Assessment and achievement of univariate normality for all the variables are also considered sufficient for large sample sizes, especially sample sizes larger than 200 since large sample sizes reduce the negative impacts of non-normality (Ghasemi & Zahediasl 2012). Given that this study obtained 487 usable responses, the study checked the univariate normality for all the measured variables of the conceptual framework.

Univariate normality can be measured using either statistical or graphical techniques. While the graphical method is appealing because of its simplicity, this study used the statistical method of assessing normality as the latter can provide more accurate interpretation of the results (Hopkins & Weeks 1990). A number of statistical tests, such as the eyeball test, the

Shapiro-Wilk test, the Kolmogorov-Smirnov test, and using skewness and kurtosis are available to assess the normality of the data. However, assessing normality though skewness and kurtosis is considered relatively more accurate irrespective of sample size, since the results of other approaches are unreliable for a larger sample size, especially sample sizes greater than 300 (Kim 2013). Hence, this study checked the normality of each measured variable using skewness and kurtosis.

Skewness indicates the symmetry around the mean of a distribution of values (George & Mallery 2016). If skewness is zero, it indicates the perfect balance of a distribution, while any deviation from zero represents the extent of departure of a distribution from the symmetry (Hair *et al.* 2010). Any positive skew indicates a left-shifted distribution, and the negative skew denotes a right-shifted distribution. While skewness informs the balance of a distribution, kurtosis indicates the height—peakedness or flatness—of a distribution. Similar to skewness when a distribution is perfectly normal, the kurtosis of a distribution is zero. On the other hand, a positive kurtosis value denotes that a distribution is peaked with short, thick tails, while a negative value indicates a flat distribution (Tabachnick & Fidell 2001). Although both skewness and kurtosis are zero when a distribution is perfectly normal, a slight departure from normality is not a concern, especially when the sample sizes are big (e.g. n > 200) (Hair *et al.* 2010). Both skewness and kurtosis values between -2 to +2 is considered acceptable for further analysis, including SEM (George & Mallery 2016; Kim 2013).

The results, as depicted in Table 5.12, indicate that both the skewness and kurtosis values of all the measurement items of this study are within the acceptable normality range. In fact, the skewness of all the measurement items are between + 1 and – 1, which is considered excellent for psychometric purposes (George & Mallery 2016). Since both the skewness and kurtosis values of all measurement items are within the acceptable range, and the sample sizes of this

study is 487, departure from normality is not a concern in this study. Therefore, all the measurement items are retained for further analysis.

Table 5.12: Skewness and kurtosis of all variables

Variables (Items)	Skewness	Kurtosis	Variables (Items)	Skewness	Kurtosis
BSSC1	-0.891	0.816	CRC1	-0.972	1.253
BSSC2	-0.323	**-0.472**	CRC2	-0.724	0.341
BSSC3	-0.704	0.383	CRC3	**-1.001**	0.742
BSSC4	-0.744	0.521	CRC4	-0.822	0.920
BSSC5	-0.764	0.542	CRC5	-0.854	0.939
BSRC1	-0.920	1.161	CRC6	-0.909	0.637
BSRC2	-0.843	0.660	CRC7	-0.843	0.518
BSRC3	-0.500	-0.002	CCC1	-0.757	0.924
BSRC4	-0.513	0.088	CCC2	-0.371	0.249
BSRC5	-0.452	0.116	CCC3	-0.862	0.648
BSRC6	-0.703	0.334	CCC4	-0.795	0.448
BSRC7	-0.616	0.493	CCC5	-0.745	0.180
BSCC1	-0.964	**1.561**	CCC6	-0.771	1.014
BSCC2	-0.602	0.388	CC1	-0.529	0.139
BSCC3	-0.855	0.763	CC2	-0.525	-0.266
BSCC4	-0.776	0.690	CC3	-0.678	0.120
IS1	-0.907	1.457	CC4	-0.362	-0.076
IS2	-0.860	1.103	CC5	-0.513	0.173
IS3	-0.839	1.067	CC6	-0.641	0.300
IS4	-0.496	0.441	SR1	0.750	0.473
RS1	-0.858	0.745	SR2	0.562	-0.189
RS2	-0.411	0.695	SR3	**0.816**	0.085
RS3	-0.705	0.234	SR4	0.664	0.738
SC1	-0.877	1.023	SR5	0.672	0.283
SC2	-0.402	-0.074	SR6	0.618	0.004
SC3	-0.494	-0.074	SR7	0.481	-0.183
SC4	-0.360	-0.215	OP1	-0.679	0.340
FS1	-0.493	0.124	OP2	-0.723	0.337
FS2	-0.753	0.670	OP3	-0.589	0.280
FS3	-0.447	-0.011	OP4	-0.786	0.185
FS4	-0.364	0.163	OP5	-0.683	0.411
CSC1	-0.456	0.188	OP6	-0.811	0.358
CSC2	-0.704	0.568	OP7	-0.186	0.282
CSC3	-0.878	0.389			
CSC4	-0.875	1.279			
CSC5	-0.567	0.080			
CSC6	-0.454	0.159			
CSC7	-0.810	0.486			

Valid N is 487 for all the cases

5.3.4 Non-response Bias

Non-response bias refers to the differences between the replies of the respondents and non-respondents (Lambert & Harrington 1990). Non-response bias is one of the major concerns in a survey research in any discipline, including operations management, as it can undermine the generalisability of the results to the entire population (Frohlich 2002; Hansen & Hurwitz 1946). Wagner and Kemmerling (2010) report, through an extensive review of the survey research published from 1998 to 2007, that there are mainly two types of non-responses: item non-response and unit non-response. Item non-response, which deals with the non-responses of one or more questions by a respondent, is not a concern in this study since cases that answered all the questions were only considered for the analysis. However, unit non-response, which deals with the non-responses from a targeted respondent of the sampling frame, was carefully checked in this study to avoid any kind of potential bias (Bartlett, Bartlett & Reio 2008; Dooley & Lindner 2003). Based on the suggestions of Armstrong and Overton (1977), non-response bias was first checked by comparing the respondents against the populations. Distributions of the respondents on the demographic questions were compared with the distributions of the populations on the same questions, where the population distributions were found in the literature. Since distributions of both sample respondents and populations are similar, as discussed in Section 5.2, non-response bias is not a concern in this study (Armstrong & Overton 1977; Bartlett, Bartlett & Reio 2008).

To further ensure that the data are free from any non-response bias, the two waves of responses were compared using χ^2 tests on the demographic questions and five higher-order independent variables of the structural model (Armstrong & Overton 1977). Responses that were received before the reminder were considered as early respondents (n = 331), and those received after the reminder letter were considered as late respondents (n = 156), who were also deemed as representative of the non-respondents (Collier & Bienstock 2007; Wagner & Kemmerling

2010). The results of the χ^2 tests, shown in Table 5.13, are all non-significant, with *p*-values greater than 0.05 for the demographic questions and the five independent variables of the structural model. These results re-confirm that non-response bias is not a problem in this study.

Table 5.13: Results of non-response bias

Aspects	Variables	*p*-value
Key demographic variables	Age of firms	0.21
	Number of employees	0.19
	Annual sales	0.38
	Selling market	0.12
	Experience of respondents in the surveyed firms	0.12
	Experience of respondents in the apparel industry	0.24
Independent variables	Buyer–supplier social capital	0.44
	Cluster social capital	0.51
	Supplier integration	0.30
	Cluster cooperation	0.32
	Supply risk	0.55

5.4 Dimensionality Assessment

Assessment of dimensionality is one of the essential requirements for building a summated scale (Straub, Boudreau & Gefen 2004). Dimensionality assesses whether a set of items reflects one or more underlying concepts (Clark & Watson 1995). It assists in understanding the structure of a set of measurement items. A number of studies (for example, Straub, Boudreau and Gefen (2004) and Venkatraman (1989)) suggest to the use the EFA to establish the dimensionality for each of the theoretical constructs. In addition to checking dimensionality, EFA allows researchers to refine measures (Conway & Huffcutt 2003). As a result, EFA is the most widely used tool for checking the dimensionality of the instrument and refining the measures (Conway & Huffcutt 2003; Ruscio & Roche 2012). Following the suggestions of previous researchers, EFA was also used in this study to assess the dimensionality of the scales and to refine the measures.

A basic assumption of an EFA is that 'underlying structure does exist in the set of selected variables' (Hair *et al.* 2010, p. 101). The existence of statistical correlations among the measures does not guarantee that the observed patterns or structures are theoretically valid and appropriate for the study. Therefore, Straub, Boudreau and Gefen (2004) recommend using EFA separately for each group of variables that reflect same theoretical construct. Moreover, it is inappropriate to use the derived factor structures when both the dependent and independent variables are used in a factor analysis (Hair *et al.* 2010). This study, therefore, runs the EFA separately for six higher-order theoretical constructs, as shown in the conceptual framework of the study in Chapter 2 (Page 52). Since EFA is a sequential and linear statistical analysis, this study follows a five-step EFA protocol (Figure 5.2), as suggested by Williams, Onsman and Brown (2010, p. 4), for reducing potential oversights.

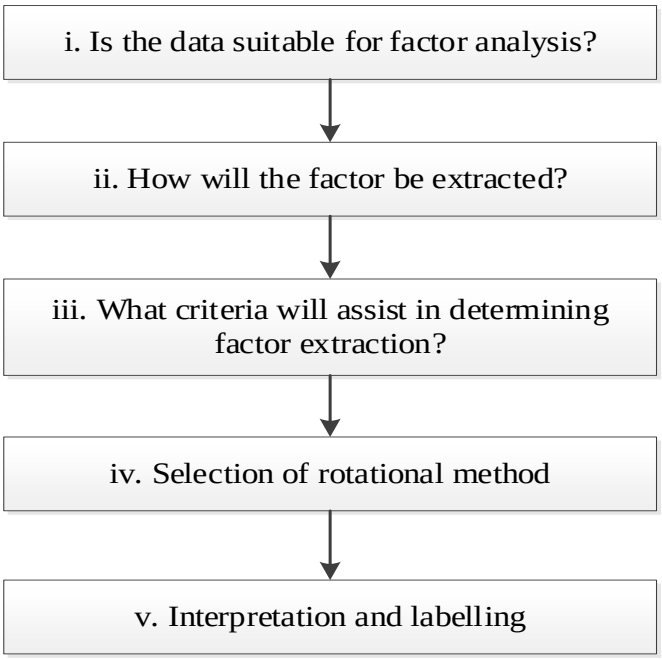


Figure 5.2: A five-step guide of EFA

Source: Williams, Onsman and Brown (2010, p. 4)

i. This study first assesses the factorability of the data. Factorability is the assumption that the variables are correlated with each other, so that coherent factors can be identified

(Williams, Onsman & Brown 2010). Since factor analysis always derives factors, the objective is to ensure a base level of statistical correlation amongst the set of variables (Conway & Huffcutt 2003). The study uses the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMOMSA) statistic, and Bartlett's Test of Sphericity (BTS) to assess the factorability of the data (Williams, Onsman & Brown 2010). A KMOMSA statistic, which indicates homogeneity among the variables, ranges from 0 to 1. A value of over 0.5 supports the factorability of the data (Ferguson & Cox 1993); however, a KMOMSA value between 0.9 to 1 is considered to be extremely supportive of the factorability (Kaiser & Rice 1974). A statistically significant BTS score ($p < 0.05$), which indicates significant correlation among the variables, is also required for supporting the factorability of the data. The results, as depicted in Table 5.14, show that the KMOMSA statistics are more than 0.9 and the BTS scores are significant ($p < 0.000$) for all the theoretical constructs. These results suggest that the condition of factorability of the data is met (Tabachnick & Fidell 2007). In addition to the KMOMSA statistic and BTS score, a minimum sample size of 300 with an cases-to-variables ratio of 10:1 is required for the factor analysis (Hair *et al.* 2010; Tabachnick & Fidell 2001). Since this study has 487 valid responses and the cases-to-variables ratio ranges from 24:1 to 81:1 for the different theoretical constructs, the condition of factorability of the data is further satisfied.

Table 5.14: Results of factorability assessment of the data

Constructs	No of items	KMOMSA	BTOS (*p*-value)	Cases-to-variables ratio	Comment
Buyer–supplier social capital	16	0.939	0.000	30:1	EFA supported
Supplier integration	15	0.928	0.000	32:1	EFA supported
Cluster social capital	20	0.960	0.000	24:1	EFA supported
Cluster cooperation	6	0.917	0.000	81:1	EFA supported
Supply risk	7	0.944	0.000	70:1	EFA supported
Operational performance	7	0.938	0.000	70:1	EFA supported

Upon satisfying the condition of factorability of the data, the following rules were established for other steps of EFA, as shown in Figure 5.2:

ii. A number of factor-extraction methods, such as principal components analysis, principal factors, maximum likelihood factoring, generalised least square, etc. (see Tabachnick and Fidell (2001) for the full list), are available in the literature. This study used the maximum likelihood (ML) method, originally developed by D.N. Lawley in 1940 (Tucker & Lewis 1973), for factor-extraction since the ML method is considered as the best factor-extraction technique when the data are normally distributed (e.g. skewness and kurtosis < 2) (Costello & Osborne 2005). Moreover, ML will assist in ensuring consistency with the next phase of the analysis as ML estimation will be used in the CFA (Swisher, Beckstead & Bebeau 2004).

iii. Similar to factor-extraction methods, numerous criteria are used in the literature to decide the number of factors, such as Kaiser's criterion (Eigenvalue > 1, or larger value without specifying the cut-off), the Scree test, the percentage of variance accounted for, etc. (see Conway and Huffcutt (2003) for the full list of criteria). Deciding the optimal number of factors is crucial since the fit index and the cumulative percentage of variance explained increase with the number of factors, while the parsimony of the solution decreases with the numbers (Tabachnick & Fidell 2001). Considering the importance of deciding the optimal number of factors, Williams, Onsman and Brown (2010) recommend the use of multiple criteria in selecting the number of factors. This study used three criteria, i.e. Kaiser's criterion (Eigenvalues > 1.0), the Scree test, and the total percentage of cumulative variance explained (minimum 60 per cent) in deciding the number of factors (Costello & Osborne 2005; Hair *et al.* 2010).

iv. The next consideration in EFA is the selection of the rotation method. Selecting the appropriate rotation technique improves the simplicity and clarity of the data structure by maximising the high-item loading and minimising the low-item loading (Costello & Osborne 2005; Williams, Onsman & Brown 2010). The two main types of rotation techniques are orthogonal and oblique rotation. While orthogonal rotations produce uncorrelated factors, oblique rotations allow factors to correlate (Tabachnick & Fidell 2001). Since the factors of this study, such as the three dimensions of social capital, are expected to correlate with each other, promax rotation (an oblique rotation approach), was applied (Hendrickson & White 1964).

v. The final decision when deciding and interpreting the factors in EFA is the minimum factor loading to assign a variable to a factor. Hair *et al.* (2010) report that any factor loading of ± 0.5 or above is statistically significant. This study also decided the minimum factor loading of an item as ±0.5, and retained variables for further analysis with a factor loading of ± 0.5 or above.

The results of six EFA models are shown in Appendix D (i–vii). The results, as summarised in Table 5.15 show that both the buyer–supplier social capital and the cluster social capital produced a three-factor solution with Eigenvalues greater than 1.0 from the factor analysis. The buyer–supplier social capital model explains 64.12 per cent of the total variance and the cluster social capital model accounts for 66.62 per cent of the total variance, which is more than the minimum cumulative variance (60 per cent) suggested by Hair *et al.* (2010). Moreover, the results of the Scree test were also checked, which confirm that no more than three factors could be retained for both buyer–supplier social capital and cluster social capital constructs (Costello & Osborne 2005). These three sub-dimensions of social capital were named as structural, relational and cognitive capital, as suggested in the Social Capital Theory and by previous studies. Using the Kaiser's Eigenvalue criterion and Scree test, the supplier integration model

produced a four-factor solution that explains 63.27 per cent of the total cumulative variance. These four factors were termed as information sharing, resource sharing, supplier collaboration and flexible sourcing, as recommended in the extant literature. Each of the other three models – cluster cooperation, supply risk and operational performance – produced a one-factor solution. All of these EFA solutions explain more than 60 per cent of the cumulative variance – cluster cooperation explains 60.46 per cent, supply risk explains 66.14 per cent, and operational performance explains 66.16 per cent.

During the process of assessing the dimensionality through EFA, one item was deleted from the cluster social capital (CSC) model. The item – the interaction between the personnel across different functions (CSC4) – obtained a very poor factor loading score (0.309), while any loading less than ± 0.50 is considered statistically insignificant. Moreover any loading less than ± 0.32 is unacceptable to allocate an item to a factor (Costello & Osborne 2005; Tabachnick & Fidell 2001). The results of the inter-rater agreement analysis were also carefully checked before deleting the items. The results (Table 4.10) showed that the power of this item was the lowest (0.82) and different (all others are > 0.90) from that of the other six items of the construct (cluster structural capital), suggesting that deletion of this item would not affect the content validity of the construct (Epstein *et al.* 1999; Haynes, Richard & Kubany 1995). Moreover, SMEs are normally operated by the owners and they do not have formal functional departments, such as marketing departments or logistics departments (Bah & Cooper 2015), which implies that this item is not essential for measuring the cluster structural capital in the context of SMEs.

Table 5.15: Summary of the EFA results

Construct	Factors generated	Total variance explained	Item(s) drops in EFA	Reasons for drops
Buyer–supplier social capital	3	64.12%	0	NA
Supplier integration	4	63.27%	0	NA
Cluster social capital (First iteration)	3	65.01%	0	NA
Cluster social capital (second iteration)	3	66.62%	1	a) Factor loading < 0.50 b) Cross-loading
Cluster cooperation	1	60.46%	0	NA
Supply risk	1	66.14%	0	NA
Operational performance	1	66.16%	0	NA

5.5 Summary

This chapter presented the results of the data evaluation, examination, and dimensionality assessment of the scale. First, the chapter evaluated the demographic profile of the survey respondents and their firms through descriptive statistics and cross-tabulation in order to ensure that the data truly represent the population. Then the collected data were examined through dealing with the missing values, assessing and handling the outliers, verifying the normality, and checking the non-response bias. Finally, the chapter assessed the dimensionality of the scale. The following key conclusions are made from the results of this chapter:

- Distributions of the sample respondents and populations on key demographic variables are similar, suggesting that the sample respondents are true representatives of the population.
- SMEs mostly depend on single sourcing and do not use formal contracts in sourcing their materials. As a result, supply risk might have a higher impact on the operational performance of SMEs.
- A total of 487 valid observations were collected from the sample respondents. These cases are free from missing values, influential outliers and non-response bias.

Moreover, the data do not violate the normality distributions, which confirm that the ML estimation can be used to analyse the data in SEM.

- The results of EFA showed that three constructs of the structural model – buyer–supplier social capital, cluster social capital and supplier integration – are multi-dimensional. While each of both buyer–supplier social capital and cluster social capital produced a three-factor solution, supplier integration produced a four-factor solution. On the other hand, the other three constructs – cluster cooperation, supply risk and operational performance – of the structural model are uni-dimensional, as each of them produced a one-factor solution.

The next chapter reports on the required validity and reliability of the scale and the model of this study. The chapter also reports the results of the hypotheses testing to answer the research questions.

CHAPTER SIX
MODEL VALIDATION AND FINDINGS

6.1 Introduction

This chapter presents the results of the data analysis procedures followed to ensure the validity and reliability of the scale and the structural model of this study. The chapter also presents the core findings to address the research hypotheses of this study. The chapter is organised into seven sections, with an introduction in Section 6.1. Then the results of the data analysis are presented in five major sections:

- First, the study presents the results of the scale validity in Section 6.2. The study conducts several essential and well-recognised scale validity tests, such as assessment of convergent, discriminant, nomological and factorial validities to ensure that the scale actually measures what it is purporting to measure.
- Second, the study examines the scale reliability to confirm the internal consistency of the set of indicators of the latent construct, and reports the reliability indices in Section 6.3.
- Third, the results of the common method bias tests are presented in Section 6.4. The study assesses common method bias in the collected data to ensure that the variance of the scale is attributable to the constructs it represents rather than to the measurement method.
- Fourth, the study assesses the structural model to confirm that the model is robust, and it explains the data well. The findings of the structural model assessment are presented in Section 6.5.
- Finally, the results of the hypotheses testing are reported in Section 6.6. This section examines both the direct and the mediation hypotheses to answer the research questions of this study, before a summary of the chapter is provided in Section 6.7.

6.2 Assessment of Scale Validity

Scale validity refers to how well a set of measures represents the intended concepts (Hair *et al.* 2010). Scale validity stage involves a number of vital validity tests that strengthen the inference of the statistical findings (DeVellis 2003). The initial content validity of the scale was established and reported in Chapter 4, the factorability of the data was supported and the dimensionality of the scale was assessed using EFA and reported in Chapter 5. Then CFA using AMOS (v.24) was employed to assess the convergent, discriminant, nomological and factorial validity of the scale (Byrne 2010; Lewis, Templeton & Byrd 2005; Peter 1981).

6.2.1 Convergent Validity Assessment

Convergent validity measures whether a set of indicators that represent the same latent construct agree with one another (Campbell & Fiske 1959). Bagozzi, Yi and Phillips (1991) recommend using CFA for measuring the convergent validity since a CFA model makes fewer assumptions while providing more diagnostic information than other approaches, such as Campbell and Fiske's multitrade-multimethod matrix, variance analysis and EFA. This study also used CFA to assess the convergent validity of the scale. A number of diagnostic information was used from the CFA model to verify how well the convergent validity of the scale was achieved. First, goodness-of-fit (GOF) indices were checked for all the first-order and second-order constructs (Bagozzi, Yi & Phillips 1991). A construct with sufficient convergent validity achieves the critical GOF. Then standardised factor loadings (SFL) of all items of the constructs was checked to verify the convergent validity (Lewis, Templeton & Byrd 2005). Hair *et al.* (2010, p. 605) report that SFL of all the items of a construct 'should be more than 0.5, and ideally 0.7 or higher' when the construct shows convergent validity. Finally, the average variance extracted (AVE) of all the first-order and second-order constructs were assessed to further confirm the convergent validity of the constructs (Mackenzie, Podsakoff &

Podsakoff 2011). An AVE greater than 0.5 provides the sufficient convergence of the construct since it means that the latent factor accounts for, on average, a majority of the variance in its measures (Straub, Boudreau & Gefen 2004). Since one of the diagnostic information categories of convergent validity is GOF indices, the following paragraphs first discuss the GOF indices used in this research before reporting the result of CFA model.

Goodness-of Fit Indices: One of the key questions when conducting SEM is that whether the specified model is a good model or not (Tabachnick & Fidell 2001). While a good model fit improves the validity of the result, a poor model fit indicates a low correspondence between the specified model and the sample data (Byrne 2010). In SEM, there exist a number of GOF indices, which assess how well the observed covariance matrix among the measured variables is reproduced by the specified model (Hair *et al.* 2010). Although there has been no consensus in the literature regarding which GOF indices should be reported, Hu and Bentler (1998) suggest the consideration of factors such as the effect of sample size, the effect of the estimation method and the sensitivity of an index to model misspecification in deciding the appropriate GOF indices. The authors recommend the use of root mean square error of approximation (RMSEA), standardised root mean square residual (SRMR), comparative fit index (CFI) and Tucker-Lewis index (TLI) when the ML estimation method is used. In addition to the above four GOF indices, Kline (2015) recommends to report the chi-square (χ^2) of the model with the DF and *p*-value. Although a non-significant *p*-value ($p > 0.05$) is desirable for the model, a significant *p*-value is often produced when the sample size is large (i.e. more than 300) and the model is complex (i.e. more than 12 observed variables) (Hair *et al.* 2010). As an alternative option Tabachnick and Fidell (2007) recommend the use of the chi-square normalised by degree of freedom (CMIN/DF), also known as normed χ^2, of which any value of 2 or less is associated with a good-fitting model. Following all these suggestions, the GOF indices used in this study and their respective meaning and cut-off value are presented in Table 6.1.

Table 6.1: Goodness-of-fit indices, their meaning and cut-off value

GOF Indices	Meaning	Threshold	References
Chi-Square	The differences in the sample and fitted covariance matrices	$p > 0.05$	Kline (2015)
Normed Chi-Square	Ratio between chi-square and degree and freedom	≤ 2	Tabachnick and Fidell (2007)
Root mean square error of approximation	A badness-of-fit index assessing discrepancy between the estimated model the population covariance matrix.	< 0.06	Hooper, Coughlan and Mullen (2008); Hu and Bentler (1998)
Standardised Root Mean Square Residual	Another badness-of-fit index showing standardised difference between the observed the predicted correlation	< 0.08	Hair *et al.* (2010); Hu and Bentler (1998)
Comparative fit index	A comparison of the sample covariance matrix with an uncorrelated (independent) matrix.	> 0.95	Hooper, Coughlan and Mullen (2008); Hu and Bentler (1998)
Tucker-Lewis index	An index showing the results of the comparison of the null (independent) and specified model using normed χ^2 values.	> 0.95	Hair *et al.* (2010); Hu and Bentler (1998)

The following sections examine the convergent validity of all the constructs of the conceptual model of this study. First, convergent validity of all the first-order constructs is examined, followed by the assessment for higher-order (second-order) constructs of the conceptual framework. In summary, for establishing the convergent validity, the following criteria are used:

i. All constructs need to achieve the cut-off value of the GOF indices, mentioned in Table 6.1.
ii. Factor loadings of all the items of the constructs need to achieve at least 0.5.
iii. AVE of all the constructs needs to achieve at least 0.5.

6.2.1.1 Convergent Validity Assessment of Buyer–Supplier Social Capital

The buyer–supplier social capital was theorised to have three first-order constructs, including buyer–supplier structural capital (BSSC), buyer–supplier relational capital (BSRC) and buyer–

supplier cognitive capital (BSCC). This study first examines the convergent validity of all three first-order constructs and then the second-order buyer–supplier social capital construct.

First-order constructs of buyer–supplier social capital: The constructs of BSSC, BSRC and BSCC consist of five (BSSC1–BSSC5), six (BSRC1–BSRC6) and four (BSCC1–BSCC4) measured items respectively. The CFA results of these proposed first-order models in corresponding with their GOF indices are presented in Table 6.2. The results show that both the BSSC and BSCC achieved all the GOF indices, which mean that both the measurement models fit the data well. However, BSRC failed to achieve the acceptable model fit for *p*-value (0.00), normed $\chi 2$ (4.32), and RMSEA (0.08). In order to scrutinise the actual cause of misfit, the standardised residual covariance matrix was first examined (Hair *et al.* 2010). In a misfit model, the standardised residual value of one or more pairs of the indicators (measured variables) would be greater than 1.96, while this result for any combination of pairs of the indicators in a perfect model should be zero (Arbuckle 2016; Byrne 2010). Although the values of the standardised residuals for all pairs of indicators were less than 1.96 in BSRC model, the residual between BSRC3 and BSRC5 provided an indication of the cause of misfit as the value was very close to 1.96 (1.82) while the values of the residuals for other pairs were less than 0.9.

Further examination with modification indices (MI) confirmed that these two items, BSRC3 and BSRC5, had a very high covariance between them, with a MI value of 40.42. A MI of 4 or greater indicates that the pair of items are likely to have cross-loading, and a reason of misfit (Hair *et al.* 2010). Moreover, BSRC5 had cross-loading with BSRC2 (MI = 6.75) and BSRC7 (MI = 5.89). When an item has cross-loading with some other items of the model, deletion of the item can reduce the $\chi 2$ of the model, and thereby improving the GOF indices (Byrne 2010). Upon review of the descriptions of the two items, it appeared that BSRC5 – the close personal

interaction between the parties – could be constructed as part of BSRC3 (personal friendship) (Li *et al.* 2005). The SFL of BSRC5 (0.78) was also lower than that of BSRC3 (0.80). Therefore, BSRC5 was removed from the BSRC construct. Results of the inter-rater agreement analysis were also carefully checked before deleting the item. The results (Table 4.10) showed that the mean of this item was the lowest (3.65), and the power (0.82) was different from that of other six items of the constructs, suggesting that deletion of this item would not affect the content validity of the construct (Epstein *et al.* 1999; Haynes, Richard & Kubany 1995). Moreover, Lee (2015) did not use this item to measure relational capital since interaction is measured in buyer–supplier structural capital. The respecified CFA model of BSRC was operationalised again after deleting BSRC5 (second iteration), and it achieved all accepted fit indices, as depicted in Table 6.2. Therefore, the first criterion of convergent validity of all the first-order buyer–supplier social capital construct is established. The measurement models for all the first-order constructs of buyer–supplier social capital are shown in Appendix E (i–iv).

Table 6.2: GOF statistics of the first-order constructs of buyer–supplier social capital

Constructs	Iteration	Item drops	$\chi 2$	DF	$\chi 2$(*p*-value)	CMIN/ DF	RMSEA	SRMR	CFI	TLI
BSSC	First	0	4.94	5	0.42	0.99	0.00	0.01	1.00	1.00
BSRC	First	0	60.41	14	0.00	4.32	0.08	0.03	0.98	0.97
BSRC	Second	1	13.59	9	0.14	1.51	0.03	0.01	0.99	0.99
BSCC	First	0	2.29	2	0.32	1.14	0.02	0.01	1.00	0.99

Once the first criterion of convergent validity was established for all the first-order constructs of buyer–supplier social capital, other two criteria were checked and reported (Table 6.3). The loadings for all the measured variables of the constructs are greater than 0.5, which indicate further support of convergence. Moreover, the AVE values of all the three first-order constructs are greater than 0.5, which reconfirms the convergent validity of all the first-order constructs of buyer–supplier social capital model.

Table 6.3: SFL and AVE of the first-order constructs of buyer–supplier social capital

Constructs	SFL of item (range)	AVE
BSSC	0.74 – 0.80	0.59
BSRC	0.75 – 0.84	0.65
BSCC	0.76 – 0.88	0.70

Second-order buyer–supplier social capital: Convergent validity of the second-order buyer–supplier social capital model was assessed upon establishing the convergent validity of the first-order constructs of buyer–supplier social capital. As shown in Table 6.4, all the GOF statistics of the second-order buyer–supplier social capital achieved the acceptable value with p = 0.08. Moreover, SFL of the indicators of the second-order buyer–supplier social capital range from 0.73 to 0.78, and the AVE for the second-order construct is 0.57, which further strengthens the convergent validity of the second-order buyer–supplier social capital. The second-order model of buyer–supplier social capital is presented in Appendix F (i).

Table 6.4: GOF statistics of the second-order buyer–supplier social capital

χ^2	DF	χ^2(p-value)	CMIN/DF	RMSEA	SRMR	CFI	TLI
106.29	87	0.08	1.22	0.02	0.03	1.00	1.00

6.2.1.2 Convergent Validity Assessment of Supplier Integration

The proposed measurement model for supplier integration is composed of four first-order constructs, namely information sharing (IS), resource sharing (RS), supplier collaboration (SC), and flexible sourcing (FS). This section first examines the convergent validity of all the four first-order factors of supplier integration. It then examines the convergent validity of the second-order supplier integration construct.

First-order constructs of supplier integration: Among the four first-order constructs, IS, SC and FS each consists of four observed variables (mentioned as IS1–IS4 for IS, SC1–SC4 for SC and FS1–FS4 for FS) while RS is composed of three measured items (RS1–RS3). The fit indices for all the proposed first-order constructs of supplier integration are shown in Table

6.5. The results show that all the first-order constructs of supplier integration achieved the accepted fit indices, which support the first criterion of convergent validity of the first-order constructs of supplier integration. The GOF indices of all the first-order constructs of supplier integration are presented in Appendix E (v–viii).

Table 6.5: GOF statistics of the first-order constructs of supplier integration

Constructs	Iteration	Item drops	$\chi 2$	DF	$\chi 2$(*p*-value)	CMIN/ DF	RMSEA	SRMR	CFI	TLI
IS	First	0	1.37	2	0.50	0.69	0.00	0.01	1.00	1.00
RS	First	0	1.02	1	0.31	1.02	0.01	0.01	1.00	1.00
SC	Second	0	2.86	2	0.24	1.43	0.03	0.01	0.99	0.99
FS	First	0	3.19	2	0.20	1.60	0.04	0.01	0.99	0.99

Having achieved the required GOF indices that support the convergent validity of the first-order factors of supplier integration, the study then checked the SFL and the AVE values for all the first-order constructs. The results (Table 6.6) of both the SFL and the AVE reconfirm the convergence of all the first-order factors of supplier integration since the loadings of all the indicators are greater than 0.5, and the AVE values of all the first-order constructs are greater than 0.5.

Table 6.6: SFL and AVE of the first-order constructs of supplier integration

Constructs	SFL of item (range)	AVE
IS	0.73 – 0.84	0.61
RS	0.78 – 0.87	0.68
SC	0.76 – 0.84	0.65
FS	0.68 – 0.81	0.59

Second-order supplier integration: The second-order model of supplier integration achieved all the accepted fit indices with $p = 0.08$ (Table 6.7), suggesting the convergent validity of the model. The SFL of the indicators of second-order supplier integration range from 0.73 to 0.82, which reconfirm the convergent validity of the second-order supplier integration model. The value of the AVE (0.63) further strengthens the convergent validity of the second-order

supplier integration model. Appendix F (ii) shows the second-order model of supplier integration.

Table 6.7: GOF statistics of second-order supplier integration

χ^2	DF	χ^2(*p*-value)	CMIN/DF	RMSEA	SRMR	CFI	TLI
105.37	86	0.08	1.23	0.02	0.03	0.99	0.99

6.2.1.3 Convergent Validity Assessment of Cluster Social Capital

Similar to the buyer–supplier social capital construct, the proposed measurement model for cluster social capital construct consists of three first-order factors, including cluster structural capital (CSC), cluster relational capital (CRC) and cluster cognitive capital (CCC). This section reports the convergent validity of the second-order cluster social capital construct and its three first-order factors.

First-order constructs of cluster social capital: A seven-item scale was developed in this study to measure CSC. One item (CSC4) was removed from the scale during EFA. As a result, the CFA model consists of six observed variables (CSC1–CSC3, and CSC5–CSC7) for CSC, seven measured items (CRC1–CRC7) for CRC and six observed variables (CCC1–CCC6) for CCC. The CFA results of all the three first-order models with their GOF indices are presented in Table 6.8. The results indicate that the CSC model achieved all the GOF indices, which establish the convergent validity of the CSC model.

However, a number of fit indices, such as *p*-value, normed χ2, and RMSEA of CRC and CCC in the first iteration indicated an inadmissible model fit. Upon investigation into the potential cause of misfit for the CRC model, it appeared that one item (CRC5) had a very high covariance with CRC3 (MI = 13.10), CRC4 (MI = 12.14) and CRC7 (7.324). Therefore, deletion of the item (CRC5) could improve the model fit indices (Byrne 2010). Based on the investigation of the descriptions of the items, it appeared that CRC3 – personal friendship between the parties

– subsumed CRC5 (personal interaction) (Li *et al.* 2005). Therefore, the item was dropped from the model. The result of the inter-rater agreement analysis (Table 4.10) also showed that the item obtained the lowest power (0.91) among the seven items during the item screening. Moreover, Lee (2015) did not use this item to measure relational capital, suggesting that deletion of this item would not affect the content validity of the construct. The respecified CFA model of CRC was operationalised again after deleting CRC5 (second iteration), and it achieved all GOF indices, as depicted in Table 6.8.

Upon investigation into the cause of misfit of the CCC model, two items – CCC4 and CCC5 – were found to have a very high cross-loading (17.59) between them, while CCC5 also had high covariance with CCC6 (8.10). From the description of the two items (CCC4 and CCC5), it appeared that CCC5 – similar terms and jargon between the members – could be constructed as part of CCC4 (similar codes and language). The SFL of CCC5 (0.87) was also found to be lower than that of CCC4 (0.90). A number of previous studies, such as Carey, Lawson and Krause (2011) and Villena, Revilla and Choi (2011), also did not use the item (CCC5) to operationalise the cognitive capital, suggesting that removal of the item from the CCC construct would not reduce the content validity of the construct. Therefore, CCC5 was removed from CCC model. Before deleting CCC5, the results of the inter-rater agreement analysis were double checked. The results (Table 4.10) showed that the mean value of the item (3.90) is lower than CCC4 (4.10) and different from that of the other five items of the construct, suggesting that deletion of the item would not affect the content validity of the construct (Epstein *et al.* 1999; Haynes, Richard & Kubany 1995). The respecified CCC model was again operationalised upon deleting CCC5 (second iteration), and the respecified model achieved the accepted model fit (Table 6.8). In summary, two items from the cluster social capital construct – one from the CRC model and one from the CCC model – were removed. Upon deleting these two items from the respective first-order construct, all the three first-order models of cluster

social capital achieved accepted model fit statistics, which provide the support of the convergent validity of the models. The first-order models of cluster social capital are presented in Appendix E (ix–xiii).

Table 6.8: GOF statistics of the first-order constructs of cluster social capital

Constructs	Iteration	Item drops	$\chi2$	DF	$\chi2$(*p*-value)	CMIN/ DF	RMSEA	SRMR	CFI	TLI
CSC	First	0	11.74	9	0.23	1.30	0.03	0.01	0.99	0.99
CRC	First	0	49.21	14	0.00	3.52	0.07	0.02	0.99	0.98
CRC	Second	1	12.23	9	0.20	1.36	0.03	0.01	0.99	0.99
CCC	First	0	36.39	9	0.00	4.04	0.08	0.02	0.99	0.98
CCC	Second	1	5.61	5	0.35	1.12	0.02	0.01	1.00	0.99

Although the fit indices of the first-order models of cluster social capital provide the support of the convergent validity, this study further checked and reported the SFL and the AVE of all the three first-order factors (Table 6.9) to reconfirm the convergent validity of the models. The loadings of all the indicators of the first-order constructs are greater than 0.5, and the AVE values of all the three first-order constructs are also greater than 0.5, which reconfirms the convergent validity of all the first-order models of cluster social capital.

Table 6.9: SFL and AVE of the first-order constructs of cluster social capital

Constructs	SFL of item (range)	AVE
CSC	0.69 – 0.81	0.59
CRC	0.80 – 0.87	0.68
CCC	0.82 – 0.88	0.70

Second-order cluster social capital: Having established the convergent validity of all the first-order constructs of cluster social capital, the study then assessed the convergent validity of the second-order cluster social capital model. The results of the GOF indices, as reported in the Table 6.10, show a good model fit with $p = 0.06$ for the second-order cluster social capital construct, suggesting the convergent validity of the model. The SFL values of the indicators of the second-order model range from 0.77 to 0.80, and the AVE of the second-order construct is

0.62 further establishing the convergent validity of the second-order cluster social capital model. The second-order model of cluster social capital is presented in Appendix F (iii).

Table 6.10: GOF statistics of second-order cluster social capital

χ^2	DF	χ^2(*p*-value)	CMIN/DF	RMSEA	SRMR	CFI	TLI
140.48	116	0.06	1.21	0.02	0.03	0.99	0.99

6.2.1.4 Convergent Validity Assessment of Cluster Cooperation

The proposed model for cluster cooperation (CC) consists of six measured indicators (CC1–CC6). The CFA results of the proposed first-order model in corresponding with its GOF indices are presented in Table 6.11. The results show that the model obtained the accepted value for all the GOF indices with $p = 0.38$, suggesting convergence of the model. The SFL values of the indicators (range from 0.75 to 0.82) and the AVE of the model (0.60) reconfirm the convergent validity of the model. The proposed model for CC is shown in Appendix E (xiv).

Table 6.11: GOF statistics of cluster cooperation

Iteration	Item drops	$\chi2$	DF	$\chi2$(*p*-value)	CMIN /DF	RMSEA	SRMR	CFI	TLI
First	0	9.64	9	0.38	1.07	0.01	0.01	1.00	0.99

6.2.1.5 Convergent Validity Assessment of Supply Risk

The proposed model for supply risk (SR) is composed of seven observed items (SR1–SR7). The results of GOF indices of the model, as presented in Table 6.12, indicate that the measurement model fits the data well with $p = 0.36$, which support the convergent validity of supply risk construct. Further evidence of convergent validity of the supply risk model is found from the loadings of the indicators of the model (range from 0.75 to 0.86), and the AVE of the construct (0.66). The measurement model of supply risk is shown in Appendix E (xv).

Table 6.12: GOF statistics of supply risk

Iteration	Item drops	$\chi 2$	DF	$\chi 2$(*p*-value)	CMIN /DF	RMSEA	SRMR	CFI	TLI
First	0	15.21	14	0.36	1.09	0.01	0.01	1.00	0.99

6.2.1.6 Convergent Validity Assessment of Operational Performance

The proposed measurement model for operational performance (OP) comprises seven measured items (OP1–OP7). The results of the CFA (Table 6.13) in the first iteration showed the poor fit of the model for a number of fit indices, such as *p*-value (0.00), normed $\chi 2$ (2.91), and RMSEA (0.07), although acceptable values were found for SRMR, CFI and TLI. The standardised residual covariance and MI were scrutinised to reveal the reason of the misfit. While no indication was found from the values of standardised residual covariance for the indicators of the model, the MI values confirmed that one item (OP7) had cross-loading with a number of items of the construct, such as with OP3 (19.42), OP4 (6.49) and OP6 (7.18), of the model. Moreover, the mean (4.30) of the item in the inter-rater agreement survey (Table 4.10) was found to be different from that of other items of the construct. The item (OP7), therefore, was removed from the construct, and the model was respecified with the remaining six items. Flynn, Huo and Zhao (2010) also measured operational performance by these six items, suggesting that deletion of the item (OP7) would not affect the content validity of the construct. The results of the GOF indices for the respecified model indicate an excellent model fit with $p = 0.43$, which supports the convergent validity of the model. The SFL values of the indicators of the respecified model (range from 0.78 to 0.91) and the AVE of the respecified model (0.68) provide further supports for convergence of the respecified model. The OP models, both initial and respecified, are shown in Appendix E (xvi-xvii).

Table 6.13: GOF statistics of operational performance

Iteration	Item drops	$\chi 2$	DF	$\chi 2$(*p*-value)	CMIN /DF	RMSEA	SRMR	CFI	TLI
First	0	40.75	14	0.00	2.91	0.07	0.02	0.98	0.98
Second	1	9.09	9	0.43	1.01	0.01	0.01	1.00	1.00

In summary, this section addresses the convergent validity of the first-order and second-order constructs of the theoretical model. In order to ensure the convergence of the models, a total of four items were removed at this stage from the initial scales of the constructs.

6.2.2 Discriminant Validity Assessment

Discriminant validity refers to the extent of the distinctness of the constructs (Lewis, Templeton & Byrd 2005). Evidence of discriminant validity in a survey research ensures that a construct is truly distinct from other constructs, and captures some phenomena that other constructs do not (Hair *et al.* 2010). Two methods are suggested to assess the discriminant validity: (1) assessing the significance of the difference of CFA models for all possible pairs of constructs by fixing the correlation between the pairs as one (one-factor model) and without fixing the correlation (two-factor model) (Anderson & Gerbing 1988), and (2) comparing the AVE for each construct with the square correlation between the respective construct and the other constructs (Fornell & Larcker 1981). While a significant difference between the one-factor and two-factor models of a pair of constructs, as per the first method, is considered as evidence of discriminant validity, this method is acutely criticised since a significant difference can be produced even when the correlation between the constructs is 0.9 (Hair *et al.* 2010).

On the other hand, the second method is considered to be a more rigorous approach of assessing the discriminant validity (Zait & Bertea 2011). Therefore, this study used the second approach to assess the discriminant validity. Discriminant validity holds when the AVE for each construct is greater than the square correlation between the respective construct with the other

constructs (Fornell & Larcker 1981). This study first reports the discriminant validity for all first-order constructs and then it reports for the higher-order constructs. Table 6.14 shows the square inter-construct correlations, and the AVE on diagonal for all the first-order constructs. The results show that the AVE values of all the first-order constructs are greater than the respective square inter-construct correlations, giving strong evidence of discriminant validity.

Table 6.14: AVE and square inter-construct correlations of first-order constructs

Constructs	BSSC	BSRC	BSCC	IS	RS	SC	FS	CSC	CRC	CCC	CC	SR	OP
BSSC	**0.59**												
BSRC	0.29	**0.65**											
BSCC	0.34	0.32	**0.70**										
IS	0.22	0.22	0.21	**0.61**									
RS	0.22	0.18	0.26	0.36	**0.68**								
SC	0.18	0.23	0.17	0.41	0.29	**0.65**							
FS	0.18	0.13	0.21	0.45	0.38	0.38	**0.59**						
CSC	0.12	0.15	0.12	0.08	0.06	0.10	0.06	**0.59**					
CRC	0.15	0.14	0.14	0.05	0.10	0.12	0.07	0.38	**0.68**				
CCC	0.18	0.11	0.18	0.06	0.10	0.08	0.08	0.37	0.36	**0.70**			
CC	0.15	0.17	0.22	0.12	0.18	0.15	0.12	0.28	0.30	0.35	**0.60**		
SR	0.30	0.34	0.34	0.35	0.31	0.46	0.28	0.17	0.24	0.20	0.35	**0.66**	
OP	0.16	0.18	0.22	0.22	0.22	0.28	0.22	0.17	0.20	0.18	0.26	0.36	**0.68**

Upon establishing the discriminant validity of all the first-order constructs, this study then assessed the discriminant validity for the higher-order constructs of the original measurement model (Yim & Leem 2013). Similar to the first-order constructs, the results of discriminant validity for the higher-order constructs (Table 6.15) show that the AVE values of all the higher-order constructs are greater than the square correlations of the respective construct with the other constructs. These results indicate discriminant validity of the higher-order constructs of the theoretical model of this study.

Table 6.15: AVE and square inter-construct correlations of higher-order constructs

Constructs	BSSoC	SI	CSoC	CC	SR	OP
Buyer–supplier Social capital (BSSoC)	**0.57**					
Supplier integration (SI)	0.56	**0.63**				
Cluster social capital (CSoC)	0.40	0.20	**0.62**			
CC	0.31	0.22	0.50	**0.60**		
SR	0.56	0.56	0.32	0.33	**0.66**	
OP	0.33	0.37	0.29	0.26	0.36	**0.68**

6.2.3 Nomological Validity Assessment

Nomological validity verifies if the relationships among the hypothesised constructs in a measurement model make sense (Hair *et al.* 2010). Nomological validity established when the hypothesised relationships among the constructs, proposed as per the theory in the conceptual framework, are supported by the measurement model (Straub, Boudreau & Gefen 2004). The results show that the scale holds the nomological validity since all the hypothesised constructs significantly correlate with each other ($p < 0.05$). Moreover, the correlation coefficients between supply risk and any other constructs are negative, while the correlation coefficients of any other two constructs are positive. The signs (both positive and negative) of the correlations between the constructs provide further evidence of nomological validity as these signs are as per the hypothesised relationships (Lewis, Templeton & Byrd 2005).

6.2.4 Factorial Validity Assessment of Full Measurement Model

Upon satisfying all the conditions of unidimensionality, convergent validity, discriminant validity and nomological validity, this study examines the factorial validity which assesses if a set of latent variables represent an underlying pattern (Straub, Boudreau & Gefen 2004). While discussions in the previous sections are limited to individual or pairs of constructs, factorial validity assesses the fit statistics of the full measurement model with CFA, which include all the theoretical constructs that hold convergent, discriminant and nomological validity (Lewis, Templeton & Byrd 2005; Molla, Cooper & Pittayachawan 2011). Assessment of factorial validity is highly recommended in SEM since it reduces the chance of getting poor fit from the structural model with CFA (Brown 2015). Factorial validity of the measurement model holds when the GOF indices of the model achieve the accepted value (Byrne 2010).

The results of the full CFA measurement model of this study (Table 6.16) indicate a good fit with normed $\chi 2 = 1.48$, SRMR = 0.04, RMSEA = 0.03, CFI = 0.96, TLI = 0.96, which support

the factorial validity of the measurement model, although the *p*-value is significant ($p < 0.05$). A significant *p*-value is expected because of the complexity of the measurement model with 2,055 degrees of freedom (Hair *et al.* 2010). The *p*-value was further assessed through Bollen-Stine Bootstrapping using 2,000 random Bootstrap samples (Bollen & Long 1992). Bollen-Stine Bootstrapping produces an insignificant *p*-value (0.22), which reconfirms factorial validity of the full measurement model. Moreover, the PCFI (Parsimony Comparative Fit Index) value (0.92) of the full measurement model indicates good parsimony of the model, which further strengthens the factorial validity.

Table 6.16: GOF statistics of full measurement model

$\chi 2$	DF	$\chi 2$ (*p*-value)	Bootstrapped *p*-value	CMIN/DF	RMSEA	SRMR	CFI	TLI	PCFI
3036.32	2055	0.00	0.22	1.48	0.03	0.04	0.96	0.96	0.92

The study, then, assesses the properties of all the items of the validated measurement model since they provide valuable information about the respective importance of the items in the construct (Hancock & Mueller 2001; Lewis, Templeton & Byrd 2005). Moreover, distributional properties, such as means and range, provide required information about the distribution in the sample of the study (Zhang & Shaw 2012). The distributional properties of the items provide further evidence of the credibility of the data. For example, the low values of the standard deviation (SD), which range between 0.89 and 1.25, indicate that the data are free from any influential outliers (Hair *et al.* 2010). Moreover, the individual scores of most measured variables extend across all possible response alternatives (range 1–7) of the seven-point Likert scale. This variation in responses clearly rules out the possibility that only data from a similar type of respondent, e.g. SMEs who were well connected with the suppliers, were collected. The loadings of all the measured variables are also high, suggesting that the indicators strongly measure the theoretically intended constructs. The higher the SFL an item obtains the better it reflects the construct (Hancock & Mueller 2001). In other words, the item

that obtains highest SFL in a construct indicates that respondents perceived that item as the most important indicator of the construct. Table 6.17 shows the mean, standard deviation (SD), range (minimum and maximum values), and the SFL of all the measurement items of this study.

Table 6.17: Properties of measures in the measurement model

Construct	Items	Mean	SD	Range	SFL	Factor	Items	Mean	SD	Range	SFL
BSSC (0.740)[a]	BSSC1	5.60	1.10	1 – 7	0.738	CRC (0.783)[a]	CRC1	5.55	1.05	1 – 7	0.828
	BSSC2	5.24	1.18	2 – 7	0.788		CRC2	5.32	1.10	2 – 7	0.840
	BSSC3	5.40	1.13	1 – 7	0.735		CRC3	5.68	1.20	2 – 7	0.805
	BSSC4	5.17	1.06	1 – 7	0.801		CRC4	5.28	1.13	1 – 7	0.810
	BSSC5	5.27	1.10	1 – 7	0.763		CRC6	5.66	1.19	1 – 7	0.810
BSRC (0.737)[a]	BSRC1	5.65	0.97	2 – 7	0.832		CRC7	5.52	1.15	1 – 7	0.869
	BSRC2	5.87	1.00	2 – 7	0.820	CCC (0.791)[a]	CCC1	5.12	1.09	1 – 7	0.819
	BSRC3	5.31	1.11	1 – 7	0.769		CCC2	5.06	1.18	1 – 7	0.814
	BSRC4	5.19	1.08	2 – 7	0.833		CCC3	5.21	1.12	1 – 7	0.867
	BSRC6	5.58	1.08	2 – 7	0.826		CCC4	5.49	1.21	1 – 7	0.878
	BSRC7	5.44	1.02	2 – 7	0.749		CCC6	5.00	1.03	1 – 7	0.815
BSCC (0.777)[a]	BSCC1	5.22	0.97	1 – 7	0.878	CC	CC1	5.13	1.02	2 – 7	0.784
	BSCC2	5.17	1.03	2 – 7	0.849		CC2	5.35	1.19	2 – 7	0.767
	BSCC3	5.33	1.12	2 – 7	0.836		CC3	5.24	1.17	2 – 7	0.790
	BSCC4	4.95	1.08	1 – 7	0.768		CC4	4.67	1.06	2 – 7	0.742
IS (0.812)[a]	IS1	5.36	0.96	2 – 7	0.724		CC5	4.86	1.11	1 – 7	0.753
	IS2	5.40	1.01	2 – 7	0.837		CC6	5.34	1.08	2 – 7	0.824
	IS3	5.30	1.00	1 – 7	0.810	SR	SR1	2.63	1.01	1 – 6	0.826
	IS4	5.06	0.98	2 – 7	0.736		SR2	2.51	1.06	1 – 6	0.849
RS (0.746)[a]	RS1	5.13	0.98	2 – 7	0.862		SR3	2.28	1.17	1 – 6	0.864
	RS2	4.79	0.89	1 – 7	0.785		SR4	2.92	1.07	1 – 6	0.747
	RS3	5.38	1.05	2 – 7	0.828		SR5	2.53	1.06	1 – 6	0.852
SC (0.804)[a]	SC1	5.30	0.95	1 – 7	0.822		SR6	2.51	1.07	1 – 6	0.790
	SC2	5.27	1.02	2 – 7	0.829		SR7	2.80	1.09	1 – 7	0.755
	SC3	5.39	1.08	2 – 7	0.829	OP	OP1	5.19	1.04	1 – 7	0.823
	SC4	5.03	1.05	2 – 7	0.751		OP2	5.48	1.15	1 – 7	0.805
FS (0.785)[a]	FS1	5.22	0.97	2 – 7	0.700		OP3	4.96	1.07	1 – 7	0.811
	FS2	5.14	1.09	1 – 7	0.811		OP4	5.40	1.06	2 - 7	0.900
	FS3	4.87	0.97	2 – 7	0.794		OP5	5.16	1.07	1 – 7	0.803
	FS4	4.68	0.91	2 – 7	0.749		OP6	5.36	1.15	2 – 7	0.785
CSC (0.771)[a]	CSC1	4.80	1.14	1 – 7	0.695						
	CSC2	4.93	1.09	1 – 7	0.725						
	CSC3	5.55	1.25	2 – 7	0.804						
	CSC5	5.05	1.12	1 – 7	0.799						
	CSC6	4.88	1.13	1 – 7	0.787						
	CSC7	5.63	1.11	2 – 7	0.811						

[a] Standardised coefficients of the first-order factors

6.3 Assessment of Scale Reliability

Scale reliability 'is the proportion of variance attributable to the true score of the latent variable' (DeVellis 2003, p. 27). Assessment of scale reliability for ensuring internal consistency of a set of indicators of a latent construct is considered mandatory in survey-based empirical research (Straub, Boudreau & Gefen 2004). Selection of the most appropriate measures of scale reliability depends on the nature of the measurement model (Graham 2006). The results from the CFA analysis show that all items in the measurement models of this study have different factor loadings and error variances, which implies that the measurement models of the constructs are congeneric in nature (Raykov 1997). In such situations, coefficient *H* is considered the most appropriate measure of assessing scale reliability since it is flexible enough to accommodate congeneric measures (Hancock & Mueller 2001). Therefore, the study used coefficient *H* to assess the scale reliability. A scale is considered internally consistent when the coefficient $H > 0.7$, and coefficient $H >$ the reliability of the best item (reliability of the best item = square of highest SFL in CFA) of the respective construct (Hancock & Mueller 2001; Molla, Cooper & Pittayachawan 2011).

The results of scale reliability assessment of all first-order constructs of this study are shown in Table 6.18. The results show that the scale is internally consistent as i) coefficient $H > 0.8$ for all constructs, and ii) coefficient $H >$ the reliability of the best item of the respective construct. Fornell and Larcker (1981) suggest that construct reliability (CR) should be reported along with other measures of scale reliability when the data are analysed using SEM, where a value of CR estimated at over 0.70 indicates good reliability. The values of CR for all the first-order constructs range from 0.85 to 0.93, as depicted in Table 6.18, indicating sufficient scale reliability. Cronbach's α, the most widely used measure of internal consistency of the scale to reconfirm the scale reliability, was also examined. The values of Cronbach's α range from 0.84

to 0.93 (Table 6.18), while any value greater than 0.70 is deemed acceptable (DeVellis 2003), providing further evidence of scale reliability.

Table 6.18: Results of scale reliability of the first-order constructs

Construct	Coefficient H	Reliability of the best item of the construct	Cronbach's α	CR
BSSC	0.88	0.64	0.88	0.88
BSRC	0.92	0.69	0.92	0.92
BSCC	0.91	0.77	0.90	0.90
IS	0.87	0.71	0.86	0.86
RS	0.87	0.74	0.86	0.86
SC	0.89	0.69	0.88	0.88
FS	0.85	0.66	0.85	0.85
CSC	0.90	0.66	0.90	0.90
CRC	0.93	0.76	0.93	0.93
CCC	0.93	0.77	0.92	0.92
CC	0.90	0.67	0.90	0.90
SR	0.94	0.74	0.93	0.93
OP	0.93	0.81	0.93	0.93

Since the measurement model of this study consists of three second-order factors, scale reliability was also assessed for these three second-order factors. Similar to the first-order constructs, the results of CFA analysis demonstrate that all the second-order constructs are congeneric in nature since their indicators have different factor loadings and error variances. Therefore, the reliability was assessed using coefficient *H*. CR and Cronbach's α of all the second-order constructs were also checked to reconfirm the scale reliability. The results (Table 6.19) provide the support of the scale reliability of the second-order constructs, since the values of coefficient *H*, CR and Cronbach's α for all the second-order constructs are well beyond the threshold of 0.7, and the coefficient *H* is higher than the reliability of the best first-order factor of the respective construct.

Table 6.19: Results of scale reliability of the second-order constructs

Construct	Coefficient H	Reliability of the best first-order factor	Cronbach's α	CR
Buyer–supplier social capital	0.80	0.61	0.80	0.80
Supplier integration	0.87	0.66	0.87	0.87
Cluster social capital	0.83	0.63	0.83	0.83

6.4 Assessment of Common Method Variance

Common method variance (CMV) refers to the variance that is attributed by the measurement method rather than the scales that measures the constructs (Podsakoff *et al.* 2003). Assessment of CMV is important when both the dependent and explanatory variables are perceptual in nature, and they are both derived from the same respondent at the same time (Chang, Witteloostuijn & Eden 2010). Although several *ex-ante* approaches were adopted during the research design stage to reduce the possibility of CMV, ex post tests were also used to evaluate the presence of the CMV. First, Harman's single-factor (or one-factor) test was applied in the CFA, where all items from all constructs were loaded into one factor (Podsakoff *et al.* 2003). The model fit indices are unacceptable with χ^2 = 13799.99, DF 2079, normed χ^2 6.63, SRMR 0.11, RMSEA 0.11, CFI 0.48, TLI 0.47, and the loadings of many items are less than 0.5. These results suggest that a single factor cannot account for the majority of the variance in the data, thus any potential CMV is trivial.

In order to further assess the potential presence of CMV, a common latent factor was added to the indicators of the original measurement model (MacKenzie, Podsakoff & Fetter 1993; Mackenzie, Podsakoff & Paine 1999). The result shows that only 6.76 per cent of common variance can be explained by the added latent factor. The fit indices of the original measurement model (normed χ^2 = 1.48, SRMR = 0.04, RMSEA = 0.03, CFI = 0.96, TLI = 0.96), and the new model with added latent variables (normed χ^2 = 1.47, SRMR = 0.04, RMSEA = 0.03, CFI = 0.96, TLI = 0.96) are also found to be similar. With all these findings, it can be concluded that common method bias is not a concern in this study.

6.5 Assessment of Structural Model

A structural model is a logical and conceptual representation of the variables investigated in the study, as per established theory and literature (Hair *et al.* 2010). A well-specified structural

model fits the data well, and obtains the acceptable value for the GOF indices (Byrne 2010). This section assesses the validity of the structural model.

6.5.1 Original Structural Model

Figure 6.1 shows the proposed structural model of this study which was developed in Chapter 2 based on the literature review and underpinning theories.

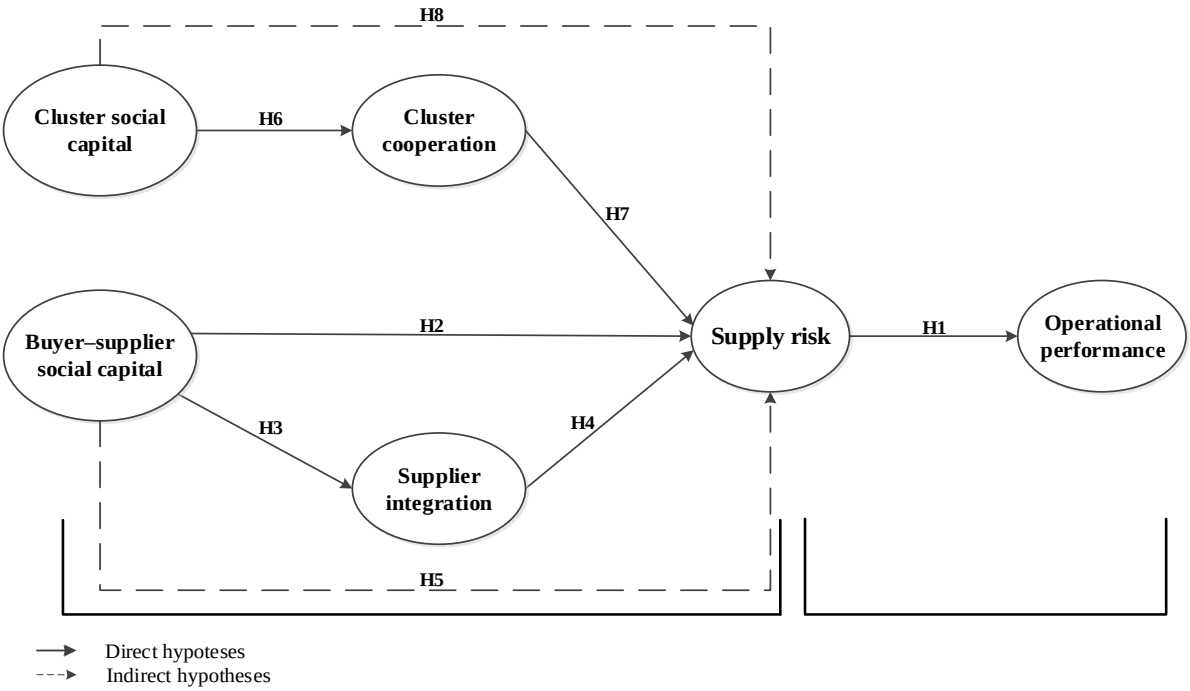


Figure 6.1: Proposed structural model of the study

The fit of the proposed initial structural model (Table 6.20) was inadmissible in terms of SRMR (0.15), although all other fit statistics were within the acceptable range with normed $\chi^2 = 1.59$, RMSEA = 0.04, CFI = 0.95, TLI = 0.94. Hu and Bentler (1998) report that SRMR is the most sensitive fit index for models when factor covariance(s) are misspecified. The authors conclude that an acceptable value of SRMR for a structural model is required in using the ML estimation method to demonstrate that the model has accurately estimated all the covariance(s) between the constructs. Therefore, the original structural model was modified to ensure that it took into account all the relationships among the constructs supported by both the theory and the data.

Some modifications, supported by the theory and the context of the study, might also provide a model with a higher parsimony score (Gimenez, Large & Ventura 2005).

Table 6.20: GOF statistics of the initial structural model

$\chi 2$	DF	$\chi 2$ (*p*-value)	CMIN/DF	RMSEA	SRMR	CFI	TLI	PCFI
3284.50	2064	0.00	1.59	0.04	0.15	0.95	0.94	0.91

6.5.2 Structural Model Modification

Data analysis shows that the two exogenous variables of this study (buyer–supplier social capital and cluster social capital) are not uncorrelated in nature although they were conceptualised as uncorrelated in the initial structural model. Through a revisit to the Social Capital Theory, it is revealed that one form of social capital can create the other (Adler & Kwon 2002; Inkpen & Tsang 2005). Staveren and Knorringa (2007) report that SMEs are more likely to initially leverage social capital with other actors within a cluster since they usually share a common goal and face a similar problem. A high social capital within a similar group (bonding social capital) enables group members to foster and use network resources from the external groups (bridging social capital) (Islam & Walkerden 2014; Woolcock 2001). Moreover, this study adopts the mixed view of social capital, which admits that network members benefit not only from the resources embedded within the network but also from the resources that are available through development of relationships (Nahapiet & Ghoshal 1998). In fact, the bridging social capital provides the most valuable outcomes since it allows members to connect and access to the networks beyond the community (Hawkins & Maurer 2010; Woolcock 2001).

Prior literature on SME clusters suggests that cluster ensures proximity (Biswas, Roy & Seshagiri 2007), provides frequent and repeated interactions (Molina-Morales & Martinez-Fernandez 2010), generates informal contacts (Tallman *et al.* 2013), and builds strong relationships among the firms within a cluster (Oprime, Tristao & Pimenta 2011). Such close

ties or bonding among the members of a cluster serves as a bridge to generate the network capital from other groups. Having strong bonding with other firms within a cluster means that SMEs share valuable information about their external networks (such as network with suppliers, customers and distributors) through informal interactions, and assist each other in linking to those external networks. SMEs gain valuable resources and create influence to another party through accessing to those external networks, which has a significant impact on the growth of the firms (Kannadhasan *et al.* 2018; Molina-Morales & Martinez-Fernandez 2010). Since strong bonding within a cluster assists SMEs in linking with other groups, this study, therefore, respecified the structural model by adding the regression path from cluster social capital to buyer–supplier social capital (Figure 6.2). As a result, the study added the following hypothesis:

H9: *Cluster social capital has a positive effect on buyer–supplier social capital.*

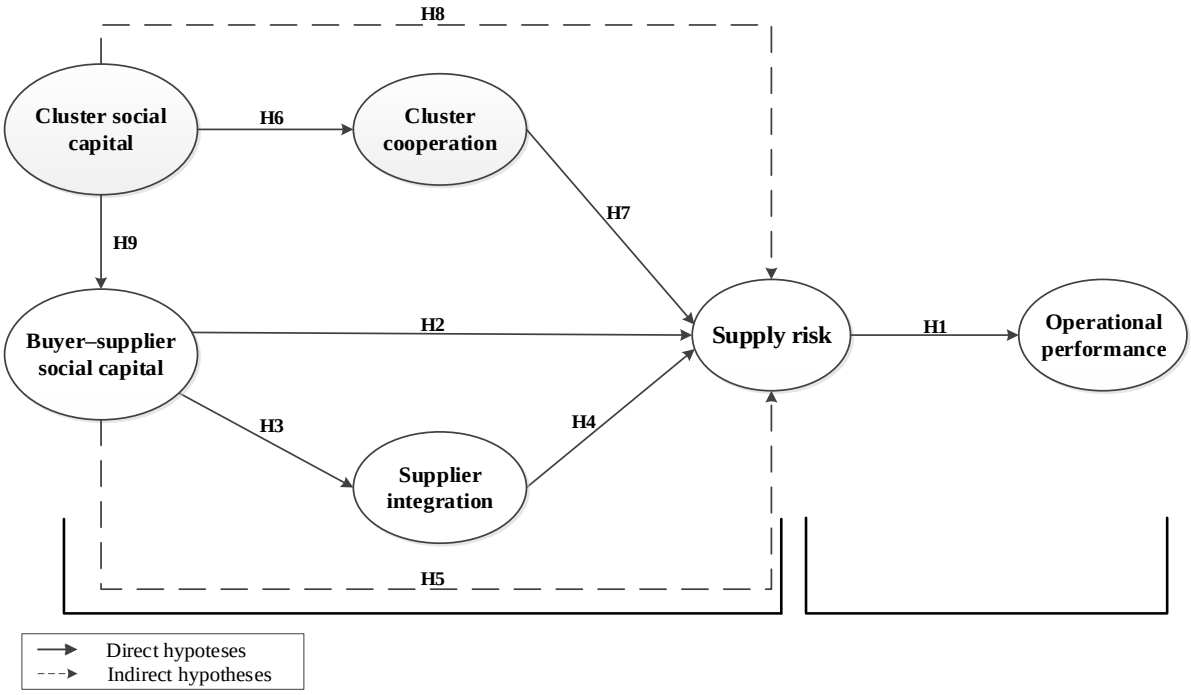


Figure 6.2: Respecified structural model of the study

The respecified structural model, as shown in Figure 6.2, was evaluated in terms of the most widely used GOF indices in SEM literature. The results of the fit statistics of the respecified model (Table 6.21) indicate that the model is supported and accepted in terms of normed χ^2 (1.51), RMSEA (0.03), SRMR (0.05), CFI (0.96) and TLI (0.95). However, similar to the full measurement model, the *p*-value of the structural model is significant ($p < 0.05$) due to the complexity of the model with 2,063 degrees of freedom. A further assessment of the *p*-value through Bollen-Stine Bootstrapping, using 2,000 random Bootstrap samples, produces an acceptable *p*-value (0.17), reconfirming the fit of the structural model. The PCFI value of the model is 0.92, suggesting that the model is parsimonious too.

Table 6.21: GOF statistics of the respecified structural model

$\chi2$	DF	$\chi2$ (*p*-value)	Bootstrapped *p*-value	CMIN/DF	RMSEA	SRMR	CFI	TLI	PCFI
3108.7	2063	0.00	0.17	1.51	0.03	0.05	0.96	0.95	0.92

Although it is evident from the fit statistics of the respecified model that the structural model is valid, the loading estimates of all indicators of the model were further examined to ensure that they have not changed substantially from the measurement model. Little or no change (i.e. change less than 0.05) in the loading estimates of the indicators confirms the stability among measured variables, and provide further support of a structural model's validity (Hair *et al.* 2010). The results, as presented in Table 6.22, show that loading estimates of all measured variables in the respecified model remain virtually unchanged as in the measurement model. Only one standardised loading has changed and the change is only 0.005 (rounded to 0.01 in Table 6.22), suggesting that the measured indicators are stable in both the measurement and the structural models. As such, the structural model explains the data well and is valid and robust.

Table 6.22: Differences of SFL in structural and measurement model

Constructs	Items	SFL differences in measurement and structural model	Constructs	Items	SFL differences in measurement and structural model
BSSC	BSSC1	0.00	CRC	CRC1	0.00
	BSSC2	0.00		CRC2	0.00
	BSSC3	0.00		CRC3	0.00
	BSSC4	0.00		CRC4	0.00
	BSSC5	0.00		CRC6	0.00
BSRC1	BSRC1	0.00		CRC7	0.00
	BSRC2	0.00	CCC	CCC1	0.00
	BSRC3	0.00		CCC2	0.00
	BSRC4	0.00		CCC3	0.00
	BSRC6	0.00		CCC4	0.00
	BSRC7	0.00		CCC6	0.00
BSCC1	BSCC1	0.00	CC	CC1	0.00
	BSCC2	0.00		CC2	0.00
	BSCC3	0.00		CC3	0.00
	BSCC4	0.00		CC4	0.00
IS1	IS1	0.00		CC5	0.00
	IS2	0.00		CC6	0.00
	IS3	0.00	SR	SR1	0.00
	IS4	0.00		SR2	0.00
RS1	RS1	0.00		SR3	0.00
	RS2	0.00		SR4	0.00
	RS3	0.00		SR5	0.01
SC1	SC1	0.00		SR6	0.00
	SC2	0.00		SR7	0.00
	SC3	0.00	OP	OP1	0.00
	SC4	0.00		OP2	0.00
FS1	FS1	0.00		OP3	0.00
	FS2	0.00		OP4	0.00
	FS3	0.00		OP5	0.00
	FS4	0.00		OP6	0.00
CSC	CSC1	0.00			
	CSC2	0.00			
	CSC3	0.00			
	CSC5	0.00			
	CSC6	0.00			
	CSC7	0.00			

Since the validity of the structural model has been established, the next section presents the results of the hypotheses.

6.6 Hypotheses Results

This section presents the results of the direct hypotheses followed by the mediation hypotheses. The study tested the hypotheses using ML estimations as the data hold the normality

assumption. In order to improve the precision and external validity of the findings, the study further compared the results using Bayesian Theorem. The results of all the direct and indirect paths hypothesised in the theoretical model, and found by employing this ML estimation are shown in Figure 6.3.

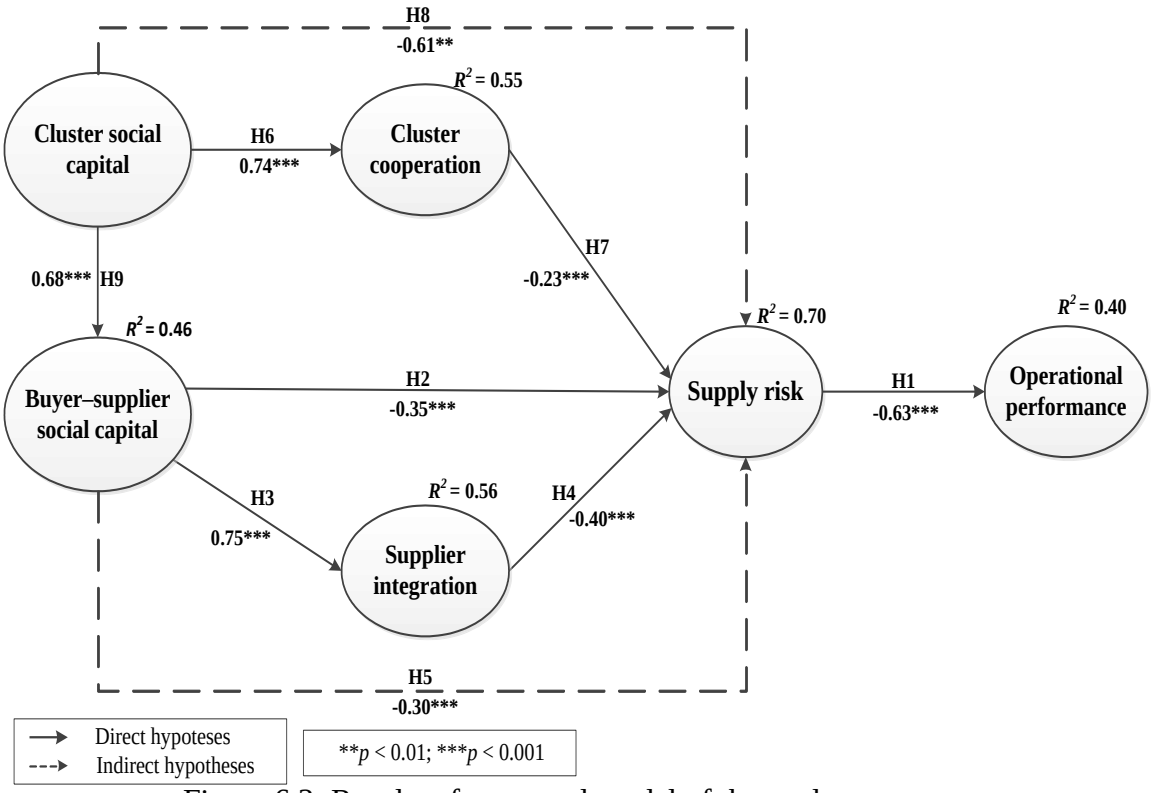


Figure 6.3: Results of structural model of the study

6.6.1 Direct Hypotheses

All of the hypotheses with direct effects are supported. The results show that H1, which postulates that supply risk negatively influences operational performance of SMEs, is supported with a path coefficient (β) of -0.63, which is statistically significant ($p < 0.001$). H2 proposes a direct negative effect of buyer–supplier social capital on supply risk of SMEs. The hypothesis is supported with β -0.35, and $p < 0.001$, confirming that SMEs can reduce supply risk by leveraging social capital with their key suppliers. H3 posits a direct positive effect of buyer–supplier social capital on supplier integration, which is supported with a path coefficient

of 0.75 and $p < 0.001$. A direct negative influence of supplier integration on supply risk, as postulated in H4, is also supported ($\beta = -0.40$, and $p < 0.001$). H6 theorises that cluster social capital has a positive effect on cluster cooperation. The results indicate that cluster cooperation is significantly affected by cluster social capital, with a γ of 0.74, which is statistically significant at $p < 0.001$. The path from cluster cooperation to supply risk, postulated in H7, is found to be statistically significant at $p < 0.001$ ($\beta = -0.23$), which confirms that cooperative activities among the firms in a SME cluster can mitigate the supply risk of SMEs. Finally, H9, which postulates that social capital in a SME cluster can increase buyer–supplier social capital, is also supported with $\gamma = 0.68$, and $p < 0.001$. Table 6.23 summarises the results of the direct hypotheses.

Table 6.23: Summary of the results of the direct hypotheses

Path			Path coefficient	Probability (*p*-value)	Result
Supply risk	→	Operational Performance	-0.63	0.000	H1: Supported
Buyer–supplier social capital	→	Supply risk	-0.35	0.000	H2: Supported
Buyer–supplier social capital	→	Supplier integration	0.75	0.000	H3: Supported
Supplier integration	→	Supply risk	-0.40	0.000	H4: Supported
Cluster social capital	→	Cluster cooperation	0.74	0.000	H6: Supported
Cluster cooperation	→	Supply risk	-0.23	0.000	H7: Supported
Cluster social capital	→	Buyer–supplier social capital	0.68	0.000	H9: Supported

6.6.2 Test of Mediation

H5 and H8 of this study propose two indirect effects of social capital on supply risk of SMEs. Although the significance of the indirect path can be tested using a number of approaches, such as the Baron and Kenny approach or the Sobel test, a growing body of literature call into question these approaches (Arbuckle 2016). Previous studies suggest that bias-corrected

Bootstrap confidence intervals can generate more reliable inferences than other approaches for indirect influence (Shrout & Bolger 2002). Bias-corrected Bootstrapping is also considered the most appropriate technique of mediation analysis when the sample size is greater than 100 (Rungtusanatham, Miller & Boyer 2014). Since the sample size of this study is 487, a bias-corrected Bootstrap confidence interval was adopted in this study, using 2,000 random Bootstrap samples, to test the significance of the indirect paths. Table 6.24 summarises the results of the indirect hypotheses.

Table 6.24: Summary of the results of the indirect hypotheses

Independent Variable	Mediating Variable	Dependent Variable	Path coefficient	Probability (*p*-value)	Result	Mediation Type
Buyer–supplier social capital	Supplier integration	Supply risk	-0.30	0.000	H5: Supported	Partial
Cluster social capital	Multiple links	Supply risk	-0.61	0.001	H8: Supported	Full

H5 postulates an indirect impact of buyer–supplier social capital on supply risk through supplier integration, i.e. supplier integration mediates the relationship between buyer–supplier social capital and supply risk. The result supports the indirect impact of buyer–supplier social capital on supply risk, with a $\beta = -0.30$, which is statistically significant at $p < 0.001$. The result implies that supplier integration partially mediates the relationship between buyer–supplier social capital and supply risk, as the direct effect of buyer–supplier social capital on supply risk (H2) is also statistically significant. Table 6.25 compares the direct and indirect impacts of buyer–supplier social capital on the supply risk of SMEs. The results show that both the direct and indirect paths, through supplier integration, from buyer–supplier social capital to supply risks contribute substantially and almost equally (53.85 per cent and 46.15 per cent respectively) to reducing supply risk of SMEs. Therefore, SMEs need to improve integration with their key suppliers in order to gain the most influence of buyer–supplier social capital on supply risk mitigation.

Table 6.25: Direct and indirect impacts of buyer–supplier social capital on supply risk

Independent variable	Dependent variable	Total effect	Direct effect		Indirect effect via supplier integration (%)	
			β	%	β	%
Buyer–supplier social capital	Supply risk	0.65	0.35	53.85	0.30	46.15%

H8, proposing an indirect negative impact of cluster social capital on supply risk of SMEs, is also supported with $\gamma = -0.61$, and $p < 0.01$. Since no direct effect of cluster social capital on supply risk is established, the result suggests a full mediation. The structural model shows that three indirect paths from cluster social capital to supply risk are possible, including (1) cluster social capital → cluster cooperation → supply risk; (2) cluster social capital → buyer–supplier social capital → supply risk; and (3) cluster social capital → buyer–supplier social capital → supplier integration → supply risk. In order to investigate whether any or all specific paths are statistically significant, the result is further analysed using the plugin developed by Gaskin (2016a) and Gaskin (2016b). The results (Table 6.26) show that all three paths are statistically significant with $\gamma = -0.17$, and $p < 0.01$ for path 1, $\gamma = -0.24$, and $p < 0.01$ for path 2, and $\gamma = -0.20$, and $p < 0.01$ for path 3. The result suggests that although social capital in a cluster has no direct effect on supply risk of SMEs, it can minimise the supply risk by both enhancing the cooperation and joint activities with their peers, and developing social relations with the key suppliers.

Table 6.26: Indirect impact of cluster social capital on supply risk via different mediators

Independent Variable	Mediating Variable	Dependent Variable	Path coefficient	Probability (*p*-value)	Result
Cluster social capital	Cluster cooperation	Supply risk	-0.17	0.001	H8(1): supported
Cluster social capital	Buyer–supplier social capital	Supply risk	-0.24	0.002	H8(2): supported
Cluster social capital	Buyer–supplier social capital → Supplier integration	Supply risk	-0.20	0.001	H8(3): supported

6.6.3 Hypotheses Results in Bayesian SEM

Section 6.6.1 and 6.6.2 demonstrated that the study found support for the statistical significance of all causal relationships using ML estimation. In ML estimation, the true values of the model parameter from a given sample are considered as fixed but unknown, while the estimates of those parameters are considered as random but known (Arbuckle 2016). As a result, a number of previous studies suggest that the results are compared using an alternative statistical inference called a Bayesian inference, in order to improve the generalisability of the results (Congdon 2003; Song & Lee 2012; Walwyn & Roberts 2010). In fact, the Bayesian inference can be viewed as a generalisation of the ML estimation (Gill 2004; Song & Lee 2012). If the model parameters estimated using the former approach are similar to that of the latter, it can be concluded that they are reliable and valid.

In the Bayesian approach, true model parameters are always unknown and considered to be random, and they are assigned a prior distribution before the data are seen (Muthén & Asparouhov 2012). Once the data are observed, Bayesian Theorem combines the empirical evidence and prior belief to generate a new distribution for the parameters, called a posterior distribution (Arbuckle 2016). Given that a posterior distribution reflects both empirical evidence and prior distribution, the results found from a Bayesian approach are considered more externally valid (Song & Lee 2012; Walwyn & Roberts 2010). Therefore, the current study checked the results of hypotheses testing using Bayesian Theorem, and compared the results with the results found based on ML estimation presented in Section 6.3.

The results of Bayesian SEM can improve the precision of the findings of this study in a number of ways. First, Bayesian SEM depends less on asymptotic theory (Song & Lee 2012). As a consequence, it produces more reliable results even with small or moderate sample sizes. Although the study gathered valid data from 487 cases, which is considered sufficient for SEM

(Anderson & Gerbing 1984; Hoe 2008), further assessment of results using Bayesian SEM will improve the reliability of the results found based on ML estimation. Second, regression coefficients obtained in Bayesian SEM are considered more reliable when the model and/or data structure are complex (Arbuckle 2016; Jiang & Mahadevan 2009). This is because the Bayesian SEM approach is more flexible than traditional SEM when dealing with complicated model and/or data structures (Song & Lee 2012). Given that the structural model of the study is complex with 2,063 degrees of freedom, having similar results in both Bayesian SEM and ML approaches will strengthen the accuracy of the results. Finally, Bayesian SEM incorporates the prior information in addition to the information available in the collected data for producing results (Lee & Song 2004). As such, achieving comparable results in Bayesian SEM will further strengthen the accuracy of the results obtained based on ML estimation.

The structural model depicted in Figure 6.3 was run again using the Bayesian SEM approach. The Bayesian generated 54,500 analysis samples that were collected after 500 burn-in samples with eight thinning. At this point, the distribution achieved a well-accepted convergence statistic (CS) with a value of 1.0008 (Gelman *et al.* 2004). Moreover, the autocorrelation coefficient is effectively zero at lag 80 and beyond. This means that after 80 iterations, the simulated samples have forgotten their starting position. This fact provides the support that a burn-in period of 500 samples with eight thinning is more than enough to ensure convergence in the distribution (Arbuckle 2016). Therefore, it can be safely concluded that the analysis samples are samples from the true posterior distribution. The study then checked the posterior predictive *p*-value of the structural model. Similar to the *p*-value in the in ML method, the posterior predictive *p*-value of the structural model in Bayesian SEM is significant ($p < 0.05$). Although a significant posterior predictive *p*-value suggests that the external validity of the model can be further improved, it is not conclusive or unexpected due to the model complexity with 2063 degrees of freedom (Gelman 2013).

The study then assessed the estimates of the path coefficients of the structural model using Bayesian Theorem. All the estimates of the direct paths are found very close to the estimates obtained based on ML estimation. Moreover, all the estimates for the direct paths fall within the 95 per cent confidence intervals, which further support the reliability of the results. For example, the Bayesian estimate of H1 is -0.64, and the lower and upper boundaries of the 95 per cent credible interval are -0.69 and -0.59, respectively. In other words, it is 95 per cent certain that the true value of the standardised direct effect of H1 lies between -0.69 and -0.59. The estimates of the direct paths are presented in Table 6.27.

Table 6.27: Estimates of direct paths

Hypotheses	Path			ML method	Bayesian SEM method		
				Path coefficient	Path coefficient	95% lower bound	95% upper bound
H1	Supply risk	→	Operational Performance	-0.63	-0.64	-0.69	-0.59
H2	Buyer–supplier social capital	→	Supply risk	-0.35	-0.35	-0.46	-0.24
H3	Buyer–supplier social capital	→	Supplier integration	0.75	0.75	0.70	0.80
H4	Supplier integration	→	Supply risk	-0.40	-0.39	-0.49	-0.29
H6	Cluster social capital	→	Cluster cooperation	0.74	0.76	0.72	0.81
H7	Cluster cooperation	→	Supply risk	-0.23	-0.25	-0.31	-0.18
H9	Cluster social capital	→	Buyer–supplier social capital	0.68	0.68	0.61	0.74

Finally, the study assessed the estimates of the indirect paths for the two indirect hypotheses. Like the results of the direct paths, the estimates of the indirect paths in both approaches are very similar. The indirect estimates also fall within the 95 per cent confidence interval. The estimates of the indirect paths are presented in Table 6.28.

Table 6.28: Summary of the results of the indirect hypotheses

Hypotheses	Path			ML method	Bayesian SEM method		
	Independent Variable	Mediating Variable	Dependent Variable	Path coefficient	Path coefficient	95% lower bound	95% upper bound
H5	Buyer–supplier social capital	Supplier integration	Supply risk	-0.30	-0.29	-0.37	-0.22
H8	Cluster social capital	Multiple links	Supply risk	-0.61	-0.62	-0.67	-0.57

The path coefficients of all hypotheses were found to be very similar in both ML estimation and the Bayesian Theorem approach. These results further strengthen the reliability and the accuracy of the findings.

6.7 Summary

The aim of this chapter was to present the results of the data analysis. The following key conclusions are made from the results of this chapter:

- The scale holds the convergent, discriminant, nomological and factorial validity, and it is internally consistent. Moreover, the presence of CMV is not a concern in this study.
- The structural model of the study is robust, and the model explains the data well.
- The results supported all the hypotheses, which were postulated based on the lens of the Social Capital Theory and the Theory of Swift, Even Flow. The results indicate that supply risk significantly reduces the operational performance of SMEs and also suggest that SMEs can effectively reduce supply risk by leveraging social capital with their key suppliers and with peers located within the cluster, and improving supplier integration and cluster cooperation.

The next chapter discusses the results of this study.

CHAPTER SEVEN
DISCUSSION

7.1 Introduction

This empirical study integrates the Social Capital Theory with supply management research on SMEs to provide insight into how social capital with the key suppliers and with peers located within a geographical cluster can be leveraged to reduce supply risk, thereby improving operational performance. This chapter discusses the results of the study presented in Chapter 6 in light of the existing literature for addressing the hypotheses proposed in this research. The chapter is organised into five sections, with an introduction in Section 7.1. Then the findings on the effect of supply risk on the operational performance of SMEs are discussed in Section 7.2. The next two sections discuss the roles of buyer–supplier social capital, cluster social capital, supplier integration and cluster cooperation in mitigating supply risk of SMEs. The roles of buyer–supplier social capital and supplier integration are discussed in Section 7.3, while the roles of cluster social capital and cluster cooperation are discussed in Section 7.4. Finally, Section 7.5 provides a summary of this chapter.

7.2 Effect of Supply Risk on Operational Performance of SMEs

The study has proposed a framework that investigates the impact of supply risk on operational performance of SMEs (H1). The results confirm that supply risk can reduce operational performances of SMEs (β = -0.63, $p < 0.001$). The findings suggest that when SMEs face greater variations in their upstream supply in the form of quality, quantity or lead times, their ability to meet customer requirements deteriorates substantially. The findings support the notion that outcomes in supply performance disperses throughout the entire supply chain of

SMEs (Kim, Lee & Lee 2017). While a consistent and desired supply performance can enhance the overall operational performance, any variation has a detrimental effect on the operations of SMEs. This observation corroborates the Theory of Swift, Even Flow which postulates that 'the more swift and even the flow of materials through a process, the more productive that process is' (Schmenner & Swink 1998, p. 102). Given that all the activities involved in a supply chain are sequenced, variation in the upstream supply of SMEs can have a domino effect and reduce the ultimate operational performance of the chain. The negative outcomes of supply risk are also well-documented in the definition of supply risk. For example, Zsidisin (2003a) defines supply risk in terms of detrimental outcomes of a supply variation, which are primarily related to the inability of a firm to meet customer demand or ensure customer safety.

However, the finding of this study differs from that of Chen, Sohal and Prajogo (2013) where, in the case of large firms, supply risk does not significantly undermine operational performance. Such a difference reflects that, unlike large firms, SMEs are not able to resolve any variation in the upstream supply within the production process. This is probably due to the fact that their production systems are not well-structured nor do they carry optimal buffer stocks to reduce the impact of supply risk. The differences in the impacts of supply risk also indicate that SMEs are more vulnerable to supply risk than larger firms (Hendricks & Singhal 2005b; Kaufmann, Carter & Rauer 2016). In the context of Bangladeshi SMEs, Rashid (2012) reports that supply risk is one of the major issues that hinders the performance of the SMEs. Another recent study (Abdin 2018) also agrees that variations in the quantity delivered and frequent changes of the price of the material make the whole Bangladeshi SME sector uncompetitive in the current market. The result of H1 provides further empirical evidence that Bangladeshi SMEs are vulnerable to supply risk that undermine their operational performance.

Supply risk in this study is reflected by seven measurement items that examine the occurrence of variations in the inbound supply. The evaluation of the measurement model indicates that

the loadings of all the supply risk indicators range between 0.747 and 0.864 (Table 6.17). The high loadings indicate that all the seven items strongly measure the theoretically intended supply risk construct and they all can substantially reduce the operational performance of SMEs. Among the seven indicators, the investigated SMEs believe that the most crucial supply risk indicator is deviations in the specified quantity (0.864). This result reflects the findings of Abdin (2018) who reports that the inadequate quantity of raw material supply is one of the main problems for all Bangladeshi SMEs, including apparel-SMEs. The high impact of quantity deviation of supply on operational performance is also reasonable, as SMEs do not hold sufficient buffer inventories for probable supply risk (Ellegaard 2008; Faisal, Banwet & Shankar 2007b). They may even need to stop the production process in the occasion when their key suppliers are unable to provide the specified volume of the material. Break of promise in delivering material (0.852) and deviations in the delivery lead times (0.849) are considered as the second and third most crucial indicators, respectively, of supply risk. These results suggest that SMEs are highly dependent on the seamless and timely performance of their suppliers (Prasad, Tata & Guo 2012).

The evaluation of the loadings in the measurement model of operational performance indicates that, among the six performance metrics, SMEs perceive on-time delivery (0.900) as the most important metric, which load more heavily on the construct than the other items. Previous literature provides confronting findings for the on-time delivery as an indicator of the operational performance of SMEs. For example, Hsu *et al.* (2011) find that ensuring 'just-in-time' delivery is one of the most important operational performance indicators, which contributes to the overall performance of the SMEs. On the other hand, Thakkar and Deshmukh (2008) report that SMEs consider the inventory cost, internal failure and service levels, while large firms consider on-time delivery, response rate and service level as the measures of operational performance. Despite the differences in the literature regarding on-time delivery as

a measure of operational performance, the result of this study shows that Bangladeshi apparel-SMEs have perceived the importance of on-time delivery for the operations as it is hard to survive in the modern competitive market without maintaining on-time delivery of products (Chen, Sohal & Prajogo 2013). In particular, the apparel industry is characterised by intense global competition (Niemann, Kotze & Mannya 2018), which motivates Bangladeshi SMEs to ensure on-time delivery. The loadings of the other five performance metrics in the construct range between 0.785 and 0.823, suggesting that they are all perceived with almost equal importance as the indicators of operational performance. The high factor loadings of all the items suggest that supply risk can substantially reduce the performance of all these metrics supporting the validity of H1, which shows that supply risk significantly undermines the operational performance of SMEs. Table 7.1 summarises the salient points of the above discussions on the impacts of supply risk on operational performance of SMEs.

Table 7.1: Summary of discussions on the effect of supply risk

Hypothesis	Significance of Findings
H1: Supply risk has a negative effect on operational performance of SMEs.	▪ Ability of SMEs to meet customer requirements deteriorates substantially when there is greater variation in upstream supply in terms of quality, quantity, lead times or overall requirements. ▪ The observation corroborates the Theory of Swift, Even Flow. ▪ SMEs are not able to resolve any variation in the upstream supply within the production process. ▪ SMEs are more vulnerable to supply risk than large firms when compared to other studies. ▪ Deviations in the specified quantity is the most crucial supply risk indicator to SMEs, which can substantially hamper their operations. ▪ On-time delivery is the most important operational performance metric to SMEs.

7.3 Effect of Buyer–Supplier Social Capital on Supply Risk of SMEs

The impact of buyer–supplier social capital on supply risk of SMEs is hypothesised in the current study in two ways: (1) direct influence of buyer–supplier social capital on supply risk;

and (2) indirect influence of buyer–supplier social capital on supply risk through supplier integration. The results confirm that buyer–supplier social capital reduces the supply risk of SMEs, both directly and indirectly, via supplier integration. This section discusses the findings related to those direct and indirect influences.

7.3.1 Direct Effect of Buyer–Supplier Social Capital on Supply Risk of SMEs

The study reveals a statistically significant direct negative impact of buyer–supplier social capital on the supply risk of SMEs ($\beta = -0.35$, $p < 0.001$), supporting H2. Aligned with the literature, the result shows that frequent and multiple interactions, improved interpersonal relationships and similar understandings with the key suppliers can assist SMEs in mitigating variations in the supply performance (Cooke 2007). According to Prasad, Tata and Guo (2012), social capital of SMEs with key suppliers is malleable and can be utilised for achieving specific operational metrics. The result of the current study shows that greater social capital with key suppliers is effective in reducing the occurrences of variations in the upstream supply in terms of quality, quantity, lead times and the overall requirements of supply.

Based on the tenets of the Social Capital Theory, Adler and Kwon (2002) suggest that social capital can be a substitute for other resources or can compensate for a lack of other standard practices of a firm. In the same vein, the findings of the current study suggest that in an SME's upstream supply chain set-up, where there is a lack of formal governance mechanism or well-developed supply infrastructure, the use of social capital with key suppliers will result in reduced supply risk. Since the formal legal structures and supply channels of SMEs in developing countries, like Bangladesh are still at an immature stage (Sodhi & Tang 2014; Sreedevi & Saranga 2017), social capital with the key suppliers provide them with an alternative and informal way of mitigating supply risk in an efficient manner. This is because an established network of business partners, such as buyer–supplier networks, do not need

extensive documentation or litigation to ensure a consistent and deviation-free network performance (Clarke, Chandra & Machado 2016).

The significant negative impact of buyer–supplier social capital on supply risk of SMEs can also be explained by the 'debt/favour' concept of social capital introduced by Lee and Humphreys (2007). The authors propose that in a buyer–supplier network with the presence of improved social capital, a favour performed by one of the parties is perceived as a debt by another party, which has to be repaid, sometime, in the future. Similarly, the result of the current study shows that the debt/favour relationships, i.e. key suppliers are, in effect, indebted to the buying SMEs due to the favour provided to them, put pressure on suppliers to perform according to the promises made to the SMEs. As a result of this reciprocal exchange mechanism, key suppliers ensure that the job is performed without any deviations, thus the risk is minimised in the supply network.

Finally, the result suggests the existence of a 'power to influence' benefit of the buyer–supplier social capital (Yeung 2008). A classic example of 'power to influence' partners can be found in the study by Coleman (1988, p. 103) in the context of 'the Senate Club' of the U.S. Senate, where the author reports that social relations among some of the senators built up a set of obligations among them, which made it possible to get legislation passed in the Senate that would otherwise be stymied. Similarly, improved buyer–supplier social capital creates a set of obligations in the network of relationships. These obligations provide the focal buyer SMEs with sufficient powers to influence their key suppliers, which benefit SMEs to get things done and achieve their initial sourcing objectives.

Bangladeshi apparel-SMEs mostly use imported materials, at least the key materials such as fabrics, thread, and dye, for producing their products (Chowdhury, Azam & Islam 2013). However, they do not import the materials directly due to their limited financial and technical

abilities. Rather, they source the material from local traders/importers. Some of them are large in size and they deliver materials to many apparel manufacturers (Abdin 2018). Since many apparel-SMEs are dependent on only a few local traders/importers for materials, and they do not use any formal contract in sourcing, as discovered in the demographic questions in Chapter 5, they rely heavily on these traders/suppliers. The result of the current study demonstrates that in such high-dependency situation, improved buyer–supplier social capital can serve as a facilitator to ensure the seamless supply performance by reducing the incentives for suppliers to behave opportunistically.

As previously mentioned in Chapter 2 and Chapter 4, social capital is reflected by three first-order dimensions, namely structural, relational and cognitive dimensions. A comparison of the loadings of these three first-order dimensions of buyer–supplier social capital reveals that cognitive capital achieves the highest loading (0.777), signifying that cognitive capital is the most important dimension for SMEs in the buyer–supplier network. However, in the context of large firms Villena, Revilla and Choi (2011) find that relational capital is the most important dimension in the buyer–supplier network. The differences in the findings are probably because that SMEs prefer to source and develop networks with local and known suppliers with whom they share similar languages and understandings (Ellegaard 2009). Another plausible reason is that cognitive capital plays an important role in accumulating structural and relational capital for SMEs (Gao, Sung & Zhang 2011). As such, SMEs place higher importance on cognitive capital rather than structural and relational capital. The results suggest that buyer–supplier cognitive capital, such as shared values and philosophies as well as common languages and codes, can assist SMEs in reducing variations in the upstream supply by improving the sense of fairness in the relationships.

Although cognitive capital achieves the highest factor loading in the buyer–supplier network, structural (0.740) and relational (0.737) capital also attain high loadings. These loadings indicate that all three dimensions are strongly measuring the theoretically intended buyer–supplier social capital construct. The high loading factors of these first-order dimensions also signify their importance in mitigating supply risk. Consistent with the broader claim of social capital theorist (Ellis & Pecotich 2001; Partanen *et al*. 2008), the high loading of the structural capital suggests that buyer–supplier structural capital, which is the strength of social interactions existing between buying SMEs and their key suppliers, is essential for ensuring consistent success of an SME's network.

The loading of buyer–supplier relational capital indicates that interpersonal relationships between SMEs and their key suppliers are also crucial for achieving supply risk mitigation. In contrast, Hormiga, Batista-Canino and Sánchez-Medina (2011) find that relational capital with the suppliers does not improve SME's success. One of the possible reasons of such differences is that it is not the time spent for networking, but the relationship quality that determines the success of an SME's network. The authors measured relational capital in terms of the number of hours spent per week for networking with their suppliers. The findings clearly indicate that hard-earned relational capital provides little or nothing to the company. Another possible reason is that networking with everyone does not bring positive outcomes for the SMEs. The authors measured the time spent in establishing relational capital with all suppliers of the surveyed SMEs in general, while a number of studies (Chen, Sohal & Prajogo 2013; Cheng, Yip & Yeung 2012) suggest that it is important to allocate scarce resources to build relational capital with the key suppliers from whom firms source the main/crucial components of production. Another reason could be the context of the study. Hormiga, Batista-Canino and Sánchez-Medina (2011) collected the data from two developed countries, Spain and Portugal. Relational capital plays more influential role in the developing or emerging countries than

developed countries since SMEs in the developing countries are more dependent on social capital for improving risk management capabilities (Stam, Arzlanian & Elfring 2014). The result of the current study suggests that in a developing country like Bangladesh leveraging all dimensions of buyer–supplier social capital are crucial for mitigating the supply risk of SMEs.

Further evaluation of the measurement items of these first-order factors of buyer–supplier social capital indicates that the loadings of the five indicators of structural capital range from 0.735 to 0.801 (Table 6.17). These loadings indicate that structural capital is strongly reflected by these items, suggesting that the indicators play a crucial role in achieving the outcomes of buyer–supplier social capital, such as reduced supply risk. Among the indicators, the surveyed SMEs agree that face-to-face interactions (0.801) and joining in organised social and family events (0.788) are the two most important indicators of social interactions. However, they allocate less importance to other modes of social interactions, such as interactions via multiple channels (0.763). These results demonstrate that despite the increasing popularity of digital and mobile communication, SMEs still depend more on direct interactions, such as face-to-face interactions and gatherings at family and social events, to interact with their key suppliers. The main reasons of such dependency are that SMEs lack the sophisticated information technologies and skills of using such technologies to interact with their key suppliers (Ya'kob & Jusoh 2016).

All the indicators of relational capital achieve high loadings, ranging from 0.749 to 0.833, indicating their strength in reflecting relational capital and importance in achieving supply risk mitigation. Among the indicators, reciprocity, which is the sense of fairness to work mutually, (0.833) attains the highest loading, followed by trust (0.832). The highest loading of reciprocity suggests that SMEs value competence trust the most, that is when SMEs perceive that their key suppliers have the necessary expertise to assist them, they also feel it fair to work mutually

with the suppliers and develop interpersonal relationships with them, mirroring the findings of Carsrud and Brännback (2012). The loading of trust (0.832) is also found to be almost similar to reciprocity, suggesting that Bangladeshi SMEs not only give importance to the competence trust but also to the interpersonal trust that they have developed with their key suppliers through a history of interactions. This is consistent with Bylok and Cichobłaziński (2012) who find that trust is a vital element of social capital that has an influence on the network outcomes. Other indicators such as commitment (0.826), mutual respect (0.820), personal friendship (0.769) and togetherness (0.749), are also found to be crucial for SMEs' buyer–supplier relational capital.

Similar to the loadings of the indicators of structural and relational capital, the loadings of the items of the buyer–supplier cognitive capital are high in value, ranging between 0.768 and 0.878. These indicators reflect the level of congruence in the network of relationships, and the high loading factors reveal their significance in reducing the supply variations. The results demonstrate that SMEs perceive shared attributes and ideologies as critical elements to create collective understandings relating to 'how things ought to be' (Arregle *et al.* 2007, p. 79). Among the indicators, shared corporate values (0.878), philosophy/approaches to business dealings (0.849) and common codes and languages (0.836) achieve loadings higher than 0.8. The results mean that Bangladeshi SMEs select and promote suppliers for networking who share similar values, norms and languages. Compared to these three indicators, similar resources/capabilities attains a lower loading (0.768). The results suggest that firms being of similar size and capability is not as strong as common ideologies to reflect common understandings of the network members.

7.3.2 Indirect Effect of Buyer–Supplier Social Capital on Supply Risk of SMEs

7.3.2.1 Effect of Buyer–Supplier Social Capital on Supplier Integration

Consistent with expectations, the study reveals a statistically significant positive impact of buyer–supplier social capital on supplier integration of SMEs ($\beta = 0.75$, $p < 0.001$), supporting H3. The findings suggest that social interactions, interpersonal relationships and similar understandings between SMEs and their key suppliers improve the integrative behaviours between both parties (Padilla-Meléndez, Del Aguila-Obra & Lockett 2013). Such behaviours include information and resource sharing, joint actions to solve problems, and flexible arrangements in sourcing. The findings of this study support the argument of Cheng, Yip and Yeung (2012) that social capital with key suppliers improves, as do other resources or mechanisms, firms' supply management practices. The findings corroborate the argument of the Social Capital Theory that network integration is one of the main direct benefits of social capital (Adler & Kwon 2002).

The result of H3 suggests that inter-organisational social relations with key suppliers enable SMEs to exchange and access broader ranges of information and valuable resources, such as technical knowledge and business experience, along the supply network (Capó-Vicedo, Mula & Capó 2011). This is probably due to the fact that SMEs do not have the luxury to develop the required technological systems for effectively integrating with the suppliers to facilitate exchange of information, experience and know-how between them (Ya'kob & Jusoh 2016). Therefore, they are highly dependent on improved social capital, characterised by social interactions, interpersonal relationships and common goals and understandings to foster information and resource exchange.

Moreover, the result of H3 supports the findings of Liao and Barnes (2015) who report that it is not the information technology capability, but the high relationship quality and interpersonal

connections of SMEs with their key suppliers that improve the collaboration and flexibility in the upstream supply. A well-structured information system may enable information dissemination, but does not guarantee quality of information and knowledge shared between the parties, nor does it confirm other integrative practices such as joint actions and improved flexibility in sourcing. The findings of the current study suggest that in an economy like Bangladesh's, where SMEs have a lack of technological systems (Bakht & Basher 2015), leveraging social capital with the key suppliers can supplement the shortfall, and improve integration with the key suppliers.

As previously mentioned in Chapter 4, supplier integration is conceptualised as a second-order construct in this study, which includes four first-order factors such as information sharing, resource sharing, supplier collaboration and flexible sourcing. The evaluation of the measurement model shows that all four first-order factors of supplier integration achieve high standardised coefficients, ranging from 0.746 to 0.812. These high loadings indicate that supplier integration is well reflected by each of these factors, suggesting that buyer–supplier social capital is able to explain a considerable portion of the variance in these sub-constructs of supplier integration. In other words, leveraging social capital with the key suppliers can increase the exchange of relevant and required information and resources, foster collaborative actions, and improve flexible arrangements in sourcing. Digging deeper into the item level, it is revealed that the standardised coefficients of the measurement items of these four sub-constructs are all greater than 0.7 (Table 6.17). The high loadings of all these indicators indicate their importance as a supplier integrative practice, and suggest that social capital with key suppliers can assist SMEs in enhancing these integrative practices.

7.3.2.2 Effect of Supplier Integration on Supply Risk

Supplier integration is found to have a strong negative direct effect on supply risk of SMEs (β = -0.40, $p < 0.001$), supporting H4. The result demonstrates that SMEs working in an integrative manner with their key suppliers can understand each other better and achieve greater success in network relationships, such as reduction in exposure of risk from suppliers. Aligned with the literature, the findings of this study support the notion that high-performing SMEs in upstream supply are those who are able to develop integrative relationships with their key suppliers in inter-firm relationships (Blackhurst, Dunn & Craighead 2011; Welbourne and Pardo-del-Val 2009).

The existing literature supports the notion that integrative practices with the key suppliers can reduce supply risk for large firms. For example, Chen, Sohal and Prajogo (2013) have examined several supply variations, which include variation in terms of quality, quantity, lead times, overall requirements, supplier's promise and capacity. They find that coordinated and joint actions performed by both buyers and their key suppliers can reduce these supply variations. Another study (Cheng, Yip & Yeung 2012) finds that exchanges of information with the key suppliers can improve supplier performance measures, which include percentage of order suppliers meeting specification in terms of design, quality, delivery time, cost, special/rush order lead time and material development time. In other words, the findings reveal that information sharing reduces the variations in the expected outcome of inbound supply for large firms. As such, supplier integration is considered an effective strategy to help reduce complexity in upstream supply (Subramanian, Rahman & Abdulrahman 2015) It is also well-documented in the literature that integrative practices with the key suppliers have ensured consistent delivery of material for Japanese automotive companies (Dyer & Ouchi 2002; Liker & Choi 2004). The findings of the current study extend the value of supplier integration for

SMEs and show that integrative practices not only provide benefits to the large firms, but are also effective for SMEs to reduce the variations in the inbound supply.

As mentioned earlier, all four first-order factors, namely information sharing, resource sharing, supplier collaboration and flexible sourcing, of supplier integrations and their measurement items achieve high loading coefficients, indicating their importance in mitigating supply risk. Among the four sub-constructs, the surveyed Bangladeshi SMEs believe that exchange of information between them and their key suppliers is the most important integrative practice (0.812). This finding differs from that of Yim and Leem (2013) where, in the context of large firms, supplier collaboration is found to be the most important integrative practice followed by information sharing and resource sharing. The differences in the findings suggest that SMEs most value the timely exchange of relevant and required information by their counterparts because they have a lack of information technology to provide visibility in the supply chain (Hormiga, Batista-Canino & Sánchez-Medina 2011). This is further evident in the high loadings (ranging from 0.724 to 0.837) of the four items that reflect the extent of information exchanged between them and their key suppliers. Timely sharing of required information, considered as a countermeasure to risk (Chen, Sohal & Prajogo 2013; Fan *et al.* 2017), allows SMEs to become aware of probable risk beforehand and to take the necessary actions to reduce it. Consequently, SMEs can reduce the actual occurrence of supply risk. The result is consistent with Ya'kob and Jusoh (2016) who find that supplier integration practices, specifically information sharing, both significantly and positively improve the business performances of SMEs by ensuring consistency in the network outcomes.

The factor loading of resource sharing (0.746), which includes the exchange of both tangible and intangible resources, indicates that it can explain a substantial portion of the variance in supply risk. The result suggests that exchanges of tangible assets, including financial resources

and extended credit period, assist SMEs in ensuring expected supply outcomes as they are able to deploy those complementary resources offered by the key suppliers to ensure network success (Min, Kim & Chen 2008). The result also indicates that the exchanges of intangible resources, which include business experience, knowledge and technical know-how, with the key suppliers can reduce variations in the inbound supply. In fact, the factor loading of sharing business experience (0.862) is highest in the construct, demonstrating the importance of sharing experience and knowledge in supply risk mitigation. The exchange of intangible assets achieve high loading probably because that sharing of business experience and technical know-how with the key suppliers creates a knowledge-based buyer–supplier network (Christopher & Lee 2004; Ritchie & Brindley 2007). Such a knowledge-based network can improve the performance of the network because it improves the competence of the SME practitioners. Moreover, a higher supply knowledge can reduce the supply variation, as variance of a process and knowledge are considered inversely linked. For example Anderson, Rungtusanatham and Schroeder (1994, p. 485) report that large 'variation indicates less knowledge of special and common causes of variation'. The result of the current study also suggests that with the increase of the exchanges of knowledge and learning with the key suppliers, SMEs are able to reduce variations in inbound supply as they become aware of the causes of variation. As such they perceived high importance for the exchange of intangible assets.

The loadings of supplier collaboration (0.804), which measures coordinated or joint activities performed by SMEs and their key suppliers, and its four measurement items (ranging between 0.751 and 0.829) are high in value, indicating the strength of collaborative actions in reducing the supply risk of SMEs. This is consistent with the previous research arguing that supplier collaboration plays a crucial role in improving the supplier capabilities to meet the buyer's specifications (Mikalef *et al.* 2015; Van der Vaart *et al.* 2012). With a focus on large firms,

Chen, Sohal and Prajogo (2013) also report that supplier involvement and collaboration can significantly reduce supply variations of the buying firms.

Finally, the high loadings of flexible sourcing (0.812) and its four measures (ranging from 0.700 to 0.811) suggest that SMEs perceive less risk from their key suppliers when they see that their suppliers are willing to take necessary actions to meet their sudden demands and allow them to modify the order specifications (Ellegaard 2009). The result is consistent with Eze *et al*. (2013) who report that a formal structure without ensuring flexible arrangement fails to bring the desired outcomes for SMEs. When the key suppliers allow SMEs to give rush/sudden orders or modify the order quantity or delivery time, they are able to change the order specifications due to any unforeseen circumstances. Such arrangements in sourcing assist SMEs in achieving the expected supply performances.

7.3.2.3 Effect of Buyer–Supplier Social Capital on Supply Risk through Supplier Integration

In this study, it is argued that buyer–supplier social capital has an indirect influence, in addition to its direct influence, on supply risk of SMEs through supplier integration (H5). In other words, supplier integration mediates the relationship between buyer–supplier social capital and supply risk. The study finds a partial support for H5 that supplier integration mediates the influence of buyer–supplier social capital on the supply risk of SMEs. This means that buyer–supplier social capital is independently linked to reductions of variation in upstream supply, as well as indirectly through supplier integration. The indirect path from buyer–supplier social capital to supply risk through supplier integration is found to be significant with a $\beta = -0.30$ and $p < 0.001$. The outcome suggests that although buyer–supplier social capital has a significant direct impact on supply risk, supplier integration further strengthens the magnitudes of the impact.

The findings are consistent with that of previous research revealing the benefits of buyer–supplier social capital in reducing risk or enhancing the risk-mitigation capabilities of SMEs, regardless of the existence of supplier integration (Gao, Sung & Zhang 2011; Prasad, Tata & Guo 2012). These studies argue that leveraging social capital with the key suppliers can independently enhance the risk-mitigation capabilities of SMEs. The findings of the current study provide the statistically validated empirical support that these capabilities are further enhanced when social capital can improve the integrative behaviours with the network members. The findings are also consistent with that of previous research reporting how social capital improves SMEs performance (Arregle *et al.* 2007; Mamun *et al.* 2016; Prasad, Tata & Guo 2012; Song *et al.* 2016). These studies find that social capital enhances the performance of SMEs both directly and indirectly through improving network integration.

In the current study, the indirect impact of buyer–supplier social capital on supply risk is found to be 46.15 per cent of the total effect. The number indicates that supplier integration plays a relatively crucial role in mediating the relationship, which also highlights the value of supplier integration in mitigating supply risk. This finding is not surprising, as previous researches have also highlighted the indirect benefits of social capital. In fact, Arregle *et al.* (2007) mention that the impact of social capital on SMEs performance is more indirect, through improving network cooperation, than direct.

In summary, this section demonstrates that buyer–supplier social capital and supplier integration can independently reduce the supply risk of SMEs. However, the influence of buyer–supplier social capital on supply risk is enhanced when it can influence the integrative practices between SMEs and their key suppliers. Table 7.2 summarises the salient points of the above discussions on the role of leveraging network resources with the key supplier.

Table 7.2: Summary of the discussions on the roles of buyer–supplier social capital and supplier integration

Hypothesis	Significance of Findings
H2: Buyer–supplier social capital has a negative direct effect on supply risk of SMEs.	▪ Buyer–supplier social capital, which includes frequent and multiple interactions, improved interpersonal relationships and similar understandings with the key suppliers, is effective in reducing supply risk of SMEs. ▪ Leveraging social capital with the key suppliers provides an alternative, informal but efficient way of mitigating supply risk when there is a lack of formal governance mechanism, or well-developed supply infrastructure. ▪ Improved buyer–supplier social capital can also reduce supply risk of SMEs when they rely heavily on their suppliers. ▪ The observation validates the 'debt/favour' concept of social capital and supports the existence of the 'power to influence' benefit of buyer–supplier social capital. ▪ All three dimensions of buyer–supplier social capital can assist in reducing supply risk of SMEs, although cognitive capital is the most important dimension in the buyer–supplier network. ▪ Buyer–supplier relational capital plays a more influential role in the developing or emerging countries, like Bangladesh, than in developed countries; and when interpersonal relationships are built only with the key suppliers rather than all suppliers when compared to other studies. ▪ Surveyed SMEs agreed that face-to-face interactions and joining in organised social and family events are more important than other modes of social interactions.
H3: Buyer–supplier social capital has a positive effect on supplier integration of SMEs.	▪ Social capital between SMEs and their key suppliers increases the supplier integrative practices, which include exchange of relevant and required information and resources, collaborative actions and flexible arrangements in sourcing. ▪ Buyer–supplier social capital can supplement the lack of technological systems required to effectively integrate with the key suppliers. ▪ All dimensions of buyer–supplier social capital can assist SMEs in this regard. ▪ The outcome corroborates the Social Capital Theory.
H4: Supplier integration has a negative effect on supply risk of SMEs	▪ Variations in the upstream supply reduce significantly when SMEs work in an integrative manner with their key suppliers. ▪ The observation extends the value of supplier integration for SMEs. ▪ Although all four supplier integrative practices investigated in this study can substantially reduce supply risk of SMEs, information sharing is the most important one among the four.
H5: Supplier integration mediates the relationship between buyer–supplier social capital and supply risk.	▪ Supplier integration partially mediates the relationship between buyer–supplier social capital and supply risk of SMEs. ▪ Magnitude of impact of buyer–supplier social capital on supply risk is substantially enhanced when social capital improves supplier integration. Thus, supplier integration serves as a crucial mediator in the relationships.

7.4 Effect of Cluster Social Capital on Supply Risk of SMEs

This study hypothesised in Chapter 2 that cluster social capital has an indirect impact on the supply risk of SMEs through improving cluster cooperation. The analysis has revealed that in addition to the above-mentioned indirect impact, cluster social capital also indirectly affects supply risk through enhancing buyer–supplier social capital. This section discusses the findings related to the influences of cluster social capital.

7.4.1 Effect of Cluster Social Capital on Cluster Cooperation

Consistent with expectations, the findings reveal that cluster social capital in an SME cluster has a statistically significant positive impact on the cluster cooperation ($\gamma = 0.74$, $p < 0.001$), supporting H6. In this regard, the results show that leveraging social capital with other SMEs within the cluster, who maintain close social relations with each other, improves the cooperation of all the SMEs embedded in the network. The R^2 of cluster cooperation is found to be 0.55, suggesting that cluster social capital substantially facilitates the development of cooperative practices among the network members (Granata *et al.* 2017). In particular, when SMEs maintain and foster frequent social interactions, good interpersonal relationships, and congruent ideologies with other SMEs in the cluster, they all experience improvements in the exchange of relevant supply information, experiences, knowledge and resources, the joint solutions to common supply problems, and the practice of collaborative sourcing.

This finding corroborates the Social Capital Theory from a horizontal network perspective, in that enhanced social relations within a network of similar firms inside a cluster or an industrial district improves cooperation between the firms embedded in that network (Inkpen and Tsang 2005; Oprime, Tristao & Pimenta 2011b). It also sheds light on the importance of horizontal social capital for improving ‘coopetition’ – cooperation among competing firms – in an SME cluster. Since the SMEs of each cluster studied in this research manufacture similar apparel

products (Bangladesh SME Foundation 2013), the firms within a cluster can be regarded as competing firms. Such a result provides empirical evidence that cluster social capital is effective in enhancing the coopetition of network members, as suggested by a few other studies (Dana *et al.* 2013; Granata *et al.* 2017).

In line with previous researches (Bellandi 2002; Camison & Fores 2011), this result suggests that a system of social relations among SMEs in a geographical cluster improves the availability of local public goods, such as the circulation of information, knowledge, skills, and resources. The more an SME establishes social capital with its peers in the cluster, the more public goods, including those related to supply management, can be acquired by the SME from its peers. This is probably due to the fact that social embeddedness in a network of similar SMEs in an industrial cluster serves as stimuli for all the network members to exchange knowledge and resources with their peers, as the knowledge and resources circulating in the network can be obtained and applied by all the SMEs embedded therein (Ng *et al.* 2017). In the context of the Bangladeshi SME cluster, Abdin (2016) reports that improvements in the exchange of information and know-how, including sourcing know-how, is one of the key priorities of SME clusters. The results of the current study demonstrate that leveraging cluster social capital could be a feasible option for enhancing such flows of information and knowledge inside a cluster.

The result also suggests that improved cluster social capital enables the network members to tackle a common supply problem jointly. This is probably because that as a result of being socially tied to their peers within the cluster, SMEs feel a sense of responsibility to promote the whole group (Wang & Fesenmaier 2007). The result is also consistent with that of Lewis, Byrom and Grimmer (2015), where the authors find that network capital of the horizontal SMEs in a cluster can improve the collaborative practices among the members of the network. Although the study is conducted in the context of the downstream supply chain, it shows that

cluster social capital can improve the cluster cooperation to undertake collaborative marketing of the products. The outcome of the current study extends the benefits of cluster social capital to the upstream supply chain and demonstrates that with its increase, embedded SMEs practice cooperative sourcing of the material.

Similar to buyer–supplier social capital, cluster social capital is reflected by three first-order dimensions – namely, structural, relational and cognitive dimensions. The measurement model evaluation demonstrates that among the three dimensions, cognitive capital achieves the highest loading (0.791), similar to the result found in buyer–supplier social capital. The result further strengthens the notion that cognitive capital plays the most influential role in enhancing the cooperation in a network of SMEs. The factor loadings of two other dimensions of cluster social capital, cluster structural capital (0.771) and cluster relational capital (0.783), are also found to be high. These loadings signify that all three dimensions strongly measure the theoretically intended cluster social capital construct. These loadings also suggest that each of these three dimensions explain a substantial portion of the variance in cluster cooperation and contribute to its improvements. The results also demand specific strategies for leveraging all dimensions of cluster social capital to improve cluster cooperation. This is because merely belonging to an SME cluster does not improve cooperative behaviours among the members unless social relations are improved with each other (Molina-Morales, García-Villaverde & Parra-Requena 2014).

The high loadings of all three dimensions support the notion that all dimensions of cluster social capital can play the ‘efficacy role’ to acquire information, develop knowledge and improve cooperation among the network members (Chetty & Agndal 2007). However, the result differs from that of García-Villaverde, Parra-Requena and Molina-Morales (2018), where the authors do not find any support for the hypothesis that structural cluster capital

improves the cooperative practices inside a cluster. Such a difference in the findings is probably due to the fact that García-Villaverde, Parra-Requena and Molina-Morales (2018) measured social interactions with all contacts, such as people, firms and institutions in the cluster. On the other hand, the study only measured the social interactions with the peers with whom the surveyed SMEs had maintained good social relations. The differences in the results suggest that close social interactions with some peers improve cooperation in the relationships, while close social interactions with everyone do not provide the intended benefits.

The measurement model evaluation in Chapter 6 demonstrates that the loadings of the six indicators of structural cluster capital range from 0.695 to 0.811 (Table 6.17). These loadings demonstrate the importance of social interactions among the members of a cluster network to promote the collaborative actions and the exchanges of sourcing knowledge, such as supply information, experiences and skills in the relationships. In fact, some of this unique knowledge would otherwise remain unknown by these SMEs. This is because there is a type of knowledge, known as tacit knowledge, which cannot be transmitted through the formal channels and can only be exchanged and accessed through the social interactions inside the cluster (Carbonara, Giannoccaro & Pontrandolfo 2002). For example, Nonaka (1994, p. 16) reports that 'knowledge that can be expressed in words and numbers only represents the tip of the iceberg of the entire body of possible knowledge'.

The loadings of the six cluster relational capital indicators range between 0.805 and 0.869, signifying that all the indicators strongly reflect the construct. The results also suggest that the interpersonal relationships, which include trust, mutual respect, personal friendship, reciprocity, commitment, and togetherness with their peers substantially reflect the higher-order cluster social capital and thus contribute to the enhancement of cluster cooperation (Gretzinger & Royer 2014). Among the indicators of relational cluster capital, Bangladeshi

apparel-SMEs believe that togetherness (0.869) among the network members is the most crucial indicator. The result supports the notion that SMEs value 'togetherness' with their peers most as it implies 'an atmosphere of cooperative and trusting behaviour in which economic actions is regulated by implicit and explicit rules' (Molina-Morales & Martinez-Fernandez 2003, p. 156).

Finally, all five indicators used for measuring cognitive cluster capital also achieve high factor loadings, ranging from 0.815 to 0.878, indicating their importance in reflecting cluster cognitive capital. The loadings also demonstrate the significance of developing shared norms, values and languages and a common culture among the firms in a cluster network to enhance the cooperative practices with each other. Unlike the factor loadings of cognitive capital in the buyer–supplier network, the loadings of cluster cognitive capital indicators show that 'shared codes and languages' achieves the highest loading (0.878) followed by a similar business goal (0.867). The results suggest that SMEs, including Bangladeshi apparel-SMEs, are perceived as being congruent with their peers when they all have similar dialogues and business goals (Camison & Fores 2011).

7.4.2 Effect of Cluster Cooperation on Supply Risk

The expectation mentioned in H7, that cooperation with other SMEs in a cluster network would reduce supply risk of SMEs, is also supported ($\beta = -0.23$, $p < 0.001$). The result shows that higher level cooperation, such as sharing supply information and resources and taking joint sourcing actions with other SMEs in a cluster, leads to reduced supply variations for all SMEs embedded in the network. This is probably due to the fact that the sharing and processing of supply information and experiences with other SMEs in a cluster network enhance the sourcing skills, capabilities and knowledge of the SME practitioners (Camison & Fores 2011; Puig & González-Loureiro 2017). As a result, they all become confident and competent when

managing sourcing activities. Such confidence and competences enable them to conduct the most appropriate strategies to mitigate any variations in supply. The finding is consistent with that of Mursalin (2012) where the author reveals that SMEs in Bangladesh are highly influenced by other SMEs inside the cluster with whom they have good social relations. They influence each other in selecting and managing suppliers through sharing their own experiences and knowledge, which reduce supply risk of SMEs.

Moreover, in a network of similar SMEs within a cluster, information, skills and knowledge are reproducible in nature, i.e. one type of knowledge provided by a member of a cluster network creates a new type of knowledge in the community through improving the quality or quantity of that knowledge. For example, Bellandi (2002) reports that in an SME cluster network, internal cooperation boosts the supply of experience and knowledge, which are reproduced without the help of strategic planning. The cumulated sourcing knowledge of the SME entrepreneurs contributes to their managerial skills, thereby reducing any variations in the supply. Furthermore, through the exchange of information and experience with a peer, an SME can get the contact information of a supplier who have been satisfactorily supplying material to the peer over the years. As a result, the SME can switch to the supplier who can deliver the material without any deviation in supply (Kirilmaz & Erol 2017).

Furthermore, the result shows that being cooperative with each other SMEs in a cluster network practice collaborating sourcing, i.e. they jointly procure the material. This cooperative procurement increases the sourcing power of the embedded SMEs because it increases the volume of the material sourced. Moreover, it improves the ability of the SMEs to source a critical material from a more reputable and less risky supplier who operates in a distant market, who would not otherwise have been possible for these SME to access alone. In the context of outbound sales in Australian, and in particular Tasmanian wine SMEs, similar findings are reported by Lewis, Byrom and Grimmer (2015) who find that SMEs can access new markets

through adopting cooperative marketing with their peers in a cluster. The result of the current study suggests that SMEs can also reach new suppliers through cooperative sourcing.

The result also shows that due to cooperative relationships, SMEs of a cluster network can solve sourcing-related problems jointly and undertake joint actions, such as training on procurement. These joint actions also assist all the SMEs in achieving a larger size (Gronum, Verreynne & Kastelle 2012), which is a big advantage and consequently reduces variations in supply. This is because joint actions put pressures on suppliers to oblige the sourcing requirements, as failure to do so will result in a reputation loss to all the SMEs involved in the joint action. In the context of large firms, an example of this joint action/collaboration is cited in Hearnshaw and Wilson (2013) where the authors mention that JCI and Lear, two peers that produce car seats, countered the bargaining power of their vertical supply chain player, Volvo, by establishing collaborative relationships between them.

The study used six measurement items to capture the cluster cooperative practices. The evaluation of the measurement model indicates that the loadings of the six indicators range between 0.742 and 0.824 (Table 6.17). These high loadings of the indicators reveal their strength in reflecting the theoretically intended cluster cooperation construct, and the significance in mitigating the supply risk of SMEs. Among the indicators, joint problem solving (0.824) achieves the highest loading, suggesting that collaborative or joint thought processes between SMEs in a cluster may stifle competition, and is crucial in reducing variations in supply (Dana *et al.* 2013). Among other indicators of cluster cooperation, exchange of supply-related resources (0.790), information (0.784) and experiences (0.767) are found to be the second, third and fourth most crucial indicators, respectively. These loadings signify the importance of horizontal inter-firm exchanges in an SME cluster to ensure upstream supply performance.

7.4.3 Effect of Cluster Social Capital on Buyer–Supplier Social Capital

The study reveals a statistically significant positive impact of cluster social capital on buyer–supplier social capital of SMEs ($\gamma = 0.68$, $p < 0.001$), supporting H9. The R^2 of buyer–supplier social capital is found to be 0.46, suggesting that cluster social capital can explain 46 per cent of the variance of buyer–supplier social capital. The result suggests that high levels of social capital, such as frequent social interactions, good interpersonal relationships and congruent ideologies from a network of cluster SMEs facilitate the development of social capital in the buyer–supplier network of those cluster SMEs. As discussed in the previous section, loadings of all three dimensions of cluster social capital are high, suggesting that each of them can explain a substantial portion of the variance in buyer–supplier social capital.

Consistent with the literature (Hawkins and Maurer 2010; Islam and Walkerden 2014; Kannadhasan *et al.* 2018; Molina-Morales and Martinez-Fernandez 2010), the result provides support to the linking benefits of social capital, which postulates that the relationship with one group opening the doors to new relationships and creating new contacts. In particular, the result shows that cluster social capital enhances the buyer–supplier social capital of SMEs. The result suggests that SMEs prefer to start social relations with their neighbours initially, to seize opportunities for collaborative business exchange rather than developing a business network that leads to a local social network. The result also suggests that social capital may proliferate across different networks of SMEs. A similar assumption is also noted by Kim, Lee and Lee (2017) who report that social capital with downstream supply chain partners (customers) is likely to affect those with upstream supply chain partners (suppliers).

The finding of H9 also supports the serendipitous role of social capital for the SMEs (Nahapiet & Ghoshal 1998). The serendipitous role of social capital refers to the access of new opportunities or networks through an existing network, which are unimaginable even to the

network members. In the context of SMEs, Chetty and Agndal (2007, p. 12) report that 'one party might take the brokering role to introduce the firm to someone else'. Such an introduction through a broker can lead to the formation of a new business network. This type of introduction can even lead to an improvement in the existing relationship. For example, let us assume that SME A and SME B are sourcing material from Supplier X. However, there is a lack of social relations between A and X, but strong relations between B and X. Being connected, B may serve as a broker to introduce A to Supplier X in a positive light. This introduction by SME B can lead to an improvement in the level of existing network relationships between SME A and Supplier X.

7.4.4 Effect of Cluster Social Capital on Supply Risk through Mediators

The study also finds support for H8, that cluster social capital indirectly influences the supply risk mitigation of SMEs ($\gamma = -0.61$, $p < 0.001$). All three possible indirect paths from the cluster social capital to the supply risk are found to be significant. The first path, which shows an indirect impact of cluster social capital on supply risk through cluster cooperation, is found to be significant with a $\gamma = -0.17$ and $p < 0.01$, suggesting that leveraging cluster social capital can reduce the supply variations of SMEs through enhancing cooperative practices among the members in the network (Parra-Requena *et al.* 2015). The other two paths, which show the reliance on buyer–supplier network to transmit the impact of cluster social capital on supply risk reduction are also found to be statistically significant. One of these two paths shows the indirect effect through buyer–supplier social capital ($\gamma = -0.24$, $p < 0.01$), while the other shows the serial indirect impact through buyer–supplier social capital and supplier integration ($\gamma = -0.20$, $p < 0.01$) in the relationship between cluster social capital and supply risk of SMEs. Combining these two paths, the total indirect effects of cluster social capital on supply risk via buyer–supplier network are found to be -0.44. These results suggest that horizontal social

capital with the peers in an SMEs cluster is malleable, and can reduce supply risk by improving social relations with the key suppliers (Oh, Labianca & Chung 2006).

The direct impact of cluster social capital on the supply risk of SMEs was insignificant, suggesting that the effect of cluster social capital on supply risk is fully mediated by cluster cooperation and buyer–supplier social capital. This means that cluster social capital only reduces supply variations in the upstream supply when a cooperative relationship is established with the peers, and social relations are developed with the key suppliers. In other words, cluster social capital enhances the cooperation among the SMEs in the network and leverages social relations with key suppliers. The improved cooperation with the peers and social relations with the key suppliers can, in effect, reduce the supply risk of the SMEs. Therefore, improving cluster social capital could be considered as a starting point for the reduction of supply variations of SMEs.

A plausible explanation of such full mediation could be that network capital from different groups impact outcomes in a variety of different ways (Flap, Kumcu & Bulder 2000). While the current study reveals both direct and indirect influences of buyer–supplier social capital on supply risk of SMEs, it finds that cluster social capital has only an indirect impact on the supply risk of similar sized firms. Another possible explanation of such full mediation could be that leveraging cluster social capital is a pre-condition of reducing supply risk of manufacturing SMEs in a cluster, but is not a sufficient one. For example, in the context of the Spanish footwear industry Parra-Requena *et al.* (2015) find that cluster social capital is sufficient for improving cooperative practices in a cluster, but is insufficient for ensuring innovative performance. However, the authors argue that cluster social capital is a pre-condition of ensuring innovative performance, since the study finds the indirect impact through cluster cooperative practices.

The observation of the current study is also consistent with previous studies arguing the indirect benefits of improved social capital of peers in a manufacturing SME cluster (Gronum, Verreynne & Kastelle 2012; Jansen *et al.* 2013; Molina-Morales, García-Villaverde & Parra-Requena 2014; Oh, Labianca & Chung 2006; Westlund and Bolton 2003). For example, Jansen *et al.* (2013) show that social capital with other similar firms within a cluster enhances the decision effectiveness, i.e. achieving the expected results of a decision, of SMEs through improving the evaluative judgements, such as 'confidence level' and 'understandings on the level of risk'. In other words, impact of cluster social capital on decision effectiveness is fully mediated by the evaluative judgements of the SME practitioners. Gronum, Verreynne and Kastelle (2012) also find that networking with other similar SMEs does not have any influence on the performance of SMEs unless that introduces or improves the processes, activities and methods. Mirroring these findings, the results of the current study suggest that cluster social capital only reduces the supply risk when it improves the skills and abilities of the SME practitioners in leveraging cooperative practices with other peers in the network and social capital with their key suppliers. Table 7.3 summarises the salient points of the above discussions on leveraging network resources from a network of peers in an SME cluster.

Table 7.3: Summary of discussions on the roles of cluster social capital and cluster cooperation

Hypothesis	Significance of Findings
H6: Cluster social capital in an SME cluster has a positive effect on cluster cooperation.	▪ Leveraging social capital in a network of similar SMEs located inside a cluster improves the cooperation among the firms embedded in that network. The cooperation includes sharing of supply information, knowledge and resources, joint solution of common supply problems, and practice of collaborative sourcing. ▪ The finding corroborates the Social Capital Theory and sheds light on the horizontal networking in an SME cluster. ▪ While cognitive cluster capital is found to be the most important dimension of cluster social capital to SMEs, all three dimensions of cluster social capital can substantially improve cluster cooperation.
H7: Cluster cooperation has a negative effect on supply risk.	▪ Cooperation among SMEs in a cluster network leads to reduced supply variations for all the SMEs in the network. ▪ In a cooperative culture, SMEs participating in a cluster network share supply information, experience and resources, which reduce supply risk by improving sourcing skills and capabilities. ▪ By working with others, SMEs in a cluster network practice cooperative sourcing and solve supply-related problems jointly, which reduces supply risk through larger volumes of purchase and stronger procurement power. ▪ Joint action is the most important cluster cooperation indicator to SMEs, which could substantially reduce supply risk.
H9: Cluster social capital has a positive effect on buyer–supplier social capital.	▪ High levels of social capital in a network of cluster SMEs improve social capital in the buyer–supplier network of those SMEs. ▪ The result corroborates the linking benefit and serendipitous role of cluster social capital. ▪ All dimensions of cluster social capital can substantially improve the buyer–supplier social capital of SMEs.
H8: Cluster social capital has an indirect effect on supply risk of SMEs.	▪ Cluster social capital indirectly reduces supply risk of SMEs through enhancing cluster cooperation and improving buyer–supplier social capital. ▪ Leveraging cluster social capital is a pre-condition of mitigating supply risk of SMEs. ▪ The observation validates the indirect benefit of cluster social capital for manufacturing SMEs.

7.5 Summary

This chapter discussed the findings presented in Chapter 6. It has discussed the results of the structural model that includes all the hypotheses of the study. The discussions of these hypotheses clarify how significantly supply risk undermines the operational performance of SMEs, and how SMEs can mitigate the supply risk by leveraging buyer–supplier social capital and cluster social capital, and improving supplier integration and cluster cooperation. The chapter also discussed the results of the measurement model to elucidate how several measures of the constructs contribute to the relationships investigated in this study.

A summary of the key findings of the study in relation to the research objectives, and their implications and contributions are discussed in Chapter 8. The study concludes by pointing out the limitations of the study and offering suggestions for future research.

CHAPTER EIGHT
CONCLUSIONS AND IMPLICATIONS

8.1 Introduction

In an increasingly turbulent and uncertain business environment, manufacturing SMEs have become more vulnerable to supply risk. As a result, researchers in the recent past have emphasised the importance of developing appropriate supply risk mitigation strategies for SMEs. The current research is a response to that call. Taking the apparel-manufacturing SMEs in Bangladesh as the subjects of study, this research has focused on the investigation of social capital oriented strategies to mitigate this risk. This concluding chapter offers a summary of the findings of the research in relation to the specific research objectives. It also discusses the implications and the contributions of the study findings. In addition, the chapter outlines the limitations of the current study and provides suggestions for future research.

8.2 Findings in the Light of Research Objectives

The study formulated three specific research objectives in Chapter 1. The following sub-sections address each of these research objectives based on the outcomes of the study.

8.2.1 Research Objective One

Research Objective 1: *To examine the effect of supply risk, in terms of occurrences of several supply variations, on the operational performance of SMEs.*

Corresponding to Research Objective 1, the findings of this study confirm that supply risk has a significant effect on the operational performance of SMEs. The result demonstrates that

greater variations in the upstream supply in the form of quality, quantity, lead times or overall requirements significantly reduce the ability of SMEs to meet customer requirements. The high loadings of all the indicators of supply variations in the measurement model suggest that each of these variations can substantially reduce the operational performance of SMEs. The findings corroborate the Theory of Swift, Even Flow, which postulates that the variability in the flow of materials through a process reduces the ultimate performance of the process (Schmenner & Swink 1998). The outcome provides an understanding of the importance of mitigating the supply risk of SMEs.

8.2.2 Research Objective Two

Research Objective 2: *To investigate the direct and indirect roles of buyer–supplier social capital and cluster social capital in mitigating supply risk of SMEs.*

Corresponding to Research Objective 2, the study investigates how buyer–supplier social capital and cluster social capital, as reflected by social interactions, interpersonal relationships and similar understandings among the network members, can mitigate supply risk of SMEs. Underpinned by the Social Capital Theory, the findings confirm that buyer–supplier social capital directly mitigates supply risk of SMEs. Moreover, the results reveal that buyer–supplier social capital improves supplier integration, which, in turn, strengthens the impact of social capital on supply risk of SMEs. In other words, in addition to the direct impact on supply risk of SMEs, buyer–supplier social capital indirectly reduces supply risk through improving supplier integration. Furthermore, buyer–supplier social capital assists in mitigating supply risk of SMEs by transmitting the impact of cluster social capital on supply risk. The results of the measurement model indicate that all three dimensions of buyer–supplier social capital, namely structural, relational and cognitive, play crucial roles in these regards.

On the other hand, the findings suggest that cluster social capital only indirectly mitigates supply risk of SMEs through a number of ways. First, cluster social capital improves cluster cooperation, which transmits the impact of cluster social capital to supply risk mitigation. In other words, cluster social capital mitigates supply risk of SMEs indirectly through improvement of cooperative practices among peers. Second, cluster social capital improves social capital with key suppliers, which also extends the effect of cluster social capital on supply risk. This means that cluster social capital reduces supply risk of SMEs indirectly via improving social capital with key suppliers. Finally, the result reveals that cluster social capital reduces supply risk of SMEs indirectly through improving buyer–supplier social capital and supplier integration sequentially. The high loadings of all the dimensions of cluster social capital in the measurement model suggest their importance in reducing supply risk of SMEs via the above-mentioned paths. The results corresponding to Research Objective 2 provide the mechanism by which social capital with key supplier and with peers located within a geographical cluster mitigate the supply risk of SMEs.

8.2.3 Research Objective Three

Research Objective 3: *To explore the direct roles of supplier integration and cluster cooperation in mitigating supply risk of SMEs, as well as their mediating roles in the relationship between social capital and supply risk.*

Corresponding to Research Objective 3, the findings confirm that supplier integration, as reflected by information sharing, resource sharing, supplier collaboration and flexible arrangements in sourcing, directly reduces the supply risk of SMEs. Moreover, it partially mediates the relationship between buyer–supplier social capital and supply risk, thereby assisting SMEs in achieving the greater effect of buyer–supplier social capital on supply risk mitigation. Finally, together with buyer–supplier social capital, it fully mediates one of the

paths in the relationship between cluster social capital and supply risk. Therefore, it also assists SMEs in mitigating supply risk by transmitting the impact of cluster social capital on supply risk. The high loadings of all four first-order factors of supplier integration demonstrate their importance in supply risk mitigation.

Similar to supplier integration, the outcomes of the study confirm that cluster cooperation, as reflected by exchanges of supply information and knowledge, and the joint solution of common supply problems and practice of cooperative sourcing with other SMEs in the same cluster, directly reduces the supply risk of SMEs. Moreover, cluster cooperation fully mediates the relationship between cluster social capital and supply risk, thereby assisting SMEs in achieving the impact of cluster social capital on supply risk reduction. The mediating roles of supplier integration and cluster cooperation are underpinned by the Social Capital Theory, which suggests that network integration or cooperation is the direct benefit resulting from social capital (Adler & Kwon 2002). Improved network integration or cooperation, in turn, mitigates the supply risk of SMEs.

8.3 Implications and Contributions of the Study

This study proposes and validates a theoretical model that shows the impact of supply risk on operational performance of SMEs and the roles of their social capital with key suppliers and peers, supplier integration and cluster cooperation, in mitigating this risk. The findings of the study provide implications for both SME practitioners and policy makers and contribute to research and theory in the following ways.

8.3.1 Implications for SME Practitioners

With empirical evidence, the findings of this study reveal that supply risk can have a substantial negative impact on the operational performance of SMEs. Practitioners can therefore benefit

from the outcome of this research by realising the importance of mitigating supply risk. Since complete elimination of unexpected supply variations is not possible, SMEs need to continuously monitor supply risk and devise appropriate strategies, such as leveraging social capital and enhancing supplier integration and cluster cooperation to minimise their occurrence. This is because the higher supply risks that SMEs face, the weaker their ability to recover from these risks, as recovery from each risk needs considerable resources, time and support from the network members (Scholten, Scott & Fynes 2014). Moreover, results of the measurement model suggest that any variations in upstream supply can substantially reduce the operational performance of SMEs.

Empirical evidence also reveals that social capital in the network of SMEs with their key suppliers and with peers located within the same geographical cluster can mitigate supply risk. SME practitioners, therefore, need to make relationship-specific investments to leverage social capital from these two networks. Since all three dimensions of both types of social capital are found to be crucial in achieving supply risk reduction, a balanced approach to leveraging all these dimensions needs to be adopted. Although social interaction is often dismissed in large enterprises as a waste of time (Cousins & Menguc 2006), the findings of this study reveal the importance of social interactions to smaller firms. Since larger firms have easier access to sophisticated information technologies to communicate with their network members (Spence, Schmidpeter & Habisch 2003), they can afford to treat the opportunities for enhancing social interactions as a secondary concern. However, with limited access to information technologies, SMEs should improve social interactions with their network members to achieve their desired outcomes. Therefore, SME practitioners need to focus more on how frequently and in what manner they should interact socially with their key suppliers and peers.

In order to improve social interactions with their key suppliers, SMEs sourcing locally can visit their suppliers in person and invite them to visit their manufacturing plants. They can also

maximise the interactions with their key suppliers by using different communication channels such as phone, email or social media, and allocating more resources for social events, such as job completion dinners and recognition parties. In addition, they can interact more frequently using multiple channels when an order is active, i.e. an order for the materials is made but they are yet to receive those materials. This strategy is found to be very fruitful for SMEs in achieving the expected outcomes of the project (Padilla-Meléndez, Del Aguila-Obra & Lockett 2013). In order to improve social interactions with their peers inside the cluster, SME practitioners can interact with their peers during regular daily activities, such as prayers and lunch, and can invite each other to participate in family and social events. During the focus group discussions, SME practitioners stated that in each of the sampled SME clusters there is an association house, where all SMEs of the cluster can visit and interact. Based on the results of the study, it is suggested that SME practitioners should meet with one another on a regular basis at the association house. These social interactions can provide all SMEs with a feeling that no business is an island and can improve cooperation among them.

SME practitioners need to develop relational capital in the form of trust, mutual respect, reciprocity, commitment, togetherness and personal friendship with their key suppliers and peers in order to enhance supplier integration and cluster cooperation, and to reduce supply risk. Since the mere existence of transactional relationships with key suppliers is not enough to foster the relational capital (Matook, Lasch & Tamaschke 2009), SME practitioners should aim to develop high-quality, difficult-to-replace interpersonal relationships with their key suppliers. In order to achieve these aims, they need to work towards common benefits to foster mutual respect and commitment with their key suppliers. They also need to undertake a long-term orientation, whereby they show a consistent effort to develop relational capital with their key suppliers. Even in the absence of formal contracts, practitioners in SMEs still need to consistently honour their promises with key suppliers in settling payments and ordering the

committed amount of materials. This is critical to developing trustworthiness and a sense of belonging and fairness, so that the suppliers will behave reciprocally. Similarly, for enhancing interpersonal relationships with their peers, SME practitioners should focus on the long-term outcomes of the relationships instead of concentrating on what they can gain in the short term. Moreover, they should not display any opportunistic behaviours (i.e. betrayal) that might reduce these relational capital with their key suppliers and peers. Although repairing a damaged relationship is not impossible, it may take a long time to rebuild trust that has been broken and may require external assistance such as consultants (Carsrud & Brännback 2012).

The importance of cognitive capital, such as shared values, philosophies, common languages and codes with key suppliers and with peers located within a geographical cluster are also highlighted in this study. Since cognitive capital is found to be relatively more influential than structural or relational capital in both buyer–supplier network and network of peers, SME practitioners need to pay greater attention to foster cognitive capital. The study findings suggest that practitioners of SMEs need to carefully assess the level of congruence with their key suppliers and peers. With proper communication, they can realise what is in the best interests of their relationships and work towards the development of the cognitive proximity with them, such as shared values, philosophies and goals. However, they should note that creation and maintenance of cognitive capital is costly and needs substantial investment (Nahapiet & Ghoshal 1998). SME practitioners, therefore, need to ensure that their scarce resources are optimally utilised in order to leverage cognitive capital from both the networks.

In addition to leveraging all three dimensions of social capital from both the networks, practitioners in SMEs need to improve supplier integration and cluster cooperation to capitalise on their roles in mitigating supply risk. To improve supplier integrative behaviours, which include the timely exchange of information and resources, collaborative activities and flexible arrangements, they need to develop a mutually dependent network with their key suppliers.

Most SMEs mainly focus on achieving operational efficiency in their supply network, i.e. reduced variations in supply. They often undervalue the need to improve information exchanges with key suppliers (Liao & Barnes 2015). The findings of the current study show that total success in securing upstream supply cannot be achieved unless SMEs improve the information exchanges with their key suppliers. Therefore, the emphasis should be placed on developing a culture of sharing important information with key suppliers to effectively reduce supply risk.

In addition to exchanges of information, the findings of the study imply that SME practitioners need to exchange resources with their key suppliers. While exchanges of both tangible and intangible assets with key suppliers are recommended, the loadings of the items imply that SME practitioners need to provide more emphasis on the exchanges of intangible resources, such as experience and technical knowledge, to achieve better supply risk mitigation. Findings of the study also suggest that SME practitioners should enhance collaboration with their key suppliers. These may include solving supply problems jointly with key suppliers, assisting them in improving material quality, and involving suppliers in the product design stage. Moreover, SMEs need to ensure that their sourcing activities are flexible enough to accommodate changes when needed. This condition will require them to continuously remain vigilant of the changes in the capacities of their suppliers that may affect the expected outcomes in sourcing. As soon as any such changes are detected, SMEs need to reconfigure their sourcing requirements to minimise the possible deviations in the expected outcomes.

To improve cluster cooperation, SME practitioners of a cluster need to share relevant supply information and experiences with their peers located within the cluster, which can improve the skills and knowledge base of sourcing. Such skills and capabilities are not internally available to SMEs (Gronum, Verreynne & Kastelle 2012), but are essential for formulating appropriate strategies to mitigate supply risk. Practitioners in SMEs also need to convert the exposure and

knowledge that they received through cooperation with their peers into operational practices. Otherwise, the knowledge will lose its value and will only be considered as random information. Moreover, the findings imply that SMEs can form a sourcing group with other like-minded peers located inside the cluster to improve their bargaining power, and to lower supply risk. While forming a sourcing group, SMEs need to be strategic in selecting the products to be sourced through cooperative sourcing. They need to ensure that cooperative sourcing is a means to help them gain better prices and minimise risk, but not at the risk of surrendering competitive advantage. They can source common items collaboratively; while unique materials that give them a competitive advantage may need to be sourced independently. Finally, based on the findings of the study, SME practitioners are suggested to solve any sourcing-related problems jointly with their peers inside a cluster, as it puts pressure on suppliers to take proper remedial actions to keep their reputations with all the SMEs involved in joint actions.

In summary, the findings suggest that SME practitioners need to leverage all three dimensions of social capital with key suppliers and with peers located within a geographical cluster, and improve supplier integration and cluster cooperation to reduce supply risk. However, they need to be strategic in finding the right suppliers or key suppliers for building such social capital and integrative practices. This is because building social relations with all suppliers does not bring positive outcomes for the manufacturing SMEs (Hormiga, Batista-Canino & Sánchez-Medina 2011). As such, they need to analyse the portfolio of their suppliers to find the critical ones to develop social relations. Similarly, they need to select their peers carefully for networking to achieve supply risk mitigation. After selecting the key suppliers and peers for networking, SME practitioners need to assess the current state of social capital, and integration or cooperation with them. As a basis to assess these network resources, they can use the measurement items of this study, which are the practices that reflect these resources. Upon assessment, they need

to identify the areas of improvement and formulate appropriate strategies and action plans to improve them. They also can use the standardised loadings of the items to understand the relative importance of each practice of these network resources in mitigating supply risk. This can help them prioritise the strategies to develop the most influential practice first, or to focus only on the most influential aspects of these network resources. As such, SMEs can better utilise their resources in exploiting opportunities of building network resources.

8.3.2 Implications for Policy Makers

In addition to the managerial implications, the findings of the study offer several recommendations for policy makers, such as that of the Bangladeshi apparel-manufacturing SMEs, the Bangladesh SME Foundation and the Government of Bangladesh. First, the outcomes of this study inform policy makers of the need to improve capabilities, especially social skills, of SME practitioners in leveraging social capital as they generally lack these capabilities (Bylok & Cichobłaziński 2012). Moreover, leveraging social capital with different groups, such as upstream suppliers, downstream customers and horizontal peers, may require different skills and strategies. Therefore, policy makers should undertake appropriate actions, such as formal training and workshops, to improve the social capital building capabilities of SME practitioners. They should also support network maintenance and management. Otherwise, social capital can wear out and lose their value (Oh, Labianca & Chung 2006).

Second, policy makers, especially those in developing countries, are suggested to undertake appropriate awareness programmes, such as campaigns and seminars, to help SMEs understand the value of network resources with their key suppliers and peers. The aim is to advise them of the roles of buyer–supplier social capital, cluster social capital, supplier integration and cluster cooperation in reducing supply risk, thereby improving operational performance. Although network resources in the emerging markets – where the formal institutions are weak – are

important assets to SMEs, Clarke, Chandra and Machado (2016) report that SMEs in these economies generally lack the awareness of the potential opportunities to exploit network resources. The findings of the current study highlight the benefits of leveraging network resources with key suppliers and peers for SMEs to mitigate supply risk in the context of a developing country, Bangladesh. These findings also can serve as a guide for policy makers to formulate strategies to improve awareness of SMEs to leverage their network resources. Although the study used Bangladeshi apparel-manufacturing SMEs as subjects for investigation, the findings can be generalised, with caution, to SMEs in other developing countries. Hence, they can be viewed as a reference for the policy makers of developing countries in general in implementing awareness programmes for SMEs.

Third, policy makers are suggested to provide incentive programmes to motivate SMEs to leverage social capital and enhance cooperation with their like-minded peers located inside their cluster. These incentive programmes can overcome the fear of losing competitive advantage in networking with peers (Dana *et al.* 2013). Developing network relationships with their peers who located within the cluster is important, since many countries, including Bangladesh, Chile, India, Germany, Italy, Japan, Mexico and Pakistan, have implemented the cluster concept for the growth of SMEs through leveraging cluster social capital and cluster cooperation (Abdin 2018; United Nations Industrial Development Organisation 2001). Policy makers, for example, can establish a cluster community club or association house in each SME cluster, or enhance the services of the club if it is already available. Policy makers can even provide financial assistance in paying the membership fee of the community clubs. Such an incentive is noted in Morris and Barnes (2006), where the authors report that in a South African cluster, a club called the KwaZulu-Natal Benchmarking Club was launched in 1997 with a joint effort of government financial support and firm membership fee in a ratio of 65 per cent and 35 per cent respectively. The club was found to be effective in building trust and enhancing

interactions among the network members. A similar effort is suggested in this study to the policy makers for enhancing cluster social capital and cluster cooperation to reduce supply risk.

Fourth, policy makers are suggested to initiate a move towards supporting SMEs in identifying and solving problems arising while networking with key suppliers and peers. Clarke, Chandra and Machado (2016) report that a strong formal institution has a positive influence on the development and accumulation of social capital. Moreover, SMEs generally face numerous problems when building networks with different groups, such as key suppliers and peers. For example, in the context of the construction supply chain of Spanish SMEs, Capó-Vicedo, Mula and Capó (2011) reveal 11 key problems, such as a fear of losing competitive advantage, uncertainty about the benefits and the lack of a network culture, in building networks with suppliers and other influential supply chain players. Policy makers of other contexts can also identify the potential barriers of SMEs in creating social networks with their key suppliers and peers, and can take appropriate actions to solve them. Most of the problems in developing network relationships reported by Capó-Vicedo, Mula and Capó (2011) are related to the mindset of SME entrepreneurs. Based on the findings of this study, it is suggested that policy makers should highlight the importance of building network relationships with key suppliers and peers to change the mindset of the SME entrepreneurs.

Finally, policy makers should support network integration or cooperation, which can serve as the springboard for future outcomes, such as improved firm performance. Since SMEs generally lack a strategic view, policy makers can initiate programmes to stimulate SMEs in developing enduring cooperative relationships with suppliers and peers. Cooke and Wills (1999) find that support programmes such as funding, goal-setting and capability enhancing, initiated by the public bodies for encouraging and incentivising cooperation among network members during 1989–93 and 1994–98 were associated with the improvements in business performance, innovation and knowledge base of SMEs in Denmark, Ireland and Wales (U.K.).

Based on the findings of the current study, policy makers of other contexts are also suggested to implement appropriate support programmes to improve supplier integration and cluster cooperation to reduce the supply risk of SMEs.

8.3.3 Contributions to Research and Theory

This study makes a number of contributions to research and theory. First, this study adds to the currently scarce literature on the supply risk of SMEs by combining antecedents and consequences of supply risk in a single framework. The study empirically shows how SMEs can utilise buyer–supplier social capital, cluster social capital, supplier integration and cluster cooperation to build relational rents for mitigating supply risk. Moreover, the study establishes the importance of mitigating such risks for SMEs, since it finds a strong negative impact of supply risk on their operational performance. To hypothesise and test this effect, the study uses the Theory of Swift, Even Flow, which has not been used extensively before in supply chain and operations management research. This research has thus extended the use of this theory to the research in this area, in particular to supply risk mitigation research focusing on SMEs, and contributes to its applications.

Second, using data collected from the apparel-manufacturing industry of Bangladesh, this research has empirically tested a social-capital-focused supply risk mitigation model for SMEs. Such an effort contributes to the literature in two ways. The majority of the studies in supply risk mitigation are in the context of large enterprises in developed countries. What is considered as best managerial practices in that context may not be applicable to SMEs in developing economies (Li, Ye & Sheu 2014). This study supplements the inadequacy in the research on risk management in the context of SMEs in developing countries. Also, most of the previous studies on supply risk mitigation are either based on mathematical modelling using simulated data or are conceptual in nature (Falkner & Hiebl 2015). This study contributes to the currently

scarce empirical studies in this area by using survey data for hypotheses testing, thereby enhancing the generalisability of the findings.

Third, using triangulation of a literature review, focus group discussions and a questionnaire survey, this study explores and subsequently validates the two types of social networks of SMEs, which can help mitigate their supply risk. Several prior studies, such as those by Flap, Kumcu and Bulder (2000) and Zahra, Yavuz and Ucbasaran (2006), report that SMEs sometimes leverage the 'wrong kind of social capital' as they struggle to find the right networks to leverage resources for improving a specific outcome variable, such as reduced supply variations. However, none of the prior studies have empirically examined the appropriate networks for SMEs to mitigate supply risk. The findings of this study contribute to the literature by addressing the issue of appropriate networks to leverage resources for mitigating the supply risk of SMEs. The outcomes of the study show that the right networks for SMEs to mitigate supply risk are their networks with key suppliers and networks with peers inside the cluster with whom they maintain close social relations.

Fourth, the hypothesised impacts of network resources on supply risk of SMEs are grounded in the Social Capital Theory. This is a new perspective which has not been examined thoroughly in the supply risk management literature (Cheng, Yip & Yeung 2012; Mishra *et al.* 2016). The results of the study also expand the literature on the Social Capital Theory by empirically demonstrating that leveraging social capital with peers within a cluster improves buyer–supplier social capital. Although a number of conceptual papers have highlighted that one network can serve as a bridge to connect with other networks, none of the previous research in the context of SMEs has explored such a notion empirically. This empirical finding is one of the original contributions of the current study. Combining all three dimensions of social capital, the study also provides a comprehensive view on the roles of buyer–supplier social capital and cluster social capital in mitigating supply risk of SMEs.

Fifth, what this study finds is not only that network resources can help SMEs reduce supply risk but also how these resources mitigate the risk in a substantive manner. The outcomes of the study provide the mechanism of how social capital reduce supply risk of SMEs, not by referring to a black box variable of network capital, but by unpacking the direct and indirect impacts of buyer–supplier social capital and cluster social capital on supply risk. The findings contribute to the literature by showing that different types of social capital of SMEs have different levels of reliance on network integration or cooperation as a mediator to transmit their effects to risk mitigation. While buyer–supplier social capital is found to have only partial reliance on supplier integration to transmit its effect to supply risk mitigation, cluster social capital fully depends on cluster cooperation to extend its impact to supply risk mitigation.

Finally, by following a rigorous checking process, this study develops a validated survey instrument of the hypothesised constructs in the context of SMEs which can be utilised in future research on similar topics. Many previous studies in the field of supply chain management (e.g. Chen and Paulraj 2004; Li *et al.* 2005) have highlighted the importance of clearly defining constructs and developing measurement items under various contexts to enhance the stringency of the research. Given that development of a measurement instrument for the constructs is at the core of theory-building (Venkatraman 1989), the validated scales of the constructs of the structural model of this study can facilitate further theory development and empirical examination on similar topics. Moreover, the relationships found in this study among the constructs of the structural model can be used in future studies for developing new models and extending the current model.

In summary, this section has highlighted the implications and contributions of the study findings, which are summarised in Table 8.1.

Table 8.1: Summary of implications and contributions of the study findings

Aspect	Significance of findings
Implication for SME Practitioners	▪ Importance of leveraging buyer–supplier social capital and cluster social capital to mitigate supply risk, thereby improving operational performance of the firms. ▪ Significance of integration with key suppliers and cooperation with peers located within the same cluster to achieve better risk mitigation. ▪ Relation-specific investments should be made to leverage network resources with the members of both networks (i.e. network with key suppliers and network with peers within a geographical cluster). ▪ More emphasis should be placed on enhancing cognitive social capital, as it is the most crucial dimension of social capital for both networks. ▪ Social interactions, especially face-to-face interactions and participating in the social and family events, should be improved in both networks. ▪ Long-term orientation and keeping promises need to be in place to develop a high-quality relational capital with members of both networks. ▪ A culture of information sharing with key suppliers should receive more focus, as it is the most important supplier integrative practice. ▪ Needs to be strategic in finding the right suppliers and peers for networking.
Implication for Policy Maker	▪ Importance of organising training and workshops to improve social skills of SME practitioners in leveraging social capital with key suppliers and with peers located within a geographical cluster. ▪ Benefit of undertaking programmes to make SME practitioners aware of the roles of network resources with key suppliers and peers in mitigating supply risk. ▪ Significance of initiating incentive programmes to encourage SMEs to develop social relations with peers located inside the same cluster. ▪ Importance of undertaking actions to identify and solve problems that might arise when SMEs build networks with their key suppliers and peers. ▪ Significance of supporting SMEs in improving integration with their key suppliers and cooperation with peers.
Contribution to Research and Theory	▪ Adds to the literature on supply risk of SMEs by combining antecedents and consequences of supply risk in a single framework. ▪ Supplements the inadequacy in the research on risk management of SMEs in developing countries leveraging empirical evidence and statistical analysis. ▪ Provides the appropriate networks for SMEs to leverage resources for supply risk mitigation. ▪ Extends the application of the Theory of Swift, Even Flow and the Social Capital Theory in supply risk studies in the context of SMEs. ▪ Reveals that different types of social capital of SMEs have different levels of reliance on network integration or cooperation to impact on supply risk mitigation. ▪ Provides a validated survey instrument of the hypothesised constructs, and empirical evidence of certain causal relationships in the context of SMEs.

8.4 Limitations and Directions for Future Research

Although this study has made some important contributions to both theory and practice, it is subject to a number of limitations which can be seen as directions for further research. First, this research only collected data from the apparel-manufacturing SMEs operating in Bangladesh. Although it is believed that the outcome of the research is not case-specific, and that social capital is practised in many contexts, such as *guanxi* in China or *keiretsu* in Japan (Villena, Revilla & Choi 2011), it is still necessary to be cautious when generalising the findings to other types of SMEs; or SMEs in other countries with cultures or institutional environments totally different from that of Bangladesh. Moreover, a significant posterior predictive *p*-value was found in the Bayesian SEM which suggest that further studies in other contexts can improve the external validity of the model. As such, a future study could explore the relationships in other contexts to improve the generalisability of the findings. A future study also could undertake a multi-country or multi-industry investigation to provide greater insights of the hypothesised relationships, as that would enable a comparison.

Second, this research is silent on the dark side of social capital. Villena, Revilla and Choi (2011) report that social capital can not only be supportive but also antagonistic. Therefore, it is important to explore the norms that undermine SME's capabilities to mitigate risk. Moreover, SMEs sometimes leverage 'too much social capital' due to an over-dependence on a network member or an unrealistic estimation of a network member's competency (Flap, Kumcu & Bulder 2000; Zahra, Yavuz & Ucbasaran 2006). Leveraging 'too much social capital' can adversely affect the performance of SMEs through incurring additional costs, or other types of negative outcomes including network failure. For example, Shi, Shepherd and Schmidts (2015) report that a negotiation between an SME and its key supplier came into a dead end because of excessive trust and overconfidence. Furthermore, overconfidence in network members' capabilities can enhance the cognitive biases, such as illusion of control (Carolis & Saparito

2006). These biases can eventually reduce the efforts of the SMEs to verify information or to search for more information outside the networks. As a result, SMEs may receive limited or wrong information. Considering the importance of revealing the optimal level of social capital to leverage in a network of SMEs, a future study could address this issue.

Third, data for this study were collected only from the buyer's (SME) side of the buyer–supplier dyad. Gathering matched responses from the supplier side could provide greater insight into the buyer–supplier relationship. For example, Johnston *et al.* (2004) report that the matched-paired approach of capturing buyer–supplier social capital and supplier integration assists in ensuring that the outcomes of these variables are truly attributed to them, and not to any undefined externality. Therefore, future studies could collect matched data from both SMEs and their key suppliers and verify the impact of social capital and supplier integration on supply risk. Similarly, data of the cluster social capital and cluster cooperation were captured from the focal firm (SMEs), and were not verified by their peers. A future study could gather data from all members of a cluster network of SMEs and examine whether the hypothesised relationships of these variables vary because of the differences in responses.

Fourth, this study used cross-sectional survey data, which usually only provide a snapshot view, to measure social capital in this study. As social capital changes over time (Cousins *et al*. 2006), a longitudinal study would enable a holistic exploration of how buyer–supplier social capital and cluster social capital evolves over the lifecycle of the relationships of SMEs. Moreover, a longitudinal study would enable an exploration of how the different dimensions of social capital in both the networks impact each other over time (Li, Ye & Sheu 2014). Hence, a longitudinal study would provide a better insight into the relationships investigated in this study.

Fifth, studies are also needed to identify the contingency factors, both internal and external, to SMEs, which could have interactive effects in the relationship between social capital, supplier integration, cluster cooperation and supply risk. For example, it would be interesting to investigate the moderating impacts of the age of firms (new versus old), technological orientation (high-tech versus low-tech) and distinct cultural factors to see if the impacts of buyer–supplier social capital and cluster social capital on supply risk vary across these contextual variables. Furthermore, this research does not consider the size or geographical proximity of suppliers in investigating the role of buyer–supplier social capital and supplier integration in mitigating supply risk of SMEs. Future studies could investigate how SMEs seek to develop and leverage social capital when they source their main materials from large international suppliers under the situation of power imbalance. A future study could also be conducted to investigate whether the impact of social capital and supplier integration will vary because of differences in geographical proximity between SMEs and their key suppliers.

Finally, the R^2 of supply risk was found to be 0.70, which suggests that the four explanatory variables used in this study, namely buyer–supplier social capital, supplier integration, cluster social capital and cluster cooperation, account for 70 per cent of the variations in supply risk in apparel-manufacturing SMEs in Bangladesh. Although these four variables explain the majority of the variations in supply risk, it is evident that there are some other factors that also influence the supply risk and explain 30 per cent of its variance. Therefore, a future study, using a qualitative methodology, could explore those variables, which would provide additional valuable insights on supply risk mitigation of SMEs. Table 8.2 summarises the limitations of the study and the proposed directions for future research.

Table 8.2: Summary of limitations of this study and directions for future research

Limitation of this Study	Direction for Future Research
Generalisability of findings due to use of sample data	▪ To explore the hypothesised relationships in other contexts or conduct a multi-country or multi-industry study to provide greater insights.
Focus only on the positive side of social capital	▪ To investigate the norms that are antagonistic and to explore the optimal level of social capital to leverage supply risk mitigation.
Matched responses were not collected	▪ To verify the hypothesised relationships by collecting data from both SME and its key supplier in the dyadic buyer–supplier network, and from all members in the cluster network of SMEs.
Used only cross-sectional survey data	▪ To conduct a longitudinal study to explore how social capital evolves over a lifecycle in the relationships of SMEs.
Effects of contingency factors were ignored	▪ To explore the interactive effects of the related contingency factors in the hypothesised relationships.
Network resources do not explain full variance in supply risk	▪ To explore other factors, using a qualitative study, that also assist in mitigating supply risk of SMEs.

8.5 Summary

This chapter has summarised the key findings of this study in relation to the three specific research objectives formulated in Chapter 1. It has also highlighted the implications and the contributions of the research findings. Moreover, this chapter has also outlined the limitations of the current study and has proposed directions of future research to overcome the identified limitations.

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APPENDICES

Appendix A: Ethics Approval

RMIT UNIVERSITY

Deputy Pro Vice-Chancellor
(Research & Innovation)
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Melbourne VIC 3001
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Notice of Approval

Date:	16 December 2015
Project number:	19773
Project title:	*Supply Risk Mitigation of Small and Medium Enterprises: A Social Capital Approach*
Risk classification:	Low risk
Principal Investigator: Student Investigator: Other Investigator:	Dr Charles Lau Mr Priyabrata Chowdhury Dr Siddhi Pittayachawan
Project Approved:	**From: 15 December 2015 To: 02 March 2019**

Terms of approval

Responsibilities of the principal investigator

It is the responsibility of the principal investigator to ensure that all other investigators and staff on a project are aware of the terms of approval and to ensure that the project is conducted as approved by BCHEAN. Approval is only valid while the investigator holds a position at RMIT University.

1. *Amendments*
   Approval must be sought from BCHEAN to amend any aspect of a project including approved documents. To apply for an amendment submit a request for amendment form to the BCHEAN secretary. This form is available on the Human Research Ethics Committee (HREC) website. Amendments must not be implemented without first gaining approval from BCHEAN.
2. *Adverse events*
   You should notify BCHEAN immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
3. *Participant Information and Consent Form (PICF)*
   The PICF must be distributed to all research participants, where relevant, and the consent form is to be retained and stored by the investigator. The PICF must contain the RMIT University logo and a complaints clause including the above project number.
4. *Annual reports*
   Continued approval of this project is dependent on the submission of an annual report.
5. *Final report*
   A final report must be provided at the conclusion of the project. BCHEAN must be notified if the project is discontinued before the expected date of completion.
6. *Monitoring*
   Projects may be subject to an audit or any other form of monitoring by BCHEAN at any time.
7. *Retention and storage of data*
   The investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.

Regards,

Associate Professor Penny Weller
Chairperson
RMIT BCHEAN

RMIT UNIVERSITY

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Notice of Project Amendment Approval

Date:	7 April 2016
Project number:	19773
Project title:	*Supply Risk Mitigation of Small and Medium Enterprises: A Social Capital Approach*
Risk classification:	Low Risk
Principal Investigator:	Dr Charles Lau
Student Investigator:	Priyabrata Chowdury
Other Investigator:	Dr Siddhi Pittayachawan
Project Approved:	**From: 15 December 2015 To: 2 March 2019**

Project Amendment Approved: **From:** 7 April 2016

Amendment Details:
Conduct three focus group discussions before the approved survey to enhance the validity of the instrument for data collection.

Terms of approval:

Responsibilities of the principal investigator
It is the responsibility of the principal investigator to ensure that all other investigators and staff on a project are aware of the terms of approval and to ensure that the project is conducted as approved by BCHEAN. Approval is only valid while the investigator holds a position at RMIT University.

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   You should notify BCHEAN immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
3. *Participant Information and Consent Form (PICF)*
   The PICF must be distributed to all research participants, where relevant, and the consent form is to be retained and stored by the investigator. The PICF must contain the RMIT University logo and a complaints clause including the above project number.
4. *Annual reports*
   Continued approval of this project is dependent on the submission of an annual report.
5. *Final report*
   A final report must be provided at the conclusion of the project. BCHEAN must be notified if the project is discontinued before the expected date of completion.
6. *Monitoring*
   Projects may be subject to an audit or any other form of monitoring by BCHEAN at any time.
7. *Retention and storage of data*
   The investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.

Regards,

Associate Professor Penny Weller
Chairperson
RMIT BCHEAN

Appendix B: Survey Questionnaire

Appendix B-1: English Version

School of Business IT and Logistics
INVITATION TO PARTICIPATE IN A RESEARCH PROJECT

PARTICIPANT INFORMATION
Project Title: Supply Risk Mitigation of Small and Medium Enterprises: A Social Capital Approach

Investigators:
- Priyabrata Chowdhury, PhD Research Student.
- Dr. Charles Lau, Senior Lecturer, Senior Research Supervisor.
- Dr Siddhi Pittayachawan, Senior Lecturer, Associate Research Supervisor.

Dear Participant,
You are cordially invited to participate in a research project being conducted by RMIT University. This survey will take approximately 40 minutes. Please read this sheet carefully and be confident that you understand its contents before deciding whether to participate. If you have any questions about the project, please ask one of the investigators.

Who is involved in this research project?
- I am Priyabrata Chowdhury, currently a PhD student in the school of Business IT and Logistics at RMIT University, Melbourne, Australia. This research is a student project, and conducted as a part of my PhD (Doctor of Philosophy) degree at RMIT University. My senior supervisor for this project is Dr. Charles Lau and associate supervisor is Dr Siddhi Pittayachawan. The project has been approved by the RMIT Human Research Ethics Committee.

Why research project is being conducted?
The aim of this project is to understand how social capital can mitigate the inbound supply chain risk of Small and Medium Enterprises (SMEs). The findings of this research will help the owners/managers of SMEs to develop proper strategies regarding inbound supply to lower the supply risks of the firms.

Why have you been approached?
You have been approached to participate in this research project because you are managing the sourcing or operational activities at a SME in garment industry of Bangladesh. Your contact details are obtained from the Bangladesh SME Foundation.

What is the project about? What are the questions being addressed?
This project examines the role of social capital in mitigating inbound supply chain risk of SMEs. In particular, the research aims at investigating the impact of social capital on supply risk, and supply risk on operational performance of SMEs. Social capital is defined as actual and potential resources available through, and derived from the interaction, relationship maintenance and understanding with other members of the network. Two forms of social capital such as network with key suppliers and network with other similar firms operating within the local area will be investigated. As a result, this survey comprises of questions on the interaction, relationship, understanding and cooperation/integration with your key supplier and other similar firms in your local area, and supply risk (deviation in inbound supply) and operational performance of your firm.

If I agree to participate, what will I be required to do?
If you agree to participate, you will be required to fill a questionnaire covering the above areas that will take approximately 40 minutes. Participation in this study is entirely voluntary and responses will remain confidential and anonymous.

What are the possible risks or disadvantages?
There is no apparent or hidden risk associated with participating in this research. You will not be asked to provide any personal information and personal records. However, if you are unduly concerned about your responses to any of the questionnaire items or if you find participation in the project distressing, you should contact Dr. Charles Lau or Dr Siddhi Pittayachawan as soon as convenient. They will discuss your concerns with you confidentially and suggest appropriate follow-up, if necessary.

What are the benefits associated with participation?
There is no direct benefit of participating in this research. However, the researcher is happy to make available to you any results, papers, and other outcomes from this research.

What will happen to the information I provide?
Your responses will be anonymous, and your privacy and confidentiality will be strictly maintained in such a way that nobody can identify you. Moreover, any information that you provide can be disclosed only if (1) it is to protect you or others from harm, (2) if specifically required or allowed by law, or (3) you provide the researchers with written permission. The data will only be seen by me, my supervisors, and examiners who are also concerned about your safety.

- To ensure the protection of data collected, all the data will be stored in the password protected file on RMIT university server.
- The results from this study will be disseminated in a PhD thesis, presented in the academic conference and published in the journals. However, findings will explain such a way that no one can identify you.
- The research data collected will be kept securely at RMIT University for 5 years after completion of this research project. It can only be accessed by the researchers. After five years of the completion of the research project, all the information gathered will be destroyed.
- The final thesis and the published paper will remain in the RMIT research repository as an Appropriate Durable Record (ADR).

What are my rights as a participant?
As a participant you have the following rights-

- The right to withdraw from participation at any time
- The right to request that any recording cease
- The right to have any unprocessed data withdrawn and destroyed, provided it can be reliably identified, and provided that so doing does not increase the risk for the participant.
- The right to be de-identified in any photographs intended for public publication, before the point of publication
- The right to have any questions answered at any time.

Whom should I contact if I have any questions?
For any enquiries regarding this project, please feel free to contact Dr. Charles Lau. Alternatively, you can contact with Dr Siddhi Pittayachawan.

What other issues should I be aware of before deciding whether to participate?
There has no other issue that you need to be concerned before deciding whether you want to participate.

Yours sincerely
Priyabrata Chowdhury
School of Business IT and Logistics
RMIT Universtiy, Melbourne, Australia

School of Business IT and Logistics

Supply Risk Mitigation of Small and Medium Enterprises: A Social Capital Approach

ALL INFORMATION PROVIDED WILL REMAIN STRICTLY CONFIDENTIAL

To maintain anonymity, please do not write your name or your organisation's name on the questionnaire.

The instructions below will assist you in completing the questionnaire:

- Below is an example of the questions in the questionnaire:

		Never			Sometimes			Always
SR1	Our key suppliers meet our quality specification requirements	1	2	3	4	5	6	7

Circling or ticking a number in the boxes on the right represents the degree of your agreement with the statement on the left. For example, by circling or ticking 7, your response will be interpreted as your key suppliers always meet your quality specification requirements.

- It is important that you ANSWER ALL QUESTIONS to the best of your knowledge, even if some may appear to be similar. Your responses to all parts of this questionnaire are vital to the success of this study because partially completed surveys are not useable. Therefore, please do not leave any question unanswered.
- There are no right or wrong answers. Just indicate your degree of agreement with the statement in each of the questions in the questionnaire.
- If you wish to comment on any questions, please use the space provided at the end of the questionnaire.
- The findings of this study will be reported in an aggregated form so that no organisation, department or individual respondent can be identified.
- If you have any queries or comments about the survey or the questionnaire, please do not hesitate to contact the researcher of this project.

We truly appreciate your time and effort in participating in this research project. If you wish to receive a copy of the findings of this project upon its completion, please contact the researcher. The information you provided in this survey will be kept in strict confidence. The names of participating individual, departments and companies, even if provided, will not be released.

Regards,
Priyabrata Chowdhury, PhD Candidate
School of Business IT and Logistics
College of Business, RMIT University.
445 Swanston Street, Melbourne 3000, Australia

SECTION 1: Buyer–Supplier Social Capital

In this study, buyer–supplier social capital refers to the sum of the actual and potential resources embedded within, available through, and derived from the interactions, interpersonal relationships and similar understandings between a buying SME and its key supplier. The following questions are related to buyer–supplier social capital in terms of structural, relational and cognitive dimensions. Please indicate your responses by circling or ticking a number on the following scales with respect to your key supplier (the supplier who delivers you the most critical material of production).

Buyer–Supplier Structural Capital

Buyer–supplier structural capital is the strength of social interactions/ties existing between a buying firm and its key supplier. Please read each statement carefully and then indicate the extent to which your firm and your key supplier engage in the following types of interactions/contacts:	Never			Sometimes			Always
Intensive interaction between the personnel	1	2	3	4	5	6	7
Interaction in the organised social and family events	1	2	3	4	5	6	7
Interaction in the co-location	1	2	3	4	5	6	7
Face to face interaction (such as site visit)	1	2	3	4	5	6	7
Interaction via multiple channels	1	2	3	4	5	6	7

Buyer–Supplier Relational Capital

Buyer–supplier relational capital refers to the extent of personal relationships that a buying firm and its key supplier have developed with each other. Please read each statement carefully and then indicate the extent to which the relationship between your firm and your key supplier is characterised by the following:	Not at all			To some extent			To a great extent
Trust	1	2	3	4	5	6	7
Mutual respect	1	2	3	4	5	6	7
Personal friendship	1	2	3	4	5	6	7
Reciprocity (feelings of fairness to work mutually)	1	2	3	4	5	6	7
Personal interaction	1	2	3	4	5	6	7
Commitment for working in the foreseeable future	1	2	3	4	5	6	7
Togetherness	1	2	3	4	5	6	7

Buyer–Supplier Cognitive Capital

Buyer–supplier cognitive capital is the extent to which a buying firm and its key supplier share a common perspective or understanding. Please read each statement carefully and then indicate how similar the following perspectives of your firm and your key supplier are:	Very different			Similar to some extent			Very similar
Corporate values	1	2	3	4	5	6	7
Philosophies/ approaches to business dealings and management styles	1	2	3	4	5	6	7
Business codes and language	1	2	3	4	5	6	7
Resources/capabilities of the business	1	2	3	4	5	6	7

SECTION 2: Supplier Integration

In this study, supplier integration refers to the process of an SME connecting with its key supplier by sharing information and resources, and coordinating key business functions to gain

mutual benefits. The set of questions in this section are intended to assess the level of integration between your firm and your key supplier in terms of information sharing, resource sharing, collaboration and flexibility. Please indicate your responses by circling or ticking a number on the following scales.

Please read each statement carefully and then indicate the extent of integration between your firm and your key supplier in the following areas:	Not at all			To some extent			To a great extent
Our firm and our key supplier share sensitive information (financial, production, research, and/or competition)	1	2	3	4	5	6	7
Our firm and our key supplier share with each other any information that might help other party	1	2	3	4	5	6	7
Our firm and our key supplier exchange information timely, accurately and/or completely	1	2	3	4	5	6	7
Our firm and key supplier keep each other informed about events or changes that may affect the other party	1	2	3	4	5	6	7
Our firm and our key supplier share business experiences (e.g. process design, process improvement)	1	2	3	4	5	6	7
Our firm and our key supplier share technical knowledge	1	2	3	4	5	6	7
Our firm and our key supplier share financial resources (e.g. extending credit period)	1	2	3	4	5	6	7
Our firm regularly solve problems jointly with our key supplier	1	2	3	4	5	6	7
We have helped our key supplier to improve their product quality	1	2	3	4	5	6	7
We include our key supplier in our planning and goal-setting activities	1	2	3	4	5	6	7
We actively involve our key supplier in new product development processes	1	2	3	4	5	6	7
Our key supplier allows us to make quick orders when necessary	1	2	3	4	5	6	7
Our key supplier allows us to modify the order specifications (size, volume and composition) when necessary	1	2	3	4	5	6	7
Our key supplier allows us to modify the delivery time when necessary	1	2	3	4	5	6	7
Our key supplier takes necessary actions to fulfil our sudden needs	1	2	3	4	5	6	7

SECTION 3: Cluster Social Capital

In this study, cluster social capital refers to the sum of the actual and potential resources embedded within, available through, and derived from the interactions, interpersonal relationships and similar understandings between/among similar SMEs located within a same geographical cluster. The following questions are related to cluster social capital in terms of structural, relational and cognitive dimensions. Please indicate your responses by circling or ticking a number on the following scales with respect to other similar firms in your cluster with whom you maintain close social relations.

Cluster Structural Capital

Cluster structural capital is the strength of social interactions/ties existing between/among the member organisations of a particular cluster. Please read each statement carefully and then indicate to what extent your firm and other similar firms in your cluster (**with whom you maintain close social relations**) engage in the following types of interactions/contacts:	Never			Sometimes			Always
Intensive interaction between the personnel	1	2	3	4	5	6	7

Interaction in the organised social and family events	1	2	3	4	5	6	7
Interaction in the joint workshop/training	1	2	3	4	5	6	7
Interaction between the personnel across different function	1	2	3	4	5	6	7
Interaction in the co-location (e.g. a common place such as cluster association house)	1	2	3	4	5	6	7
Interaction in the team building exercises in a cluster (e.g. (cluster development meeting and conferences)	1	2	3	4	5	6	7
Interaction in the daily activities (e.g. prayers, lunch)	1	2	3	4	5	6	7

Cluster Relational Capital

Cluster relational capital refers to the extent of personal relationships that member organisations of a particular cluster have developed with each other. Please read each statement carefully and then indicate the extent to which the relationship between your firm and other similar firms in your cluster (**with whom you maintain close social relations**) is characterised by the following:	Not at all		To some extent			To a great extent	
Trust	1	2	3	4	5	6	7
Mutual respect	1	2	3	4	5	6	7
Personal friendship	1	2	3	4	5	6	7
Reciprocity (feelings of fairness to work mutually)	1	2	3	4	5	6	7
Personal interaction	1	2	3	4	5	6	7
Commitment for helping for the foreseeable future	1	2	3	4	5	6	7
Togetherness	1	2	3	4	5	6	7

Cluster Cognitive Capital

Cluster cognitive capital is the extent to which member organisations of a particular cluster share a common perspective or understanding. Please read each statement carefully and then indicate how similar the following perspectives of your firm and other similar firms in your cluster (**with whom you maintain close social relations**):	Very different		Similar to some extent			Very similar	
Culture and values	1	2	3	4	5	6	7
Philosophies/ approaches to business dealings and management styles	1	2	3	4	5	6	7
Business goals	1	2	3	4	5	6	7
Codes and language	1	2	3	4	5	6	7
Common terms or jargons	1	2	3	4	5	6	6
Professional or trade skills of employees	1	2	3	4	5	6	7

SECTION 4: Cluster Cooperation (CC)

In this study, cluster cooperation refers to the situation where homogeneous/similar SMEs located within a geographical cluster share timely and quality information, share tangible and intangible resources and jointly take various actions. Please indicate your responses by circling or ticking a number on the following scales.

Please read each statement carefully and then indicate the extent of cooperation between your firm and other similar firms in your cluster (**with whom you maintain close social relations**) in the following areas:	Not at all	To some extent	To a great extent

Our firm and other similar firms of the local area exchange sourcing information (e.g. information about suppliers)	1	2	3	4	5	6	7
Our firm and other similar firms of the local area exchange sourcing experiences (e.g. supply management knowledge)	1	2	3	4	5	6	7
Our firm and other similar firms of the local area share resources (lending material and money)	1	2	3	4	5	6	7
Our firm and other similar firms of the local area jointly organise labour training program to improve the skills (e.g. sourcing skills) of employees	1	2	3	4	5	6	7
Our firm and other similar firms of the local area use cooperative sourcing of material and/or parts (e.g. buying materials together)	1	2	3	4	5	6	7
Our firms and other firms of the local area take joint actions to solve the supply-related problems	1	2	3	4	5	6	7

SECTION 5: Supply Risk (SR)

In this study, supply risk refers to the potential variations in the actual supply from the expected values of certain measures of supply performance. Please indicate your responses by circling or ticking a number on the following scales.

Please read each statement carefully and then indicate to what extent the following statements are true:	Never			Sometimes			Always
Our key supplier meets our quality specification requirements	1	2	3	4	5	6	7
Our key supplier meets our required delivery lead times	1	2	3	4	5	6	7
Our key supplier meets our volume requirements	1	2	3	4	5	6	7
Our key supplier meets our overall requirements	1	2	3	4	5	6	7
Our key supplier delivers our orders as promised	1	2	3	4	5	6	7
Our key supplier has the capacity to meet our requirements	1	2	3	4	5	6	7
Our key supplier charges fair price for the material	1	2	3	4	5	6	7

SECTION 6: Operational Performance (OP)

In this study, operation performance refers the abilities of an SME to meet its customer requirements. Please indicate your responses by circling or ticking a number on the following scales.

Please rate the operational performance of your firm on the following dimensions:	Very poor			Average			Very good
Product modification speed (time required to modify products to meet customers' requirements)	1	2	3	4	5	6	7
Product introduction speed (time required to introduce new products into the market	1	2	3	4	5	6	7
Ability to quickly respond to changes in market demand	1	2	3	4	5	6	7
On-time delivery (meeting quoted or anticipated delivery dates on a consistent basis)	1	2	3	4	5	6	7
Delivery speed (the time which elapses between the receipt of customer's order and the delivery of the goods)	1	2	3	4	5	6	7
Customer service (providing required customer services)	1	2	3	4	5	6	7
Order fill capacity (meeting desired quantities on a consistent basis)	1	2	3	4	5	6	7

SECTION 7: Respondent Profile

The following information requires details of the respondents. Please indicate your response in the box provided.

1. Please indicate your position in the organisation:
□Owner □Manager □Operation Manager □Others, please specify……

2. What is your highest level of education?
□Post-secondary/secondary or less □Diploma □Bachelor □Masters and above

3. How many years of operational experience do you have in this organisation?
□5 years or less □6 to 10 years □11 to 15 years □16 years or more

4. How many years of operational experience do you have in this industry?
□5 years or less □6 to 10 years □11 to 15 years □16 years or more

5. How many years has this organisation been operating?
□5 years or less □6 to 10 Years □11 to 15 years □16 years or more

6. How many people does this company employ?
□10 or less □11 to 24 □25 to 99 □100 to 250

7. What is the approximate annual sales revenue of this company (rounded in Bangladesh Taka (BDT))?
□Less than 5 million □5 to 100 million □100 to 300 million

8. How many suppliers do you have for your critical/main material of production?

□1 □2 □3 □4 □5 □ 6 or above

9. From which market are you sourcing your critical material/parts?
□Domestic □International □Both

10. In which market is your firm involved in operation/sales?
□Domestic □International □Both

11. Do you use formal contract with your key suppliers?
□Always □Never □Sometimes

Use this space for Any comment(s) on this questionnaire

THANK YOU FOR YOUR TIME IN COMPLETING THIS QUESTIONNAIRE

Appendix B-2: Bangla Version

স্কুল অফ বিজনেস আইটি এন্ড লজিষ্টিকস্
একটি গবেষণা প্রকল্পে অংশগ্রহনের জন্য আমন্ত্রন

অংশগ্রহনকারীর জন্য তথ্য

প্রকল্প শিরোনামঃ ক্ষুদ্র ও মাঝারি প্রতিষ্ঠানের সরবরাহ ঝুঁকি হ্রাসকরণ: একটি সামাজিক মূলধন কৌশল।

গবেষকবৃন্দঃ

- প্রিয়ব্রত চৌধুরী, পিএইচডি ছাত্র
- ড. চার্লস লু, জ্যৈষ্ঠ লেকচারার, জ্যৈষ্ঠ গবেষণা সুপারভাইজার
- ড. সিদ্দী পিট্টাচয়ান, জ্যৈষ্ঠ লেকচারার, সহযোগী গবেষণা সুপারভাইজার

প্রিয় অংশগ্রহণকারী,
আপনাকে আরএমআইটি বিশ্ববিদ্যালয় কর্তৃক পরিচালিত একটি গবেষণা প্রকল্পে আন্তরিকভাবে আমন্ত্রন জানাচ্ছি। এই জরিপটি সম্পন্ন করতে আনুমানিক ৪০ মিনিট সময় লাগবে। অনুগ্রহপূর্বক অংশগ্রহণের সিদ্ধান্ত নেওয়ার পূর্বে এই তথ্যপত্রটি যত্নসহকারে পড়ুন এবং নিশ্চিত হোন যে, আপনি এর বিষয়বস্তু বুঝতে পেরেছেন। আপনার যদি এই গবেষণা প্রকল্প নিয়ে কোন প্রশ্ন থাকে, সেক্ষেত্রে যে কোন একজন গবেষককে অনুগ্রহপূর্বক জিজ্ঞেস করুন।

এই গবেষণা প্রকল্পের সাথে কে জড়িত ঃ
আমি প্রিয়ব্রত চৌধুরী বর্তমানে আরএমআইটি বিশ্ববিদ্যালয়, মেলবোর্ন, অস্ট্রেলিয়া এর বিজনেস আইটি এন্ড লজিষ্টিকস্ স্কুলের একজন পিএইচডি ছাত্র। এই গবেষণাটি একটি ছাত্র/শিক্ষা প্রকল্প যা আমার পিএইচডি ডিগ্রী এর একটি অংশ হিসাবে পরিচালিত হচ্ছে। এই প্রকল্পে আমার জ্যৈষ্ঠ সুপারভাইজার হচ্ছেন ড. চার্লস লু এবং সহযোগী সুপারভাইজার হচ্ছেন ড. সিদ্দী পিট্টাচয়ান । এই প্রকল্পটি আরএমআইটি মানব সম্বন্ধীয় নৈতিক কমিটি অনুমোদন করেছেন ।

কেন এই গবেষণাটি করা হচ্ছে?
কিভাবে সামাজিক মূলধন ক্ষুদ্র ও মাঝারি প্রতিষ্ঠানের (এসএমই) সরবরাহ ঝুঁকি হ্রাস করে তা বুঝতে পারা এই প্রকল্পের উদ্দেশ্য। এই প্রকল্প থেকে প্রাপ্ত ফলাফল উৎপাদনকারী এসএমই এর মালিক/ব্যবস্থাপককে কাঁচামাল অথবা পণ্যের অংশ বিশেষ সরবরাহ (ক্রয় করে আনা) সংক্রান্ত কৌশল প্রণয়নে সাহায্য করবে যার ফলশ্রুতিতে সরবরাহ ঝুঁকি কমে যাবে।

কেন আপনার থেকে জরিপ চালানো হচ্ছে?
এই প্রকল্পে আপনার থেকে জরিপ চালানো হচ্ছে কারণ আপনি বাংলাদেশের গার্মেন্টস সম্বন্ধীয় একটি এসএমই প্রতিষ্ঠানের কাঁচামাল ক্রয় অথবা প্রতিষ্ঠান পরিচালনার সাথে জড়িত। আপনার সাথে যোগাযোগের বিস্তারিত তথ্য বাংলাদেশ এসএমই ফাউন্ডেশন থেকে নেওয়া হয়েছে।

এই প্রকল্পটি কি নিয়ে?এখানে কি ধরনের প্রশ্ন জিজ্ঞেস করা হবে?
এই প্রকল্পটি সরবরাহ ঝুঁকি হ্রাসকরণে সামাজিক মূলধনের ভূমিকা পরিরীক্ষা করছে। নির্দিষ্টভাবে বলতে গেলে এই প্রকল্পটি সরবরাহ ঝুঁকি এর উপর সামাজিক মূলধনের প্রভাব এবং ব্যবসায়ের পরিচালন কর্মক্ষমতার উপর সরবরাহ ঝুঁকি এর প্রভাব উদ্‌ঘাটন করছে। সামাজিক মূলধন বলতে বোঝায় যে কোন বাস্তব বা সম্ভাব্য সম্পদ যা একটি গোষ্ঠীর বা দলের একজন সদস্য অন্যান্য সদস্যদের সাথে যোগাযোগ সুসম্পর্ক এবং বোঝাপড়ার মাধ্যমে অর্জন করে। দুই ধরনের সামাজিক মূলধন - যথাক্রমে মূল সরবরাহকারীর সাথে সামাজিক সম্পর্ক হতে প্রাপ্ত এবং স্থানীয় অন্যান্য একই ধরনের ব্যবসায়ের সাথে সামাজিক সম্পর্ক হতে প্রাপ্ত সামাজিক মূলধন - এই প্রকল্পে পরীক্ষা করা হবে। যার কারণে এই প্রকল্পে মূল সরবরাহকারী এবং অন্যান্য স্থানীয় গার্মেন্টস সম্বন্ধীয় ফার্ম এর সাথে আপনার প্রতিষ্ঠানের যোগাযোগ, পারস্পরিক সুসম্পর্ক, বোঝাপড়া, সমন্বয়/সহযোগীতা সম্বন্ধীয় প্রশ্ন এবং আপনার ব্যবসায়ের সরবরাহ ঝুঁকি এবং পরিচালন কর্মক্ষমতা নিয়ে প্রশ্ন জিজ্ঞেস করা হবে।

আমি অংশগ্রহণ করতে সম্মত হলে, আমাকে কি করতে হবে?
আপনি অংশগ্রহণ করতে সম্মত হলে আপনাকে উপরে উল্লেখিত বিষয়বস্তুর আলোকে তৈরী একটি প্রশ্নাবলী পূরণ করতে হবে। এটি পূরণ করতে আনুমানিক ৪০ মিনিট সময় লাগবে। এই প্রকল্পে অংশগ্রহণ সম্পূর্ণ স্বেচ্ছাকৃত। সকল উত্তর গোপন এবং নামহীনভাবে রাখা হবে যাতে কে উত্তর দিয়েছে তা কেউ বুঝতে না পারে।

এই প্রকল্পে অংশগ্রহণের সম্ভাব্য ঝুঁকি বা অসুবিধা কি?
এই প্রকল্পে অংশগ্রহণের সাথে কোন দৃশ্যমান বা লুকায়িত ঝুঁকি নেই। আপনার কোন ব্যক্তিগত তথ্য জিজ্ঞেস করা হবে না। এতদ্সত্ত্বেও, আপনি যদি এই প্রশ্নাবলীর কোন প্রশ্নের উত্তর দিতে উদ্বিগ্ন হোন অথবা আপনার কাছে যদি এই প্রকল্পে অংশগ্রহণ পীড়াদায়ক মনে হয়, আপনি আপনার সুবিধাজনক সময়ে ড: চার্লস লু অথবা ড: সিদ্দী পিট্টাচয়ান এর সাথে যোগাযোগ করতে পারেন। উনারা গোপনীয়তা সহকারে আপনার উদ্বেগ নিয়ে আলোচনা করবেন এবং আপনাকে যথাযথ পরামর্শ প্রদান করবেন।

এই প্রকল্পে অংশগ্রহণের সুবিধা কি?
এই প্রকল্পে অংশগ্রহণের কোন সরাসরি সুবিধা নেই। কিন্তু গবেষকবৃন্দ এই প্রকল্প হতে প্রাপ্ত যে কোন ফলাফল অথবা প্রকাশনা আপনার নিকট পৌঁছে দিতে সম্মত রয়েছেন।

আমি যে তথ্য দিব তা কি করা হবে?
আপনার তথ্য হবে নামহীন এবং আপনার গোপনীয়তা এমনভাবে রক্ষা করা হবে যাতে কেউই আপনাকে সনাক্ত করতে না পারে। এছাড়াও আপনার দেয়া যে কোন তথ্য শুধুমাত্র তখনই প্রকাশ করা হবে। যদি (১) এটি আপনাকে বা অন্য যে কোন কাউকে ক্ষতির হাত থেকে রক্ষা করে; (২) এটি নির্দিষ্টভাবে দরকার অথবা আইনী; অথবা (৩) আপনি গবেষককে লিখিত অনুমতি দিয়েছেন। আপনার দেয়া তথ্য শুধুমাত্র আমি, আমার সুপারভাইজারবৃন্দ এবং পরীক্ষকবৃন্দ দেখতে পারবেন, যারাও আপনার নিরাপত্তা নিয়ে সচেতন।

- ❖ সংগৃহীত তথ্য রক্ষা করার জন্য আরএমআইটি বিশ্ববিদ্যালয়ের পাসওয়ার্ড সুরক্ষিত জায়গায় সংরক্ষণ করা হবে।
- ❖ এই প্রকল্প হতে প্রাপ্ত ফলাফল পিএইডি প্রবন্ধে, সম্মেলনে এবং প্রকাশনাতে উল্লেখ/উপস্থাপন করা হবে। কিন্তু কেউই আপনাকে চিহ্নিত করতে পারবে না।
- ❖ এই প্রকল্পটি শেষ হওয়ার পর সকল তথ্য আরএমআইটি বিশ্ববিদ্যালয়ে ০৫ বছরের জন্য নিরাপদভাবে সংরক্ষন করা হবে। শুধুমাত্র গবেষকবৃন্দ এই তথ্য দেখতে পারবেন। প্রকল্প শেষ হওয়ার ০৫ বছর সম্পন্ন হলে সকল তথ্য নষ্ট করা হবে।
- ❖ চুড়ান্ত পিএইডি প্রবন্ধ এবং প্রকাশনাপত্র আরএমআইটি বিশ্ববিদ্যালয় এর গবেষণা ভান্ডারে সংরক্ষণ করা হবে।

একজন অংশগ্রহনকারী হিসাবে আমার কি কি অধিকার আছে?
একজন অংশগ্রহনকারী হিসাবে আপনার নিম্নোক্ত অধিকার রয়েছে

- ❖ যে কোন সময় অংশগ্রহণ করা হতে নিজেকে বিরত রাখতে পারেন।
- ❖ যে কোন দলিল/নথি স্থগিত রাখার অনুরোধ করতে পারেন।
- ❖ আপনার দেয়া যে কোন তথ্য যা প্রক্রিয়াকরণ করা হয়নি তা চাইলে আপনি নষ্ট করতে পারেন। সেক্ষেত্রে শর্ত থাকে যে আপনার তথ্য চিহ্নিত করা যাবে এবং এটি নষ্ট করলে আপনার কোন ক্ষতি হবে না।
- ❖ যে কোন ছবি যা জনসম্মুখে প্রকাশ করা হবে, তা প্রকাশের পূর্বে আপনাকে যাতে চেনা না যায় সেই ব্যবস্থা করা হবে।
- ❖ যে কোন সময় যে কোন প্রশ্ন জিজ্ঞেস এবং উত্তর পেতে পারেন।

আমার কোন প্রশ্ন থাকলে আমি কার সাথে যোগাযোগ করব?
এই প্রকল্পের যে কোন তথ্যের জন্য আপনি ড. চার্লস লু এর সাথে যোগাযোগ করতে পারেন। অথবা আপনি ড. সিদ্দী পিট্টাচয়ান এর সাথে যোগাযোগ করতে পারেন।

<u>অংশগ্রহনের পূর্বে আমার আর কি নিয়ে সচেতন হওয়া উচিত?</u>
অংশগ্রহনের পূর্বে আপনাকে আর কোন কিছু নিয়েই সচেতন হওয়ার দরকার নেই।

আপনার একান্ত,
প্রিয়ব্রত চৌধুরী
স্কুল অফ বিজনেস আইটি এন্ড লজিষ্টিকস্
আরএমআইটি বিশ্ববিদ্যালয়, মেলবোর্ন, অস্ট্রেলিয়া

স্কুল অফ বিজনেস আইটি এন্ড লজিস্টিকস

ক্ষুদ্র ও মাঝারি প্রতিষ্ঠানের সরবরাহ ঝুঁকি হ্রাসকরণে সামাজিক মূলধনের ভূমিকা

প্রদত্ত সকল তথ্যের সম্পূর্ণ গোপনীয়তা বজায় রাখা হবে

গোপনীয়তা বজায় রাখার সুবিধার্থে আপনার নাম কিংবা আপনার প্রতিষ্ঠানের নাম উল্লেখ না করার জন্য অনুরোধ করা হলো।

নিম্নোক্ত নির্দেশাবলী আপনাকে প্রশ্নপত্রটি পূরণে সহায়তা করবে।

- নিম্নে প্রশ্নপত্রের একটি প্রশ্ন উদাহরণ হিসেবে দেওয়া হলো।

		কখনো না		মাঝেমাঝে				সবসময়
	আমাদের মূল সরবরাহকারীরা গুণগত মানের চাহিদা/শর্তাবলী পূরণ করে	১	২	৩	৪	৫	৬	৭

বক্সের ডানপাশের একটি সংখ্যায় গোল দাগ অথবা টিক চিহ্ন দেওয়ার মাধ্যমে বামপাশে উল্লেখিত বিবৃতি সম্পর্কে আপনার মতামত প্রতিফলনের মাত্রা প্রকাশ পায়। উদাহরণস্বরূপ, আপনি যদি বক্সের ৭ এর মধ্যে গোল দাগ বা টিক চিহ্ন প্রদান করেন তখন এটি প্রতীয়মান হবে যে আপনার মূল সরবরাহকারীরা সবসময় গুণগত মানের চাহিদা পূরণ করে ।

- এটা গুরুত্বপূর্ণ যে আপনি আপনার অভিজ্ঞতার আলোকে প্রত্যেক প্রশ্নের উত্তর প্রদান করবেন, এমনকি কিছু প্রশ্ন আপনার নিকট একই মনে হলেও। এই গবেষণার সফলতার জন্য প্রশ্নপত্রের সকল অংশে আপনার মতামত প্রদান অত্যন্ত গুরুত্বপূর্ণ কারণ আংশিক পূরণকৃত প্রশ্নপত্র ব্যবহারযোগ্য নয়। অতএব অনুগ্রহপূর্বক প্রত্যেক প্রশ্নের উত্তর প্রদান করুন।
- এখানে শুদ্ধ বা ভুল বলে কোন মতামত নেই। শুধুমাত্র প্রশ্নপত্রের প্রত্যেকটি প্রশ্নে আপনার মতামতের মাত্রা প্রকাশ করুন।
- আপনি যদি কোন প্রশ্ন সম্পর্কে মন্তব্য প্রদান করতে চান, তাহলে অনুগ্রহপূর্বক প্রশ্নপত্রের শেষে প্রদত্ত নির্ধারিত জায়গায় তা উল্লেখ করুন।
- এই গবেষণায় প্রাপ্ত তথ্য উপাত্ত এমনভাবে সমন্বয় করা হবে যাতে করে কোন ব্যক্তি অথবা প্রতিষ্ঠান অথবা শাখা চিহ্নিত করা না যায়।
- আপনার যদি এই জরিপ অথবা প্রশ্নপত্র সম্পর্কে কোন প্রশ্ন বা মন্তব্য থাকে তাহলে এই প্রকল্পের *গবেষকের* সাথে মাধ্যমে যোগাযোগ করার জন্য অনুরোধ করা হলো।

এই গবেষণা প্রকল্পে অংশগ্রহণের জন্য আপনি যে সময় ও শ্রম দিয়েছেন তার জন্য আপনাকে আন্তরিকভাবে ধন্যবাদ জানাই। এই প্রকল্পের শেষে আপনি যদি প্রাপ্ত ফলাফলের একটি কপি পেতে চান অনুগ্রহপূর্বক প্রকল্পের গবেষকের সাথে যোগাযোগ করুন। এই জরিপে আপনি যে সকল তথ্য প্রদান করবেন তার সম্পূর্ণ গোপনীয়তা বজায় রাখা হবে। কোন অংশগ্রহণকারী ব্যক্তির নাম, প্রতিষ্ঠান কিংবা শাখার নাম প্রশ্নপত্রে উল্লেখ করা হলেও তা প্রকাশ করা হবে না।

ধন্যবাদান্তে

প্রিয়ব্রত চৌধুরী, পিএইচডি গবেষক
স্কুল অফ বিজনেস আইটি এন্ড লজিস্টিকস
কলেজ অব বিজনেস, আরএমআইটি ইউনিভার্সিটি
৪৪৫ সোয়ান্সটন স্ট্রিট, মেলবোর্ন ৩০০০, অস্ট্রেলিয়া

অনুচ্ছেদ ১: ক্রেতা-সরবরাহকারী সামাজিক মূলধন

এই গবেষণায়, ক্রেতা-সরবরাহকারী সামাজিক মূলধন বলতে একটি ক্রয়কারী এসএমই এবং তার মূল সরবরাহকারীর মধ্যকার সাক্ষাৎ বা আলাপচারিতা, পারস্পারিক সুসম্পর্ক এবং বোঝাপড়ার মাধ্যমে অর্জিত বাস্তব এবং সম্ভাব্য সম্পদের সমষ্টিকে বোঝানো হচ্ছে। নিম্নোক্ত প্রশ্নাবলী ক্রেতা-সরবরাহকারী সামাজিক মূলধনের তিনটি দিক যেমন কাঠামোগত, সম্পর্কজনিত এবং জ্ঞানবৃত্তীয় এর সাথে সম্পর্কযুক্ত। নিম্নোক্ত স্কেলে গোল দাগ বা টিকচিহ্ন দেওয়ার মাধ্যমে আপনার মূল সরবরাহকারীর সাথে (যে আপনাকে পণ্য উৎপাদনের সবচেয়ে গুরুত্বপূর্ণ কাঁচামাল সরবরাহ করে) আপনার প্রতিষ্ঠানের সামাজিক মূলধন সম্পর্কে আপনার মতামত প্রকাশ করুন।

ক্রেতাসরবরাহকারী কাঠামোগত মূলধন

ক্রেতাসরবরাহকারী কাঠামোগত মূলধন হচ্ছে একটি ক্রয়কারী প্রতিষ্ঠান এবং তার মূল সরবরাহকারীর মধ্যকার বিদ্যমান সাক্ষাৎ বা আলাপচারিতার মাত্রা। অনুগ্রহপূবর্ক প্রতিটি স্টেটমেন্ট বা বিবৃতি যত্নসহকারে পড়ুন এবং আপনার প্রতিষ্ঠানের সাথে আপনার মূল সরবরাহকারীর নিম্নোক্ত সাক্ষাৎ বা আলাপচারিতার মাত্রা প্রকাশ করুন ঃ	কখনো না		মাঝে মাঝে				সবসময়
কর্মীদের মধ্যকার নিবিড় সাক্ষাৎ বা আলাপচারিতা	১	২	৩	৪	৫	৬	৭
আয়োজিত সামাজিক এবং পারিবারিক অনুষ্ঠানে পারস্পরিক সাক্ষাৎ বা আলাপচারিতা	১	২	৩	৪	৫	৬	৭
নির্দিষ্ট স্থানে (যেখানে উভয় পক্ষ মিলিত হয়) সাক্ষাৎ বা আলাপচারিতা	১	২	৩	৪	৫	৬	৭
সামনা-সামনি সাক্ষাৎ বা আলাপচারিতা (যেমন একে অপরের ফার্ম পরিদর্শন)	১	২	৩	৪	৫	৬	৭
বিভিন্ন মাধ্যম (যেমন ফোন, ইমেলে বা চিঠি) ব্যবহার করে সাক্ষাৎ বা আলাপচারিতা	১	২	৩	৪	৫	৬	৭

ক্রেতাসরবরাহকারী সম্পর্কজনিত মূলধন

ক্রেতা-সরবরাহকারী সম্পর্কজনিত মূলধন বলতে একটি ক্রয়কারী প্রতিষ্ঠান এবং তার মূল সরবরাহকারীর মধ্যে সৃষ্ট ব্যক্তিগত সম্পর্কের মাত্রাকে বোঝায়। অনুগ্রহপূবর্ক প্রতিটি স্টেটমেন্ট বা বিবৃতি যত্নসহকারে পড়ুন এবং আপনার সাথে আপনার মূল সরবরাহকারীদের মধ্যকার সম্পর্কের নিম্নোক্ত বৈশিষ্ট্যগুলোর মাত্রা (কী পরিমাণ রয়েছে) উল্লেখ করুন ঃ	মোটেও না			কিছু কিছু			ব্যাপক পরিমাণে
বিশ্বাস	১	২	৩	৪	৫	৬	৭
পারস্পরিক সম্মান	১	২	৩	৪	৫	৬	৭
ব্যক্তিগত বন্ধুত্ব	১	২	৩	৪	৫	৬	৭
পারস্পরিক ক্রিয়া-প্রতিক্রিয়া (একে অপরের সাথে কাজ করাকে যৌক্তিক মনে করা)	১	২	৩	৪	৫	৬	৭
ব্যক্তিগত যোগাযোগ	১	২	৩	৪	৫	৬	৭
ভবিষ্যতে একসাথে কাজ করার অঙ্গীকার	১	২	৩	৪	৫	৬	৭
ঐক্য বা একতা	১	২	৩	৪	৫	৬	৭

ক্রেতা-সরবরাহকারী জ্ঞানবৃত্তীয় মূলধন

ক্রেতা-সরবরাহকারী জ্ঞানবৃত্তীয় মূলধন বলতে একটি ক্রয়কারী প্রতিষ্ঠান এবং তার মূল সরবরাহকারীর মধ্যকার বিদ্যমান মতাদর্শ এবং বোঝাপড়ার সাদৃশ্যতা বা অভিন্নতাকে বোঝায়। অনুগ্রহপূবর্ক প্রতিটি স্টেটমেন্ট বা বিবৃতি যত্নসহকারে পড়ুন এবং আপনার প্রতিষ্ঠান এবং আপনার মূল সরবরাহকারীদের নিম্নোক্ত বিষয়গুলো/দিকগুলো কতটুকু মিল রয়েছে তা প্রকাশ করুন ঃ	খুবই ভিন্ন			কিছু মিল			অত্যন্ত মিল
ব্যবসায়িক মূল্যবোধ	১	২	৩	৪	৫	৬	৭
ব্যবসায়ের পরিচালনার দর্শন এবং ব্যবস্থাপনার পদ্ধতি	১	২	৩	৪	৫	৬	৭
ব্যবসায়িক সংকেত ও ভাষা	১	২	৩	৪	৫	৬	৭
ব্যবসায়ের সম্পদ/সামর্থ্য	১	২	৩	৪	৫	৬	৭

অনুচ্ছেদ ২: সরবরাহকারীর সমন্বয়

এই গবেষণায়, সরবরাহকারীর সমন্বয় বলতে একটি এসএমই এবং তার মূল সরবরাহকারী সহযোগিতার মাধ্যমে পারস্পরিক সুবিধা লাভের জন্য একে অপরের সাথে তথ্য, সম্পদ ও কাজের মধ্যে যে সমন্বয় সাধন করে তাকে বাঝানো হচ্ছে । নিম্নোক্ত প্রশ্নাবলীর উদ্দেশ্য হচ্ছে আপনার প্রতিষ্ঠানের সাথে আপনার মূল সরবরাহকারীর সমন্বয়ের বিভিন্ন দিকগুলোর (যেমন- তথ্য আদান-প্রদান, সম্পদ আদান প্রদান, পারস্পরিক সহযোগিতা এবং ক্রয়ের নমনীয়তা) মাত্রা যাচাই করা। নিম্নোক্ত স্কেলে গোল দাগ বা টিকচিহ্ন দেওয়ার মাধ্যমে আপনার মূল সরবরাহকারীদের সাথে সমন্বয় সম্পর্কে মতামত প্রকাশ করুন।

অনুগ্রহপূবর্ক প্রতিটি স্টেটমেন্ট বা বিবৃতি যত্নসহকারে পড়ুন এবং আপনার প্রতিষ্ঠানের সাথে আপনার মূল সরবরাহকারীর নিম্নোক্ত বিষয়ে কতটুকু সমন্বয় রয়েছে তা প্রকাশ করুন ঃ	মোটেও না			কিছু কিছু			ব্যাপক পরিমাণে
আমাদের প্রতিষ্ঠান এবং আমাদের মূল সরবরাহকারী একে অপরের সাথে সংবেদনশীল তথ্য (যেমন আর্থিক, উৎপাদন সংক্রান্ত, গবেষণা এবং/অথবা প্রতিযোগিতা সম্পর্কিত) আদান প্রদান করি	১	২	৩	৪	৫	৬	৭
আমাদের প্রতিষ্ঠান এবং আমাদের মূল সরবরাহকারী একে অপরের সাথে যে কোন তথ্য যা অপর পক্ষের উপকারে আসে তা বিনিময় করি	১	২	৩	৪	৫	৬	৭
আমাদের প্রতিষ্ঠান এবং আমাদের মূল সরবরাহকারী একে অপরের সাথে সময়মত, সঠিকভাবে এবং সম্পূর্ণরূপে তথ্য আদান প্রদান করি	১	২	৩	৪	৫	৬	৭
আমাদের প্রতিষ্ঠান এবং আমাদের মূল সরবরাহকারী একে অপরকে যে কোন ঘটনা বা পরিবর্তন যা অপরপক্ষকে প্রভাবিত করতে পারে তা অবহিত করি	১	২	৩	৪	৫	৬	৭
আমাদের প্রতিষ্ঠান এবং আমাদের মূল সরবরাহকারী একে অপরের সাথে ব্যবসায়িক অভিজ্ঞতা (যেমন- ব্যবসায়িক প্রক্রিয়া স্থাপন বা উন্নয়ন) বিনিময় করি	১	২	৩	৪	৫	৬	৭
আমাদের প্রতিষ্ঠান এবং আমাদের মূল সরবরাহকারী একে অপরের সাথে টেকনিক্যাল (প্রায়োগিক/ব্যবহারিক) অভিজ্ঞতা বিনিময় করি	১	২	৩	৪	৫	৬	৭
আমাদের প্রতিষ্ঠান এবং আমাদের মূল সরবরাহকারী একে অপরের সাথে আর্থিক সম্পদ (যেমন: বকেয়া পরিশোধের মেয়াদ বৃদ্ধি) আদান প্রদান করি	১	২	৩	৪	৫	৬	৭
আমাদের প্রতিষ্ঠান সবসময় মূল সরবরাহকারীদের সাথে একত্রিত হয়ে/যৌথভাবে সমস্যার সমাধান করি	১	২	৩	৪	৫	৬	৭
আমরা আমাদের মূল সরবরাহকারীদেরকে পণ্যের মান উন্নয়নে সহায়তা করি	১	২	৩	৪	৫	৬	৭
আমরা পরিকল্পনা এবং লক্ষ্য প্রণয়ন কর্মকাণ্ডে মূল সরবরাহকারীদেরকে অন্তর্ভুক্ত করি	১	২	৩	৪	৫	৬	৭

আমরা নতুন পণ্য প্রস্তুতে/তৈরীতে মূল সরবরাহকারীদেরকে সক্রিয়ভাবে জড়িত করি	১	২	৩	৪	৫	৬	৭
আমাদের মূল সরবরাহকারী আমাদেরকে প্রয়োজনে দ্রুত অর্ডার পেশ করতে দেন	১	২	৩	৪	৫	৬	৭
আমাদের মূল সরবরাহকারী আমাদেরকে প্রয়োজনে অর্ডার পরিবর্তন (যেমন- আকার, পরিমাণ বা উভয়ই) করতে দেন	১	২	৩	৪	৫	৬	৭
আমাদের মূল সরবরাহকারী প্রয়োজনে আমাদেরকে ডেলিভারি টাইম (মাল প্রদানের সময়) পরিবর্তন করতে দেন	১	২	৩	৪	৫	৬	৭
আমাদের মূল সরবরাহকারী আমাদের আকস্মিক চাহিদা পূরণে প্রয়োজনীয় ব্যবস্থা গ্রহণ করেন	১	২	৩	৪	৫	৬	৭

অনুচ্ছেদ ৩: ক্লাস্টার সামাজিক মূলধন

এই গবেষণায়, ক্লাস্টার সামাজিক মূলধন বলতে একটি নির্দিষ্ট ক্লাস্টার (একটি নির্দিষ্ট এলাকার সমজাতীয় ব্যবসায় প্রতিষ্ঠান এর সমষ্টি) এর আওতাধীন সমজাতীয় এসএমই-গুলোর মধ্যকার সাক্ষাৎ বা আলাপচারিতা, পারস্পারিক সুসম্পর্ক এবং বোঝাপড়ার মাধ্যমে অর্জিত বাস্তব এবং সম্ভাব্য সম্পদের সমষ্টিকে বোঝানো হচ্ছে। নিম্নোক্ত প্রশ্নাবলী ক্লাস্টার সামাজিক মূলধনের তিনটি দিক যেমন কাঠামোগত, সম্পর্কজনিত, জ্ঞানবৃত্তীয় এর সাথে সম্পর্কযুক্ত। নিম্নোক্ত স্কেলে গোল দাগ বা টিকচিহ্ন দেওয়ার মাধ্যমে আপনার প্রতিষ্ঠানের সাথে আপনার ক্লাস্টার এর অন্যান্য প্রতিষ্ঠানের (যাদের সাথে আপনার ঘনিষ্ঠ সামাজিক সম্পর্ক রয়েছে) সামাজিক মূলধন সম্পর্কে আপনার মতামত প্রকাশ করুন।

ক্লাস্টার কাঠামোগত মূলধন

ক্লাস্টার কাঠামোগত মূলধন হচ্ছে একটি নির্দিষ্ট ক্লাস্টার এর অর্ন্তভুক্ত ব্যবসায় প্রতিষ্ঠানগুলোর নিজেদের মধ্যকার বিদ্যমান সাক্ষাৎ বা আলাপচারিতার মাত্রা। অনুগ্রহপূবর্ক প্রতিটি স্টেটমেন্ট বা বিবৃতি যত্নসহকারে পড়ুন এবং আপনার প্রতিষ্ঠানের সাথে আপনার ক্লাস্টার এর অন্যান্য প্রতিষ্ঠানের (যাদের সাথে আপনার ঘনিষ্ঠ সামাজিক সম্পর্ক রয়েছে) নিম্নোক্ত সাক্ষাৎ বা আলাপচারিতা আলাপচারিতার মাত্রা প্রকাশ করুন ঃ	কখনো না			মাঝে মাঝে			সবসময়
কর্মীদের মধ্যকার নিবিড় সাক্ষাৎ বা আলাপচারিতা	১	২	৩	৪	৫	৬	৭
আয়োজিত সামাজিক এবং পারিবারিক অনুষ্ঠানে সাক্ষাৎ বা আলাপচারিতা	১	২	৩	৪	৫	৬	৭
যৌথ কর্মশালায়/প্রশিক্ষণে পারস্পরিক সাক্ষাৎ বা আলাপচারিতা	১	২	৩	৪	৫	৬	৭
বিভিন্ন প্রতিষ্ঠানে একই ধরনের কাজের সাথে জড়িত কর্মীদের নিজেদের মধ্যকার পারস্পরিক সাক্ষাৎ বা আলাপচারিতা	১	২	৩	৪	৫	৬	৭
নির্দিষ্ট স্থানে (যেমন ক্লাস্টার এর সমিতিঘর) সাক্ষাৎ বা আলাপচারিতা	১	২	৩	৪	৫	৬	৭
ক্লাস্টার এর মধ্যে দল গঠন অনুশীলনে (যেমন ক্লাস্টার উন্নয়ন সম্পর্কিত সভা এবং সমাবেশে) পারস্পরিক সাক্ষাৎ বা আলাপচারিতা	১	২	৩	৪	৫	৬	৭
দৈনন্দিন বিভিন্ন কাজের (যেমন- নামাজ আদায়/প্রার্থনা অথবা দুপুরের খাওয়া দাওয়া) সময় পারস্পরিক সাক্ষাৎ বা আলাপচারিতা	১	২	৩	৪	৫	৬	৭

ক্লাস্টার সম্পর্কজনিত মূলধন

ক্লাস্টার সম্পর্কজনিত মূলধন বলতে একটি নির্দিষ্ট ক্লাস্টার এর অর্ন্তভুক্ত ব্যবসা প্রতিষ্ঠানগুলোর নিজেদের মধ্যে সৃষ্ট ব্যক্তিগত সম্পর্কের মাত্রাকে বোঝায় যা তারা একে অপরের সাথে পারস্পারিক সাক্ষাৎ, আলাপচারিতা অথবা যোগাযোগের মাধ্যমে তৈরী করে। অনুগ্রহপূবর্ক প্রতিটি স্টেটমেন্ট বা বিবৃতি যত্নসহকারে পড়ুন এবং আপনার সাথে আপনার ক্লাস্টার এর অন্যান্য প্রতিষ্ঠানের (যাদের সাথে আপনার ঘনিষ্ঠ সামাজিক সম্পর্ক রয়েছে) সম্পর্কের মধ্যে নিম্নোক্ত বৈশিষ্ট্যগুলোর মাত্রা (কী পরিমাণে রয়েছে) উল্লেখ করুন ঃ	মোটেও না			কিছু কিছু			ব্যাপক পরিমাণে
বিশ্বাস	১	২	৩	৪	৫	৬	৭
পারস্পরিক সম্মান	১	২	৩	৪	৫	৬	৭
ব্যক্তিগত বন্ধুত্ব	১	২	৩	৪	৫	৬	৭
পারস্পরিক ক্রিয়া-প্রতিক্রিয়া (একে অপরের সাথে কাজ করাকে যৌক্তিক মনে করা)	১	২	৩	৪	৫	৬	৭
ব্যক্তিগত যোগাযোগ	১	২	৩	৪	৫	৬	৭
ভবিষ্যতে সাহায্য করার প্রতিশ্রুতি	১	২	৩	৪	৫	৬	৭
ঐক্য বা একতা	১	২	৩	৪	৫	৬	৭

ক্লাস্টার জ্ঞানবৃত্তীয় মূলধন

ক্লাস্টার জ্ঞানবৃত্তীয় মূলধন বলতে একটি নির্দিষ্ট ক্লাস্টার এর অর্ন্তভুক্ত ব্যবসায় প্রতিষ্ঠানগুলোর নিজেদের মধ্যকার বিদ্যমান মতাদর্শ এবং বোঝাপড়ার সাদৃশ্যতা বা অভিন্নতাকে বোঝায়। অনুগ্রহপূবর্ক প্রতিটি স্টেটমেন্ট বা বিবৃতি যত্নসহকারে পড়ুন এবং আপনার সাথে আপনার ক্লাস্টার এর অন্যান্য প্রতিষ্ঠানের (যাদের সাথে আপনার ঘনিষ্ঠ সামাজিক সম্পর্ক রয়েছে) নিম্নোক্ত বিষয়গুলোর/দিকগুলোর কতটুকু মিল রয়েছে তা প্রকাশ করুন ঃ	খুবই ভিন্ন			কিছু মিল			অত্যন্ত মিল
সংস্কৃতি ও মূল্যবোধ	১	২	৩	৪	৫	৬	৭
ব্যবসায়ের পরিচালনার দর্শন এবং ব্যবস্থাপনার পদ্ধতি	১	২	৩	৪	৫	৬	৭
ব্যবসায়ের লক্ষ্য	১	২	৩	৪	৫	৬	৭
ব্যবসায়িক সংকেত ও ভাষা	১	২	৩	৪	৫	৬	৭
নিজস্ব পরিভাষা বা শব্দ (যেমন স্থানীয় এলাকার বিভিন্ন শব্দ যা অন্য অঞ্চলে ব্যবহৃত হয় না)	১	২	৩	৪	৫	৬	৭
কর্মীদের পেশা এবং ব্যবসা সংক্রান্ত দক্ষতা	১	২	৩	৪	৫	৬	৭

অনুচ্ছেদ ৪: ক্লাস্টার সহযোগিতা

এই গবেষণায়, ক্লাস্টার সহযোগিতা বলতে এমন একটা অবস্থাকে বোঝানো হচ্ছে যেখানে একটি নির্দিষ্ট এলাকার সমজাতীয় এসএমই-গুলো নিজেদের মধ্যে সময়োপযোগী এবং দরকারী তথ্য এবং দৃশ্যমান ও অদৃশ্যমান সম্পদ আদান প্রদান করে এবং যৌথভাবে কিছু কর্মকাণ্ড গ্রহণ করে। নিম্নোক্ত স্কেলে গোল দাগ বা টিকচিহ্ন দেওয়ার মাধ্যমে ক্লাস্টার সহযোগিতা সম্পর্কে আপনার মতামত প্রকাশ করুন।

অনুগ্রহপূবর্ক প্রতিটি স্টেটমেন্ট বা বিবৃতি যত্নসহকারে পড়ুন এবং আপনার প্রতিষ্ঠানের সাথে আপনার ক্লাস্টার এর অন্যান্য সমজাতীয় প্রতিষ্ঠানের (যাদের সাথে আপনার ঘনিষ্ঠ সামাজিক সম্পর্ক রয়েছে) নিম্নোক্ত বিষয়ে কতটুকু সহযোগিতা রয়েছে তা প্রকাশ করুন ঃ	মোটেও না			কিছু কিছু			ব্যাপক পরিমানে
আমাদের প্রতিষ্ঠান এবং এই ক্লাস্টার এর অন্যান্য প্রতিষ্ঠান নিজেদের মধ্যে কাঁচামাল ক্রয় সংক্রান্ত তথ্য (যেমন সরবরাহকারী সম্পকে তথ্য) বিনিময় করে	১	২	৩	৪	৫	৬	৭
আমাদের প্রতিষ্ঠান এবং এই ক্লাস্টার এর অন্যান্য প্রতিষ্ঠান নিজেদের মধ্যে কাঁচামাল ক্রয় সংক্রান্ত অভিজ্ঞতা (যেমন সরবরাহ ব্যবস্থাপনা সংক্রান্ত অভিজ্ঞতা) বিনিময় করে	১	২	৩	৪	৫	৬	৭
আমাদের প্রতিষ্ঠান এবং এই ক্লাস্টার এর অন্যান্য প্রতিষ্ঠান নিজেদের মধ্যে সম্পদ (যেমন উপকরণ কিংবা টাকা পয়সা) বিনিময় করে	১	২	৩	৪	৫	৬	৭
কর্মচারীদের দক্ষতা বৃদ্ধির (যেমন ক্রয় সংক্রান্ত দক্ষতা) জন্য আমাদের প্রতিষ্ঠান এবং এই ক্লাস্টার এর অন্যান্য প্রতিষ্ঠান একসাথে প্রশিক্ষণের আয়োজন করে	১	২	৩	৪	৫	৬	৭
আমাদের প্রতিষ্ঠান এবং এই ক্লাস্টার এর অন্যান্য প্রতিষ্ঠান একসাথে মাল/উপকরণ বা মালের অংশবিশেষ ক্রয় করে	১	২	৩	৪	৫	৬	৭
সরবরাহ সংক্রান্ত সমস্যা সমাধানের জন্য আমাদের প্রতিষ্ঠান এবং এই ক্লাস্টার এর অন্যান্য প্রতিষ্ঠান একসাথে কাজ করে	১	২	৩	৪	৫	৬	৭

অনুচ্ছেদ ৫: সরবরাহ ঝুঁকি

এই গবেষণায়, সরবরাহ ঝুঁকি বলতে মাল কাঁচামাল ক্রয়ের ক্ষেত্রে প্রাথমিক নির্দিষ্ট লক্ষ্য হতে সম্ভাব্য বিচ্যুতিকে বোঝানো হচ্ছে । নিম্নোক্ত স্কেলে গোল দাগ বা টিকচিহ্ন দেওয়ার মাধ্যমে সরবরাহ ঝুঁকি সম্পর্কে আপনার মতামত প্রকাশ করুন।

অনুগ্রহপূবর্ক প্রতিটি স্টেটমেন্ট বা বিবৃতি যত্নসহকারে পড়ুন এবং নিম্নোক্ত উক্তিগুলো কতটুক সত্য তা প্রকাশ করুন ঃ	কখনো না			মাঝে মাঝে			সবসময়
আমাদের মূল সরবরাহকারী আমাদের গুণগতমানের (কোয়ালিটির) চাহিদা/শর্তাবলী পূরণ করে	১	২	৩	৪	৫	৬	৭
আমাদের মূল সরবরাহকারী আমাদের চাহিদাকৃত সময়ে মাল পাঠায়	১	২	৩	৪	৫	৬	৭
আমাদের মূল সরবরাহকারী আমাদের মালের পরিমাণের (সংখ্যার) চাহিদা/শর্তাবলী পূরণ করে	১	২	৩	৪	৫	৬	৭
আমাদের মূল সরবরাহকারী আমাদের সামগ্রিক চাহিদা/শর্তাবলী পূরণ করে	১	২	৩	৪	৫	৬	৭
আমাদের মূল সরবরাহকারী প্রতিশ্রুতি অনুসারে মাল পাঠায়	১	২	৩	৪	৫	৬	৭
আমাদের মূল সরবরাহকারীর আমাদের চাহিদা/শর্তাবলী পূরণের সামর্থ্য রয়েছে	১	২	৩	৪	৫	৬	৭
আমাদের মূল সরবরাহকারী মালের ন্যায্য দাম ধার্য্য করে	১	২	৩	৪	৫	৬	৭

অনুচ্ছেদ ৬: পরিচালন কর্মক্ষমতা

এই গবেষণায়, পরিচালন কর্মক্ষমতা বলতে একটি এসএমই এর ক্রেতার চাহিদা পূরণের ক্ষমতকে বোঝানো হচ্ছে। নিম্নোক্ত স্কেলে গোল দাগ বা টিকচিহ্ন দেওয়ার মাধ্যমে আপনার প্রতিষ্ঠানের পরিচালন কর্মক্ষমতা সম্পর্কে আপনার মতামত প্রকাশ করুন।

অনুগ্রহপূর্বক নিম্নোক্ত ক্ষেত্রে আপনার প্রতিষ্ঠানের পরিচালন কর্মক্ষমতা বা দক্ষতা পরিমাপ করুন ঃ	খুবই খারাপ			মোটামুটি			খুবই ভাল
পণ্য পরিবর্তনের/পরিমার্জনের গতি (ক্রেতার চাহিদা পূরণের জন্য পণ্য পরিবর্তন/পরিমার্জনে কত সময় লাগে)	১	২	৩	৪	৫	৬	৭
নতুন পণ্য আনয়নের গতি (নতুন পণ্য বাজারে ছাড়তে কত সময় লাগে)	১	২	৩	৪	৫	৬	৭
বাজারের চাহিদা পরিবর্তন হলে দ্রুত খাপ খাওয়ানোর ক্ষমতা	১	২	৩	৪	৫	৬	৭
নির্দিষ্ট সময়ে পণ্যের ডেলিভারি প্রদান (ক্রেতার চাহিদা অনুযায়ী সময়ে মাল প্রেরণ)	১	২	৩	৪	৫	৬	৭
মাল ডেলিভারির প্রদানের গতি (অর্ডার পাওয়ার পর মাল পাঠাতে কত সময় লাগে)	১	২	৩	৪	৫	৬	৭
ক্রেতাকে প্রয়োজনীয় সেবা প্রদান	১	২	৩	৪	৫	৬	৭
ক্রেতার অর্ডার পূরণ করার ক্ষমতা (ক্রেতার চাহিদা অনুসারে নির্দিষ্ট পরিমাণ মাল প্রদান)	১	২	৩	৪	৫	৬	৭

অনুচ্ছেদ ৭: উত্তরদাতার তথ্য

উত্তরদাতা সম্পর্কে নিম্নোক্ত তথ্যাবলী প্রয়োজন। অনুগ্রহপূর্বক নির্দিষ্ট বক্সে টিক চিহ্ন দিয়ে নিম্নে উল্লেখিত তথ্যাবলী প্রদান করুন।

১. এই প্রতিষ্ঠানে আপনার অবস্থান-

□ মালিক □ ব্যবস্থাপক □ পরিচালক □ অনান্য, অনুগ্রহপূর্বক উল্লেখ করুন ----------

২. আপনার শিক্ষার সর্বোচ্চ স্তর-

□ মাধ্যমিক/উচ্চ মাধ্যমিক বা কম □ ডিপ্লোমা □ ব্যাচেলর □ মাস্টার্স এবং বেশী

৩. এই প্রতিষ্ঠানে আপনি কতদিন ধরে কাজ করছেন?

□ ৫ বছর বা কম □ ৬ থেকে ১০ বছর □ ১১ থেকে ১৫ বছর □ ১৬ বছর বা বেশী

৪. এই শিল্পে আপনার মোট অভিজ্ঞতা কত বছর?

□ ৫ বছর বা কম □ ৬ থেকে ১০ বছর □ ১১ থেকে ১৫ বছর □ ১৬ বছর বা বেশী

৫. এই প্রতিষ্ঠান কত বছর ধরে পরিচালিত হচ্ছে ?

□ ৫ বছর বা কম □ ৬ থেকে ১০ বছর □ ১১ থেকে ১৫ বছর □ ১৬ বছর বা বেশী

৬. এই প্রতিষ্ঠানে কতজন কর্মচারী নিয়োজিত আছে?

□ ১০ জন বা কম □ ১১ থেকে ২৪ জন □ ২৫ থেকে ৯৯ জন □ ১০০ থেকে ২৫০ জন

৭. এই প্রতিষ্ঠানের আনুমানিক বার্ষিক বিক্রয় বাংলাদেশী টাকায় কত?

□ ৫ মিলিয়ন এর কম □ ৫ মিলিয়ন থেকে ১০০ মিলিয়ন □ ১০০ মিলিয়ন থেকে ৩০০ মিলিয়ন

৮. আপনার প্রতিষ্ঠানের উৎপাদিত পণ্যের প্রধান কাচাঁমালের জন্য কতজন সরবরাহকারী রয়েছে?

□ ১ □ ২ □ ৩ □ ৪ □ ৫ □ ৬ কিংবা এর অধিক

৯. কোন বাজার থেকে আপনি প্রধান কাঁচামাল ক্রয় করেন?

□ দেশীয় □ আন্তর্জাতিক □ উভয়ই

১০. কোন বাজারে আপনার প্রতিষ্ঠান পণ্য বিক্রয় করেন?

□ দেশীয় □ আন্তর্জাতিক □ উভয়ই

১১. আপনি কখন কখন আপনার মূল সরবরাহকারীদের সাথে লিখিত চুক্তি করেন?

□ কখনো না □ মাঝেমাঝে □ সবময়

যে কোন মন্তব্যের জন্য এই অংশটি ব্যবহার করুন

এই প্রশ্নপত্র পূরণে সময় প্রদানের জন্য আপনাকে অসংখ্য ধন্যবাদ।

Appendix C: Results of EFA

i. EFA model of buyer-supplier social capital

Measurement items	Factor		
	1	2	3
Intensive Interaction between the personnel	-.058	**.747**	.044
Intereaction in the social and family events	.063	**.739**	.010
Interaction in the co-location	-.047	**.775**	-.005
Face to face interaction	.027	**.798**	-.012
Interaction via multiple channels	.045	**.744**	-.018
Trust	**.801**	.033	.015
Mutual respect	**.711**	.033	.132
Personal friendship	**.861**	-.045	-.062
Reciprocity	**.849**	-.017	-.002
Personal interaction	**.824**	.000	-.076
Commitment	**.818**	-.020	.025
Togetherness	**.679**	.056	.043
Similar corporate values	.048	-.021	**.865**
Similar philosophies/ approaches	-.072	.063	**.858**
Similar business codes and languages	-.017	-.013	**.853**
Similar resources/capabilities	.061	-.008	**.732**

Extraction Method: Maximum Likelihood.
Rotation Method: Promax with Kaiser Normalisation

ii. EFA model of supplier integration

Measurement items	Factor			
	1	2	3	4
Share sensitive information	-.090	**.744**	.000	.075
Share any information that might help other party	.018	**.825**	.000	.000
Exchange information timely, accurately and/or completely	-.003	**.806**	.026	-.010
Inform events or changes that may affect the other party	.167	**.641**	.020	-.053
Share business experiences	-.009	.034	-.008	**.841**
Share technical knowledge	.010	.012	.025	**.752**
Share financial resources	.026	-.023	.011	**.839**
Solve problems jointly with our key suppliers	**.738**	.042	-.024	.106
Help key suppliers to improve their product quality	**.825**	-.012	.013	.014
Include key suppliers in our planning and goal-setting	**.840**	-.034	.031	-.004
Involve key suppliers in new product development processes	**.779**	.025	-.003	-.062
Key supplier allows to make quick orders	-.067	.026	**.613**	.163
Key supplier allows to modify the order specifications	.028	.020	**.797**	-.033
Key supplier allows to modify the delivery time	.037	-.031	**.821**	-.025
Key supplier takes necessary actions to fulfil our sudden needs	.017	.038	**.726**	-.014

Extraction Method: Maximum Likelihood.
Rotation Method: Promax with Kaiser Normalisation

iii. EFA model of cluster social capital – 1st Iteration (before item deletion)

Measurement items	Factor		
	1	2	3
Intensive interaction between the personnel	.019	.043	**.651**
Interaction in the social and family events	-.016	.002	**.736**
Interaction in the joint workshop/training	.008	.134	**.709**
Interaction between the personnel across different function	.157	.213	.309
Interaction in the co-location	-.019	-.053	**.855**
Interaction in the team building exercises in a cluster	-.018	-.056	**.840**
Interaction in the daily activities	.052	.007	**.770**
Trust	**.808**	-.006	.037
Mutual respect	**.842**	-.111	.100
Personal friendship	**.814**	.021	-.015
Reciprocity	**.818**	.054	-.045
Personal interaction	**.817**	.131	-.133
Commitment for helping in the foreseeable future	**.784**	-.004	.031
Togetherness	**.838**	-.036	.066
Culture and values	.030	**.826**	-.039
Philosophies/ approaches to business dealings and management styles	.012	**.822**	-.034
Business goals	.030	**.781**	.094
Codes and language	.000	**.898**	.002
Common terms or jargons	-.052	**.860**	.058
Professional or trade skills of employees	.015	**.808**	-.024

Extraction Method: Maximum Likelihood.
Rotation Method: Promax with Kaiser Normalisation.

iv. EFA model of cluster social capital – 2nd Iteration (after item deletion)

Measurement items	Factor		
	1	2	3
Intensive interaction	.025	.049	**.642**
Interaction in the social and family events	-.010	.008	**.729**
Interaction in the joint workshop/training	.014	.139	**.704**
Interaction in the co-location	-.013	-.046	**.847**
Interaction in the team building exercises in a cluster	-.013	-.049	**.834**
Interaction in the daily activities	.059	.015	**.760**
Trust	**.806**	-.002	.036
Mutual respect	**.839**	-.107	.101
Personal friendship	**.811**	.024	-.011
Reciprocity between	**.815**	.056	-.042
Personal interaction	**.815**	.132	-.132
Commitment for helping for the foreseeable future	**.782**	-.001	.033
Togetherness	**.835**	-.033	.071
Culture and values	.034	**.821**	-.038
Philosophies/ approaches to business dealings and management styles	.016	**.817**	-.032
Business goals	.034	**.777**	.096
Codes and language	.002	**.895**	.007
Common terms or jargons	-.050	**.858**	.064
Professional or trade skills of employees	.019	**.803**	-.022

Extraction Method: Maximum Likelihood.
Rotation Method: Promax with Kaiser Normalisation.

v. EFA model of cluster cooperation

Measurement items	Factor 1
Exchange information	.789
Exchange experiences	.757
Share resources	.779
Jointly organise labour training program	.752
Use cooperative sourcing of material and/or parts	.765
Take joint actions to solve the problems	.820
Extraction Method: Maximum Likelihood.	
Rotation Method: Promax with Kaiser Normalisation.	

vi. EFA model of supply risk

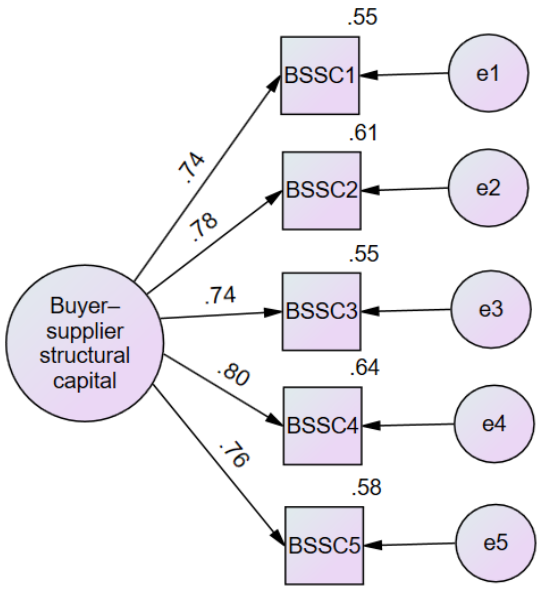
Measurement items	Factor 1
Our key supplier meets our quality specification requirements	.823
Our key supplier meets our required delivery lead times	.850
Our key supplier meets our volume requirements	.863
Our key supplier meets our overall requirements	.748
Our key supplier delivers our orders as promised	.855
Our key supplier has the capacity to meet our requirements	.790
Our key supplier charges fair price for the material	.756
Extraction Method: Maximum Likelihood.	
Rotation Method: Promax with Kaiser Normalisation.	

vii. EFA model of operational performance

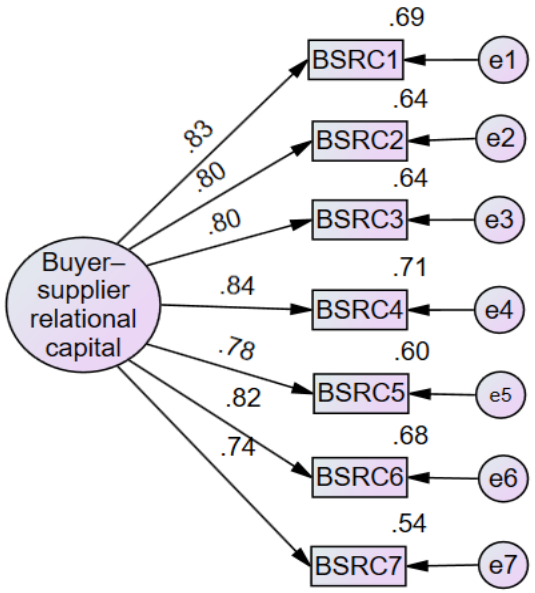
Measurement items	Factor 1
Product modification speed	.826
Product introduction speed	.804
Ability to quickly respond to changes in market demand	.825
On-time delivery	.893
Delivery speed	.804
Customer service	.775
Order fill capacity	.760
Extraction Method: Maximum Likelihood.	
Rotation Method: Promax with Kaiser Normalisation.	

Appendix D: First-Order CFA Models

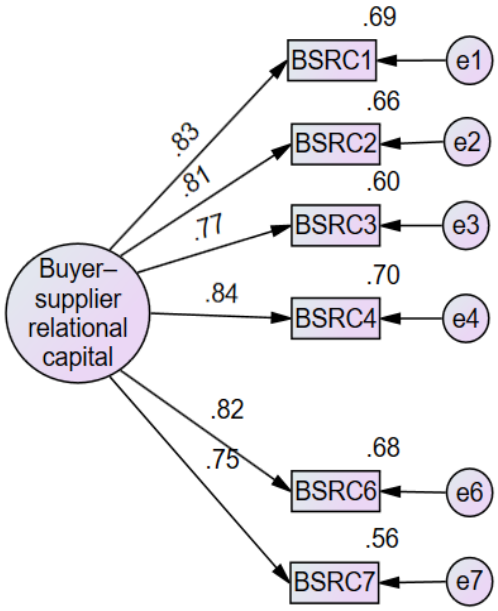
i. First-order measurement model for BSSC



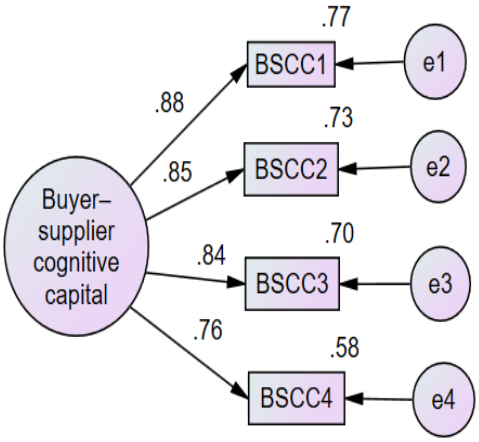
ii. First-order measurement model for BSRC (first iteration)



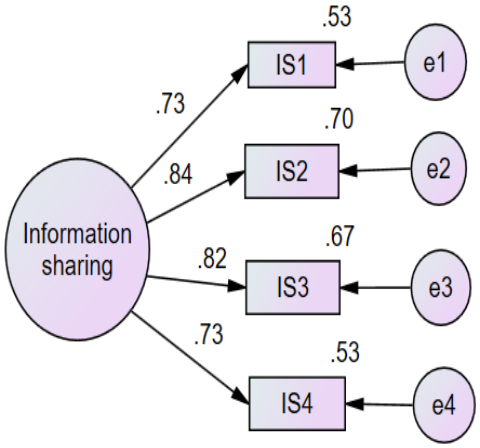
iii. First-order measurement model for BSRC (second iteration)



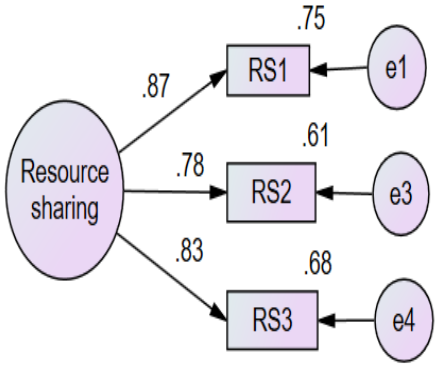
iv. First-order measurement model for BSCC



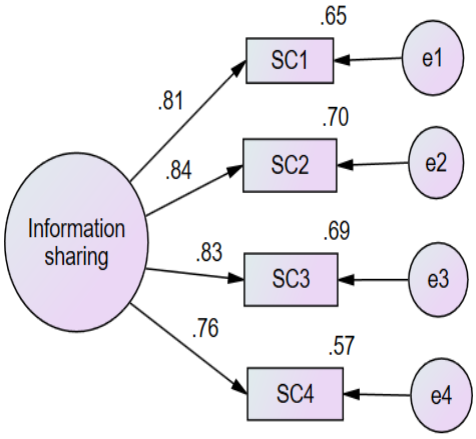
v. First-order measurement model for IS



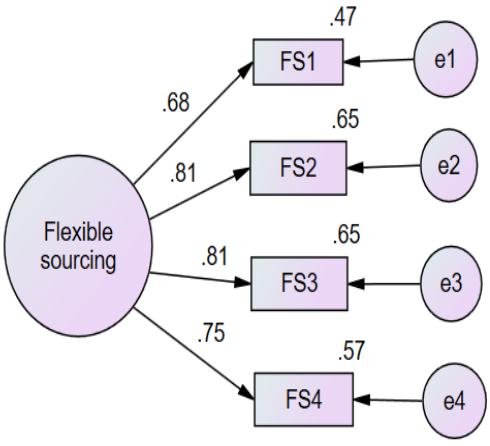
vi. First-order measurement model for RS



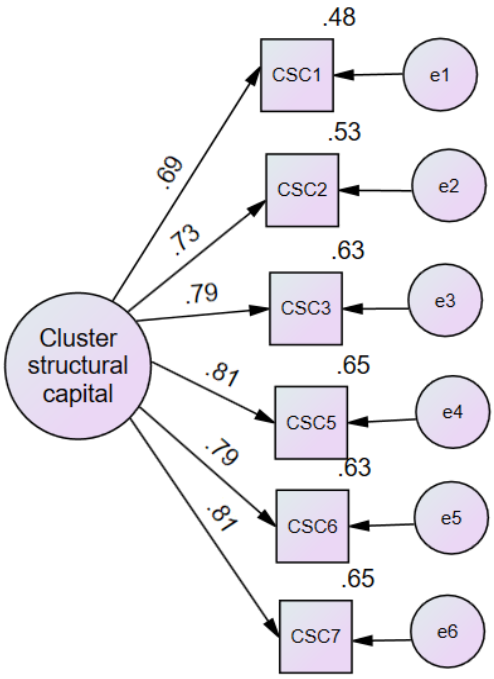
vii. First-order measurement model for SC



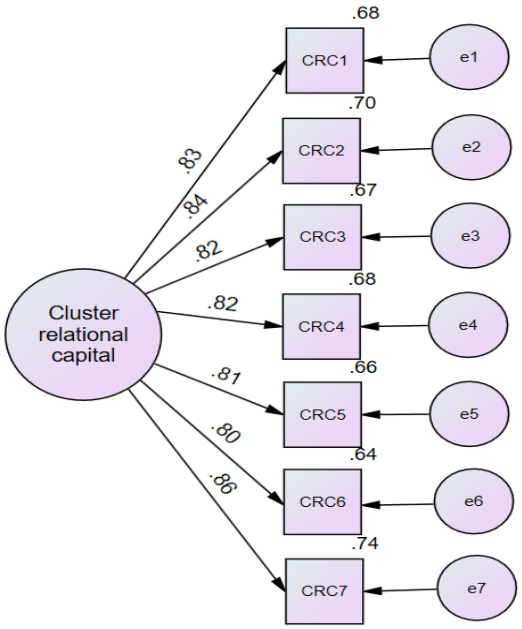
viii. First-order measurement model for FS



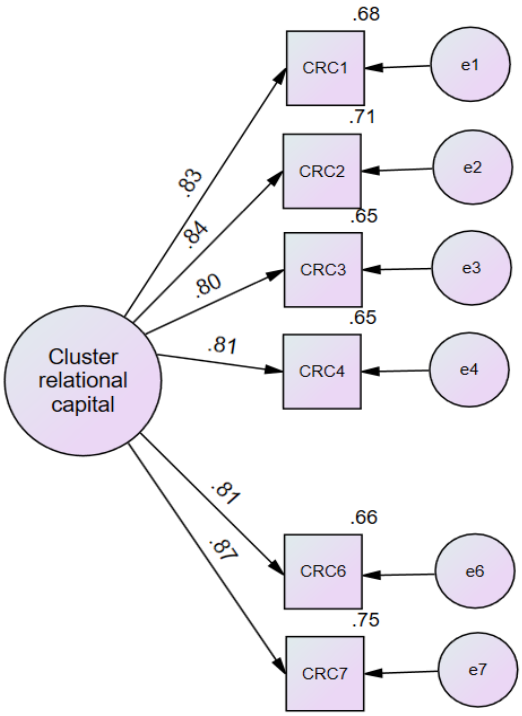
ix. First-order measurement model for CSC



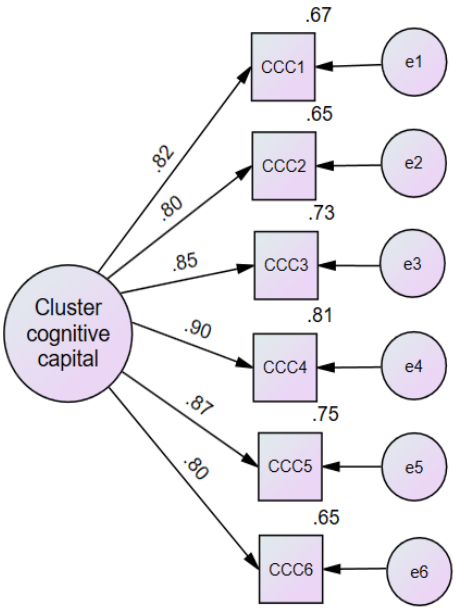
x. First-order measurement model for CRC (first iteration)



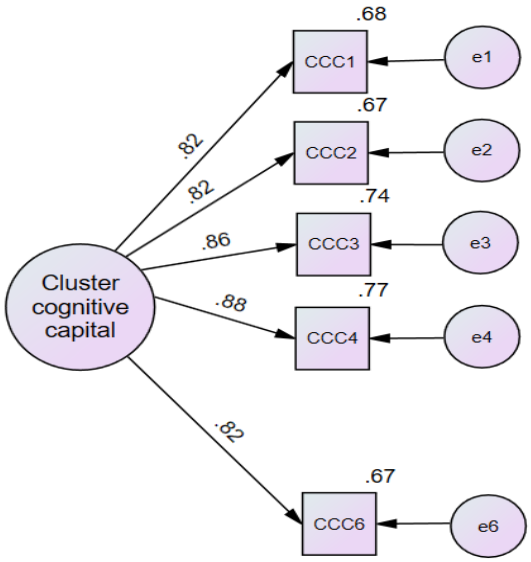
xi. First-order measurement model for CRC (second iteration)



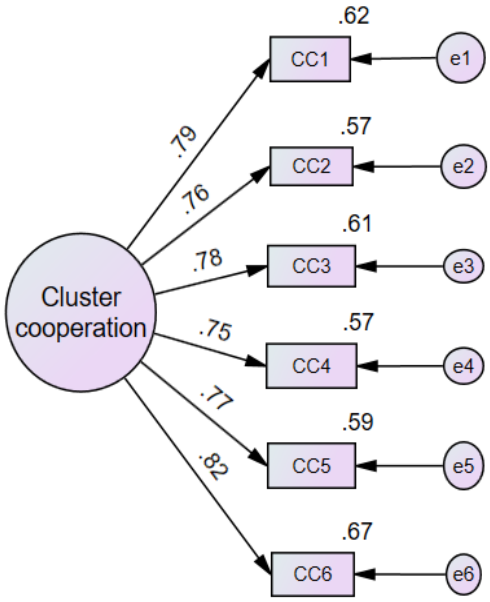
xii. First-order measurement model for CCC (first iteration)



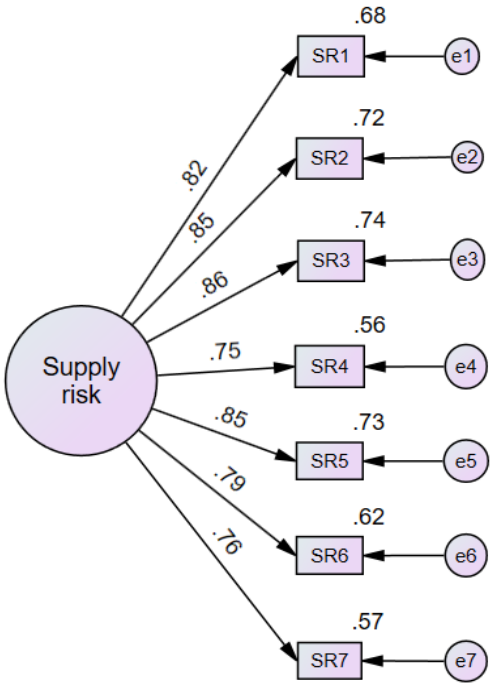
xiii. First-order measurement model for CCC (second iteration)



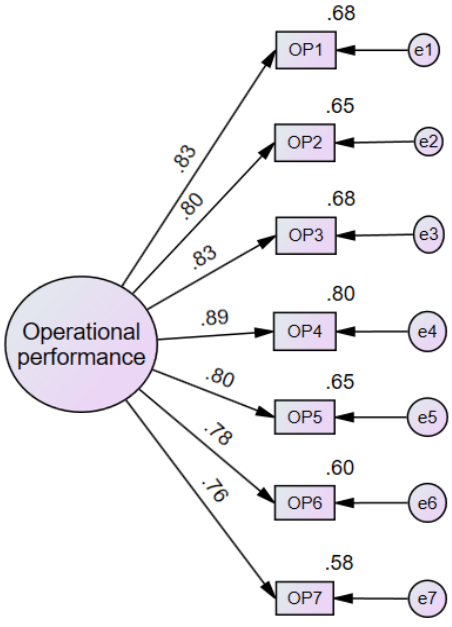
xiv. First-order measurement model for CC



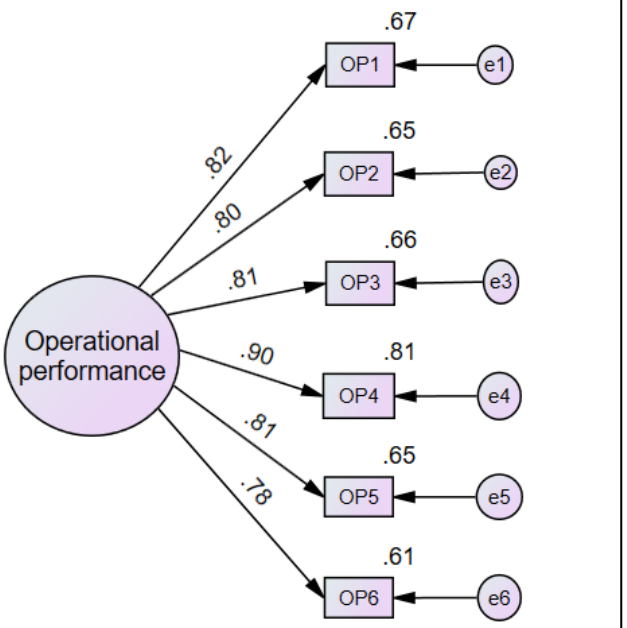
xv. First-order measurement model for SR



xvi. First-order measurement model for OP (first iteration)

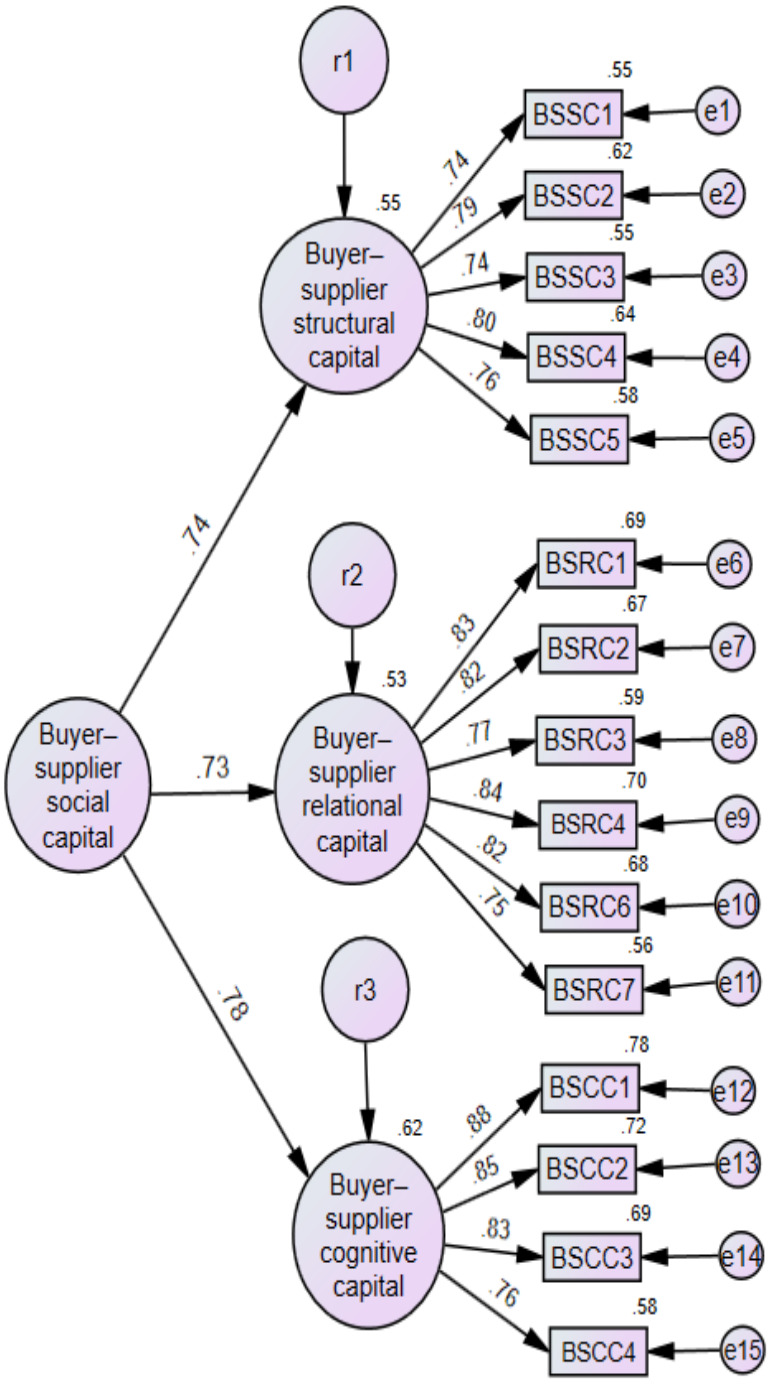


xvii. First-order measurement model for OP (second iteration)

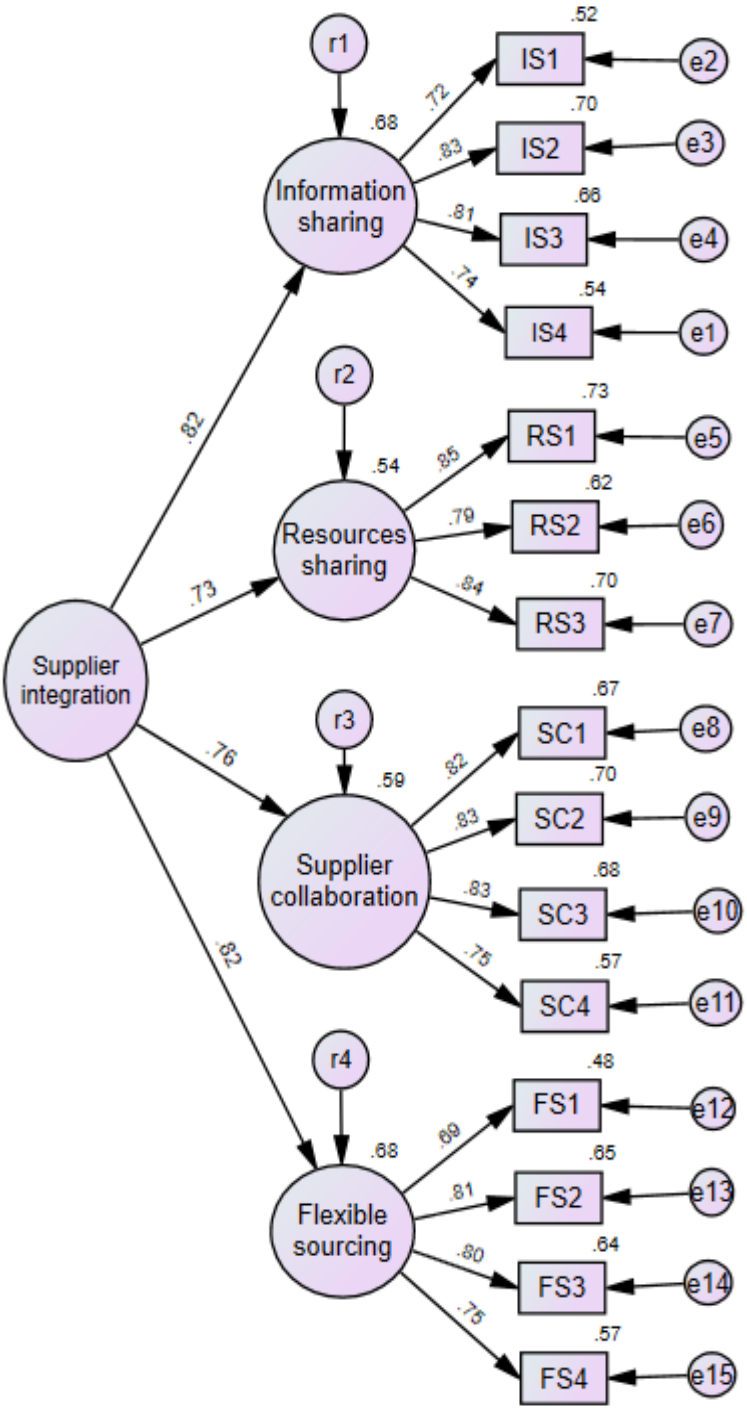


Appendix E: Second-Order CFA Models

i. The second-order model of buyer–supplier social capital



ii. The second-order model of supplier integration



iii. The second-order model of cluster social capital