TERRORISM AFFECTED REGIONS: THE IMPACT OF DIFFERENT SUPPLY CHAIN RISK MANAGEMENT STRATEGIES ON FINANCIAL PERFORMANCE

By

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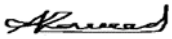
Signed …  (Muhammad Naveed Khan) Date …06/09/2019

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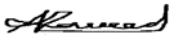
Signed …  (Muhammad Naveed Khan) Date …06/09/2019

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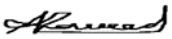
Signed …  (Muhammad Naveed Khan) Date …06/09/2019

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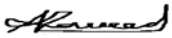
Signed …  (Muhammad Naveed Khan) Date …06/09/2019

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To my family

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Abstract

Purpose: Current geo-political events, such as terrorism and climatologic adversities, have highlighted the potential risks to supply chains (SCs), and their disastrous financial impacts on supply chains. Within supply chains, risk management plays a major role in successfully managing business processes in a proactive manner and ensuring the business continuity and financial performance (FP). The purpose of this study is to explore the supply chain risks and strategies in a terrorism-affected region (TAR), and to examine supply chain risk management (SCRM) strategies and their impacts on FP, including the war on terror (WoT) and its impacts on the local logistics industry. In addition, this study investigates the knowledge gaps in the published research on terrorism-related risk in supply chains, and develops a framework of strategies and effective decision-making to enable practitioners to address terrorism-related risks for SCRM.

Methodology: The study initially adopts a novel combination of triangulated methods comprising a systematic literature review, text mining, and network analysis. Additionally**,** risk identification, risk analysis and strategies scrutiny are conducted by using semi-structured interviews and Qualitative Content Analysis in a TAR. A model of strategies was developed from a review of existing studies and interviews. The model is empirically tested with survey data of 80 firms using fuzzy-set Qualitative Comparative Analysis (fsQCA).

Findings: This study reveals a number of key themes in the field of SCRM linked with terrorism. It identifies relevant mitigation strategies and practices for effective strategic decision-making. This subsequently leads to development of a strategic framework, consisting of strategies and effective-decision making practices to address terrorism-related risks that affect SCRM. It also identifies key the knowledge gaps in the literature and explores the main contributions by disciplines (e.g., business schools, engineering, and maritime institutions) and countries.

Further, it identifies the SC risks in a TAR, which consist of value streams: disruption risks, operational risks and financial risks. Among these, the emerging risks emcompass terrorist groups' demand for protection money, smog, paedophilia and the use of containers to block protesters. To mitigate these risks, firms frequently implemented the following strategies: information sharing, SC coordination, risk sharing, SC finance, SC security and facilitation payment. Five strategies out of the six (except facilitation payment) are able to lead to FP,

confirmed quantitatively as well. There are various equifinal configurations of SCRM strategies leading to FP. In addition, information sharing acts as a moderator in the relationship between SC security and FP. SC coordination has a mediating role in the relationship between information sharing and SC security capabilities and FP.

Research limitations/Contribution: The sample size a limitation of the study, meaning that the findings should be generalized with caution. The most valuable implications is the identification of configurations of strategies that can help managers and policymakers in implementing those findings.

Originality/value: No empirical study was found in the SCRM literature that specifically investigates the relationships between the identified strategies and FP with fsQCA, in particular in a TAR context; this study thus fills an important gap in the SCRM literature and contributes empirically.

Keywords: Terrorism, supply chain risk, strategies, fsQCA, financial performance

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List of Abbreviations

3PL	Third-Party Logistics
AMR	Advanced Manifest Rule
ANOVA	Analysis of Variance
CPEC	China-Pakistan Economic Corridor
COSO	Committee of Sponsoring Organizations of the Treadway Commission
CSI	Container Security Initiative
C-TPAT	Customs-Trade Partnership Against Terrorism
EPCRA	Emergency Planning and Community Right to Know Act
FAST	Free And Secure Trade
GDP	Gross Domestic Product
ISO	International Organization for Standardization
IT	Information Technology
NATO	North Atlantic Treaty Organization
PIA	Pakistan International Airlines
PR	Pakistan Railways
RFID	Radio-Frequency Identification
SCRM	Supply Chain Risk Management
SECP	Security & Exchange Commission Pakistan
SMEs	Small and Medium Enterprises
SST	Smart and Secure Trade Lane
TAR	Terrorism Affected Region
TEU	Twenty-foot Equivalent Unit
U.S.	United States of America
WoT	War on Terror

Chapter One

Introduction

1.1-Introduction

This chapter introduces the study and is organised into nine sections. Following this introduction, the research significance is discussed in section 1.2. Section 1.3 discusses the existing research. The knowledge gaps are identified in section 1.4. Section 1.5 defines the research aim and objectives. An overview of the research methodology is presented in section 1.6. Section 1.7 highlights the study scope and contributions. The structure of the study is outlined in section 1.8. Section 1.9 provides a summary of the chapter.

1.2- Research Significance

Supply chain risk management (hereinafter, SCRM) has increasingly attracted the interest of academics and practitioners due to current geo-political events, such as terrorism and political instability, and geological and climatologic disasters, which have emphasised the latent risks to global supply chains (SCs) and their disastrous financial effect on global companies (Das & Lashkari, 2015). In particular, the number of man-made disasters which disrupt the supply flow has increased significantly within the last decade (Nejad & Kuzgunkaya, 2014).

The growing number of disruptions has negative consequences on firms' financial performance and operations. SCRM has been studied extensively in the last decade (Colicchia & Strozzi, 2012). There have been several cases when disruptions paralysed the supply chain (hereinafter, SC). For instance, a fire which lasted for only 10 minutes in a Philips plant disrupted Ericsson's delivery of microchips for more than a month, causing losses of more than US $400 million (Chopra & Sodhi, 2004). According to the World Economic Forum survey in 2003, the daily cost of SC disruption was estimated by US firms to amount to between US $50 million and $100 million (Rice & Caniato, 2003). However, the current cost will be much greater. Indeed, the aggregate cost of Hurricane Sandy in the US in 2012 topped US $70 billion, and Thailand's floods in 2012 led to the closure of more than 1,000 factories and US $ 20 billion losses in total (World Economic Forum, 2013a).

Similarly, terrorism risk is a major factor, which can cause huge disruption for SCs. According to the World Economic Forum (2018), terrorism is among the top ten factors that affect global SCs. In 2017, the number of terrorist attacks increased to 282 in Europe and eight countries of Europe recorded at least one death from terrorism. The recent terrorist incident in New Zealand highlights the significance of terrorism in such a peaceful part of world. New Zealand was ranked 114 in the world regarding the number of terrorist accidents in 2017. Terrorism not only causes human losses but also generates economic losses as well. The global economic impact of terrorism in 2017 was US $ 52 billion. This does not include the costs connected with countering terrorism, preventing extremism and terrorism's indirect costs to business (The Institute for Economics & Peace, 2018).

Terrorism has a negative impact on supply chains by increasing the costs of contract, requiring specialised security measures, high insurance premiums, and the adoption of counterterrorism regulations (Johnston & Nedelescu, 2006). After the 9/11 attack, there has been a 600% increase in inventory level compared to normal operating conditions, due to increase in security actions on international borders (Bueno-Solano & Cedillo-Campos, 2014). It still remain to be see how much the 9/11 attack cost U.S. firms and the rest of the world due to an increase in security and regulations enforced by governments.

The global SCs and logistical infrastructures are particularly vulnerable to the direct and indirect effects of terrorist attacks (McIntyre & Travis, 2006). Globally, 21% of total terrorist attacks from 1971 to 2017 targeted global SCs (National Consortium for the Study of Terrorism and Responses to Terrorism 'START', 2018). According to the British Standards Institution (2017), terrorist attacks on global SCs increased by 16 percent between 2016 and 2017. In 2016 alone, a total of 346 attacks took place on supply chains, averaging at 3.7 per week. These terrorist attacks on the SC happened in 58 countries, which indicates the global impact of terrorism on SC. Terrorist attacks on SCs have increased at alarming rates in many countries, including Pakistan.

Pakistan is the fifth most terrorism-affected country after Iraq, Afghanistan, Nigeria and Syria (The Institute for Economics & Peace, 2018). Pakistan also is a strategic and important ally of the US in the war on terror (hereinafter, WoT). Since

1970, 14,690 terrorist indicants have occurred in Pakistan. A total of 2803 terrorist attacks (19% of the total) targeted SCs and logistics since 1971. Moreover, since 2005, the number of terrorist attacks on SCs in Pakistan has significantly increased (START, 2018). According to The Institute for Economics & Peace (2016), the effect of terrorism on the Pakistani economy is 2.8% of its total GDP, which is the eight in highest economic impact of terrorism in the world.

1.3-Existing Research

A large and growing body of literature has identified SC risks in SCRM literature (e.g., Chopra & Sodhi, 2004; Neiger et al., 2009; Tummala & Schoenherr, 2011; Tang & Musa, 2011; Ghadge et al., 2012; Vilko & Hallikas, 2012; Punniyamoorthy et al., 2013; Markmann et al., 2013; Schlegel & Robert, 2014; Heckmann et al., 2014; Wiengarten et al., 2016; Gaudenzi et al., 2018). However, the concept of terrorism risk was largely overlooked in the past, although, in the current context, terrorism is increasingly recognised as posing a threat to global SCs (Anagnostakis, 2016). The concept of terrorism risk in SCRM was primarily developed following the 9/11 terrorist attacks (Zegordi & Davarzani, 2012). There is extensive literature available on SCRM, SC disruption and supply chain security. However, a limited number of studies deals with terrorism risk management (TRM) in the context of SC and how to secure the SC from terrorist attacks (e.g., Sheffi, 2001; Rice & Caniato, 2003). A few researchers have conducted studies on terrorism risk impacts on different aspects of the SC. For example, SC performance (e.g., Czinkota et al., 2005; Bueno-Solano & Cedillo-Campos, 2014), SC security performance (e.g., Sheffi, 2001; Thibault et al., 2006; Macpherson & McConnell, 2007; MacPherson, 2008; Marlow, 2010; Reilly et al., 2012), SC resilience (e.g., Cox et al., 2011; Urciuoli et al., 2014), communication between SC partners after terrorist attacks (e.g., Degeneffe et al., 2009) and the impact of terrorism on SC employees (Reade, 2009).

In addition, SC security is widely discussed in SCRM literature. The new SC security regulations and their impact on SC performance are extensively analysed (e.g., Sheu et al., 2006; Thibault et al., 2006). Similarly, Barnes and Oloruntoba (2005) and Raymond (2006) examine the impact of the new security initiatives in the maritime context. Markmann et al. (2013) analysed the influence of terrorism risk on global SC security. There are various studies conducted on transportation

security in the context of terrorism risk (e.g., Prentice, 2008; Ekwall, 2012; Reilly et al., 2012; Strandberg, 2013). Terrorism risk is discussed in food SC security and bio-terrorism (e.g., Nganje et al., 2008; Pinior et al., 2015; Navarrete & Esteban, 2016). Moreover, a few studies are also available on SC disruption management in the context of terrorism risk (e.g., Stecke & Kumar, 2009; Knemeyer et al., 2009).

SCRM strategies are widely discussed in literature (e.g., Morash, 2001; Tang, 2006; Burke et al., 2007; Manuj & Mentzer, 2008 a&b; Stecke & Kumar, 2009; Lavastre et al., 2012; Urciuoli et al., 2014; Ho et al., 2015; Qi et al., 2017). Similarly, there is a large volume of published studies describing the impact of SC risk and SCRM on operation performance (e.g., Rice & Caniato, 2003; Lavastre el at., 2012; Kumar et al., 2014; Lavastre el at., 2014; Kauppi et al., 2016; Wiengarten et al., 2016; Fan et al., 2017; Revilla & Saenz, 2017).

With regard to FP, a few studies have been conducted to evaluate the SC risks impact on shareholders' wealth (e.g., Hendricks & Singhal, 2003, 2005, 2008; Hendricks et al., 2007). The findings of previous SCRM research provide valuable insights but have limited applications for a terrorism-affected region.

1.4-Knowledge Gaps

The initial review of the literature on SCRM identified the following major gaps. First, a limited amount of literature has been published on a holistic SCRM approach in the context of stable environments (e.g., Ritchie & Brindley 2007; Kern et al., 2012; Pettit et al., 2013; Lockamy III, 2014; Yang, 2014). However, too little attention has been paid to the identification of SC risk and SCRM practices in the context of a TAR (see Table 2.9).

Second, the current SCRM strategies were planned for routine and repeated operations, based upon the assumption of a stable environment, and reflected EU and US-centric views. However, to the best of the researcher's knowledge, no previous study has identified SC risks and SCRM strategies in a TAR.

Third, the framework explaining relationship between SCRM strategies and FP were developed in more stable environments. None of the current SCRM frameworks was planned in the context of a TAR.

Fourth, the Committee of Sponsoring Organizations of the Treadway Commission (COSO) framework for risk management is widely used in finance. There are limited studies available in the context of SCRM (e.g. Scannell et al. 2013, more). However, to the best of the researcher's knowledge, no previous study has adopted the COSO framework (SCRM) in the context of a TAR.

Fifth, there are large number of studies that adopted contingency theory in the literature of SCRM (e.g. Czinkota et al., 2005; Gordon et al., 2009; Trkman & McCormack, 2009; Ojha et al., 2013; Hofmann & Lampe, 2013; Mikalef et al., 2015; Park et al., 2016; Yim et al., 2017). However, a limited number of studies have adopted the contingency theory in the context of a TAR.

Last, there is sufficient evidence suggesting that SCRM strategies have a positive impact on FP. However, to the best of the researcher's knowledge, no previous study has investigated the impact of SCRM strategies on FP in the context of a TAR such as Pakistan. Therefore, there is a need for research to address these research gaps.

1.5- Research Objectives and Questions

The main objective of this study is to examine SCRM impact on FP in a TAR. For this purpose, appropriate identification and analysis of SC risks is necessary. In addition, the SCRM strategies that can mitigate those risks must be explored. It is also vital to assess the impact of those strategies on the FP.

This study follows the four-stage SCRM process: risk identification, risk analysis, risk mitigation and outcome (Kleindorfer & Saad, 2005; Zsidisin & Wagner, 2010). These stages are interrelated with each other, therefore, the emphasis on a certain stage could cause disintegrated findings that are only related to certain conditions; this is the reason why this study embraces all four stages. In order to achieve the research aims of this study, the following research questions are developed:

Research question 1: *What is the current state-of-the-art in SCRM literature on terrorism risk?*

Research question 2a. *What are the supply chain risks in a TAR (Pakistan)?*

Research question 2b. *What are the most frequent risks to the supply chain in that region?*

Research question 3a. *What are the SCRM mitigation strategies employed by the firms in that region?*

Research question 3b. *What are the main risk management strategies to be considered?*

Research question 4. *What is the impact of the SCRM strategies on firms' financial performance?*

Research question 5. *What is the impact of the war on terror on logistics service providers in that region?*

These research questions will be addressed by multiple research approaches. Ultimately, the results are expected to help understand the nature of the SC risk in the context of terrorism, how it should be managed and its impact on FP.

1.6- Overview of Research Methodology

SCRM consists of several phases, including risk identification, risk analysis, risk mitigation and outcome. A holistic approach to SCRM needs to embrace all these phases. This study, therefore, adopts a multi-stage mixed method including with three data collection techniques and three analysis techniques. Table 1-1 shows the research framework in detail.

Table 1.1: Research questions and relevant research method

Type of Study	RQs	Data	Sample Size	Methodology
Exploratory Study	1	Secondary Data	64	SLR, Text Mining and Network Analysis
	2 a & b			
	3 a & b	Semi-Structured Interview	35	Qualitative Content Analysis
	5			
Confirmatory Study	4	Questionnaire	80	fsQCA

Source: Author

1. 7- Study Scope and Contributions

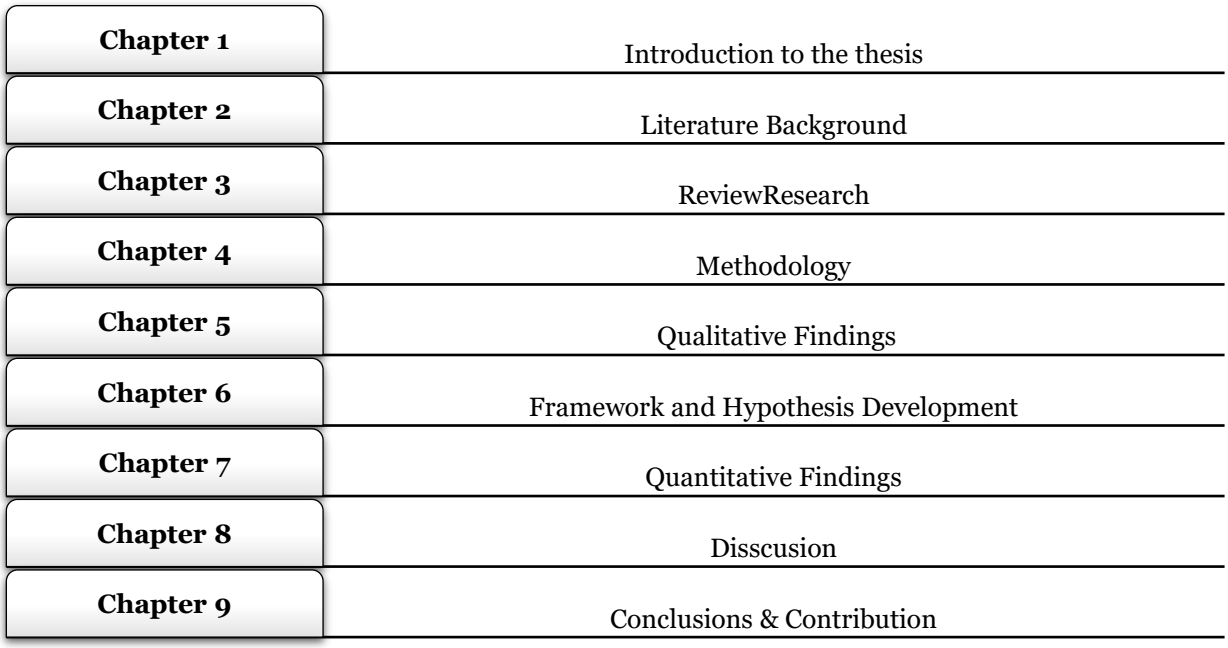
A considerable amount of literature has been published on SCRM. It is a broad topic including various perspectives from which to look at SCs. Therefore, it is important at an early stage to set the boundaries of this study, in order to develop meaningful insights. First, the context of this study is confined to a terrorism–affected region. While this study borrows theories and research conducted in different contexts of supply chain management (SCM), SCRM, finance, and other general management disciplines, it main focus is on how to manage SC risks and their impact on FP in a TAR. Second, in selecting the unit of analysis, this study assumes a SC network of diverse entities that are involved in TAR. This s considers a SC network that includes logistics service providers (LSPs), manufacturing, exporters, importers and energy providers. Third, the geographical focus of this study is Pakistan. This country provides a good sample of a TAR, due to being heavily affected by terrorism. The SC in Pakistan has been repeatedly hit by terrorist attacks in the last 15 years. Taking the scale of terrorism into account; the SCRM practices in Pakistan are expected to provide valuable and potentially generalizable insights to address the research questions.

Fifth, in 2013, China and Pakistan announced plans to construct a China-Pakistan Economic Corridor (CPEC) to connect the north-western region of China (Xinjiang) to the Pakistani port of Gwadar, as part of the One Belt and One Road initiative, with a total estimated value of around US$50bn (The Economist, 2019). Usually, the foreign oil supply of China is delivered through the Strait of Malacca, which h confronted challenges such as pirate attacks, territorial disputes and geopolitics. CPEC will offer the option of constructing an oil pipeline to bypass the Strait of Malacca. It is a framework of regional connectivity, that will not only

benefit China and Pakistan but also have positive impact on other countries of the region. The CPEC project is not only related to construction of new routes, but also include overhauling of existing Pakistani road infrastructure, which can facilitate the trade and increasing the accessibility of markets. It includes construction of a 2500–3000 km transport infrastructure, which including a road network, railways and energy tunnels between Kashgar (China) and Gwadar port (Pakistan), at a cost of 9784 million US$ (Government of Pakistan, 2019). In the context of CPEC, this study contributes valuable knowledge regarding SCRM practices in that region, which would be very useful for the future users of CPEC, to mitigate their SC risks in that region. Last, it assesses SCRM strategies' effect on FP, and the moderating and mediating roles of SCRM strategies in the context of FP.

1.8- Structure of the Thesis

Figure 1.1: The structure and progression of the thesis



Source: Author

Figure 1.1 shows the structure of this study. It comprises nine chapters. Chapter 1 provides a brief overview of the study. It explains the research significance, objectives and questions that aim to fill the research gaps identified from the literature. Last, the study scope and structure of this thesis are explained.

Chapter 2 provides a critical literature review. Opening from the concept of risk, SC risk, SCRM process and supply chain FP are explained. In addition, the definition,

history and types of terrorism are outlined. It also identifies published literature on SC and terrorism risk through a systematic literature review (SLR). At the end of the chapter, the research gap is clarified.

Chapter 3 outlines the context of this study. It provides an overview of the economic condition and logistics infrastructure of Pakistan. It provides details of the growth of terrorism in that region, especially the number of terrorist attacks on SCs and transportation. In particular, this chapter also identifies the most notorious areas for terrorist attacks in Pakistan.

Chapter 4 presents the methodology adopted for this study. Following discussion of the research philosophy and approach to qualitative and quantitative phase of this study are explained and justified: semi-structured interview and qualitative content analysis are introduced as qualitative methods, while the quantitative methods consist of a questionnaire is for data collection and fuzzy set Qualitative Compartive Analysis (fsQCA) method. Ethical issues are also considered.

Chapter 5 outlines the qualitative findings from semi-structured interviews. The semi-structured interviews explored the definitions of SC risk, identification of SC risks and SCRM strategies in that region. In addition, this chapter assesses the impact of WoT on local LSPs.

Chapter 6 provides justifications for the research model and developed hypotheses for this study, set against the background of theories such as COSO framework and contingency theory, which stimulate SCRM and the desired outcomes from a risk management perspective. These ideas are used to develop a research model, hypotheses and measuring scales and to propose moderation and mediation of SCRM strategies in the context of FP.

Chapter 7 presents the quantitative findings from statistical analyses of survey data. The significance of SCRM strategies' impact on FP is captured by the descriptive statistics. Tests of necessity and sufficiency of SCRM strategies for FP are highlighted by fsQCA. In addition, the moderating and mediating effects of SCRM strategies on FP are measured.

Chapter 8 provides discussion of the qualitative and quantitative findings, is emphasizing the relationships between SCRM literature and the novel findings.

Chapter 9 summarises the results reported in the earlier chapters and highlights the theoretical, methodological and managerial contributions of the study. It also suggests the limitations of this study and provides future research agendas.

1.9- Summary

This chapter has presented an overview of the study, in particular, the significance of SC risks especially terrorism risk in the global SC and its impact on the supply chains. A brief literate review was outlined and current research gaps in SCRM literature were highlighted (see Section 2.7). The chapter also presented the research objectives and questions with the methodologies adopted to address these questions. Specifically, qualitative content analysis and fsQCA were briefly introduced they are discussed in further detail in Chapter 4. In addition, this chapter has introduced the contents and structure of the study. The next two chapters present a literature review that provides the theoretical and academic background, and explain the research context.

Chapter Two

A Literature Review

2.1-Introduction

This chapter introduces a critical literature review related to SCRM and its impact FP. The aim of this chapter is to propose the academic background to this study. The key outcomes of this chapter are the following: first, explanation of the key concepts employed in this study; second, review of previous studies according to each concept; last, identified the research gap from previous studies.

Section 2.2 starts with the concept of risk, and provides different definitions of risk. After that, it provides different definitions of SC risk and difference among risk, uncertainty and vulnerability. Section 2.3 provides a fundamental understanding of SCRM and its various risk sources, different methods of risk analysis, different risk mitigation strategies and SCRM performance. Next, section 2.4 explains supply chain FP and risks that have impact on FP and its measurement. After that, section 2.5 provides definitions of terrorism and its various types. A systematic literature review on SC and terrorism risk is conducted in section 2.6. The research gap is derived from previous studies in section 2.7. Finally, section 2.8 contains brief summary of this chapter.

2.2-Risk

Historically, there have been many studies conducted on the concept of risk and its application in the fields of Decision Theory (Arrow, 1965), Finance (Markowitz, 1952), and Marketing (Cox, 1967). However, risk has varying definitions and usage across disciplines and contexts according to the understanding of the nature of risks (Norrman & Jansson, 2004). Similarly, Holton (2004) argued that there is no true risk because everything is a matter of perception. It is also clear that there is an almost infinite variety of definitions of risk (Ritchie & Brindley, 2007).

In literature, many researchers have tried to define risk in a number of ways. According to Diehl and Spinler (2013), there are two main definitions of risk that predominate in literature: first, risk includes both opportunity and danger (both sides positive and negative), and second, risk includes only danger (the negative side of risk). For example, in decision theory, risk is defined as the likelihood of variance in an expected outcome (Spekman & Davis, 2004). This definition

comprises both sides of risk. In contrast, the Oxford English Dictionary defines risk as "*(exposure to) the possibility of loss, injury, or other adverse or unwelcome circumstance; a chance or situation involving such a possibility*". This definition of risk includes only the danger side of risk. Generally, the literature defines risk as purely negative and leading to unwanted outcomes or consequences (Harland et al, 2003; Manuj & Mentzer, 2008a). There are several definitions of the concept of risk summarized in Table 2.1.

Table 2. 1 Different definitions of risk

Sources	Definitions
Markowitz (1952)	The variance of return
Rowe (1980)	The potential for unwanted negative consequences to arise from an event or activity
Lowrance (1980)	Risk is a measure of the likelihood and severity of adverse effects
March & Shapira (1987)	Risk as the negative variation in business performance.
Miller & Salkind (1991)	Risk is variance in results or performance that cannot be predicted ex-ante.
Sitkin & Pablo (1992)	The extent to which there is uncertainty about whether potentially significant and/or disappointing outcomes of decisions will be realized
Yates & Stone (1992)	Risk is a fundamentally subjective concept that deals with the probability of loss.
Broder & Tucker (2012)	The uncertainty of financial loss, the variations between actual and expected results or the probability that a loss has occurred or will occur
Schlegel & Robert (2014)	Risk is the probability of realizing an unintended or unwanted consequence that leads to an undesirable outcome such as loss, injury, harm, or missed opportunity.

Source: Author

In the security context, Robinson (2008:182) describes risk as "*the probability that harm may result from a given threat*". Similarly, in the context of terrorism, Willis et al. (2005:10) defined risk as having three components, threat, vulnerability and consequence: "*the expected consequence of an existent threat, which for a given target, attack mode, and damage type*". It can be expressed in the formula:

$$\text{Terrorism Risk} = \text{Threat} * \text{Vulnerability} * \text{Consequence}$$

In other words, the threat is the possibility that terrorist attack happens; vulnerability is the probability that terrorist attack outcomes in damage, given that a terrorist attack has happened; and the consequence is the expected damage, given that a terrorist attack has happened which caused damage. Therefore, for the sake of this thesis, the researcher is following the definition of Greenberg et al. (2006:143) "*risk does not exist without existence of threat, the presence of vulnerability and the potential for consequences*".

2.2.1-Supply Chain Risk

According to Christopher and Lee (2004), there is no exact definition of SC risk, but rather a list of possible risk sources. This view is also supported by Sodhi et al. (2012) and Diehl and Spinler (2013) who write that there is no consensus on the definition of SC risk.

However, SC risk has been differently defined according to the objectives of SCRM and the variety of business environment (Shin et al., 2012). There are several definitions of SC risk in SCRM literature. For example, Zsidisin (2003a:233) defined SC risk as "*the probability of an incident associated with inbound supply from individual supplier failures or the supply market occurring, in which its outcomes result in the inability of the purchasing firm to meet customer demand or cause threats to customer life and safety*". Zsidisin et al. (2005) described that SC risk is the product of two separate but interrelated elements: uncertainty and impact. Two features of uncertainty are linked to viability and business continuity. The first is the lack of awareness of all the events that might occur and cause disruption of business. The second is the probability of occurrence of those events. The second element of risk, 'impact', deals with the potential costs generated by those events. Similarly, Rao and Goldsby (2009) divided SC risk into parts: First, risk is considered the appearance of uncontrollability that may consequence in either positive or negative outcome. Second, risk defines a form of negative outcomes that adversely affect organizational performance.

The most frequently used quantitative definition of SC risk is grounded on the product of the probability of a risk event and the impact of that event. Mitchell (1995) provided a standard formula for the SC risk: Risk = P (Loss) * I (Loss)

where risk is defined as the probability (P) of loss and its significance or impact (I).

In SCRM literature, several authors provided different definitions for SC risk (Wagner & Bode, 2006) as summarised in Table 2.2.

Table 2. 2: Definitions of SC risk

Authors	Definitions
March & Shapira (1987:404)	Variation in the distribution of possible supply chain outcomes, their likelihood, and their subjective values.
Harland et al. (2003:52)	Chance of danger, damage, loss, injury or any other undesired consequences.
Jüttner et al. (2003:7)	The possibility and effect of mismatch between supply and demand.
Christopher & Lee (2004:338)	Effect of external events such as wars, strikes or terrorist attacks and the impact of changes in business strategy
Sheffi (2005:14)	The essence of most disruptions is a reduction in capacity and therefore inability to meet demand.
Peck (2006:132)	Anything that [disrupts or impedes] the information, material or product flows from original suppliers to the delivery of the final product to the ultimate end- user.
Craighead et al. (2007: 132)	Unplanned and unanticipated events that disrupt the normal flow of goods and materials within a supply chain, and, as a consequence, expose firms within the supply chain to operational and financial risks.
Wagner & Bode (2008:309)	Negative deviation from the expected value of a certain performance measure, resulting in undesirable consequences.
Manuj & Mentzer (2008:197)	The distribution of performance outcomes of interest expressed in terms of losses, probability, speed of event, speed of losses, the time for detection of the events, and frequency.
Ellis el at (2010: 37)	The perceived likelihood that a supply disruption will occur and the magnitude of supply disruption as the perception of the severity of losses that may result from a disruption.
Tummala & Schoenherr (2011:474)	Supply chain risk as an event that adversely affects supply chain operations and hence its desired performance measures.
Heckmann et al. (2014:130)	Supply chain risk is the potential loss for a supply chain in terms of its target values of efficiency and effectiveness evoked by uncertain developments of supply chain characteristics whose changes were caused by the occurrence of triggering-events.
Ho et al. (2015:5035)	The likelihood and impact of unexpected macro and/or micro level events or conditions that adversely influence any part of a supply chain leading to operational, tactical, or strategic level failures or irregularities.

Source: Authors

Therefore, for the sake of this thesis, the researcher is following the SC risk definition of Christopher and Lee (2004: 338) as "*effect of external events such as wars, strikes or terrorist attacks and impact of changes in business strategy*".

2.2.2-Risk, Uncertainty and Vulnerability

According to Manuj and Mentzer (2008b) due to the variation in definition of risk, researchers are usually unclear about SC risk and they use related and interchangeable terms like vulnerabilities (Peck, 2005); uncertainties (Sanchez-

Rodrigues et al., 2010), and disruptions (Skipper & Hanna, 2009; Macdonald & Corsi, 2013) along with risk. Similarly, terms such as disaster, peril and hazard are also used for SC risk (Abhijeet et al., 2012). This view is also supported by Tang and Musa (2011) and Diehl and Spinler (2013) who said that risk and uncertainty are used interchangeably in the SC literature regardless, of the differences and practices. Therefore, it is made difficult to understand risks in SCs (Manuj & Mentzer, 2008a).

According to Svensson (2000), uncertainty can be defined as a unique situation in which the disruption is unknown. A further definition is given by Harland et al. (2003) who described uncertainty as any deviation from the unattainable ideal of entirely settled knowledge of the relevant system. Knight (1921) was the first to make a distinction between risk and uncertainty. He defined risk as "measurable" and uncertainty as "unmeasurable". Similarly, Holton (2004) makes an attempt to differentiate risk and uncertainty by saying that risk relates to objective probabilities and uncertainty relates to subjective probabilities. This view is supported by Khan and Burnes (2007) who said that risk is measurable (in the sense that estimation can be made of the probabilities of the outcome) and manageable, while uncertainty may not be measurable. Kaplan and Garrick (1980) simplified that the relationship between risk and uncertainty with an equation stating that risk is equal to uncertainty plus damage.

$$\text{Risk} = \text{Uncertainty} + \text{Damage}$$

In the context of SCRM, SC uncertainty as defined by van der Vorst and Beulens (2002:413) as "*decision making situations in the supply chain in which the decision maker does not know definitely what to decide as he is indistinct about the objectives; lacks information about its environment or the supply chain; lacks information processing capacity; is unable to accurately predict the impact of possible control actions on supply chain behaviour; or, lacks effective control actions*". Waters (2007) said that risk happens because there is uncertainty about the future. Similarly, Sanchez-Rodrigues et al. (2010:62) said that, "*uncertainty increases the risk within supply chains, and risk is a consequence of the external and internal uncertainties that affect a supply chain*".

SC vulnerability has been broadly defined by Christopher and Peck (2004:3) as "*an exposure to serious disturbance*". Svensson (2000:732) defined vulnerability as "*the existence of random disturbances that lead to deviations in the supply chain from normal, expected or planned activities, all of which cause negative effects or consequences*". Another definition is given by Jüttner et al. (2003:200) who describe vulnerability as "*the propensity of risk sources and risk drivers to outweigh risk mitigating strategies, thus causing adverse supply chain consequences*".

SC vulnerability can be increased by so-called vulnerability drivers (risk sources) such as globalisation, customer dependence, supplier dependence, outsourcing, supplier concentration, single sourcing, decentralization, Just in Time (JIT), reduced lead times and legislation (Giunipero & Eltantawy, 2004; Zsidisin et al., 2004; Norrman & Jansson, 2004; Spekman & Davis, 2004; Hendricks & Singhal, 2005; Jüttner, 2005; Stecke & Kumar, 2009). A limited existing SCRM literature (e.g., Svensson, 2000; Zsidisin et al., 2004) attempted to identify the relationship between SC vulnerability and SC risk drivers (Park et al., 2016).

There are two main challenges to the measurement of SC vulnerability. First, it cannot be observed or measured directly, due to the complexity and interrelationships of vulnerability drivers. Second, it is a multi-dimensional concept without well-developed metrics for assessing the drivers on which vulnerability depends (Wagner & Bode, 2006; Stecke & Kumar, 2009).

2.3-Supply Chain Risk Management Framework

Managing risks in the modern environment is becoming increasingly challenging (Christopher & Lee, 2004). The current trends in business (e.g. globalization, outsourcing, information technology, cheap labour, reduced lead times and JIT) have increased the importance of SCRM. In addition, the recent increase in high profile manmade and natural incidents such as wars, earthquakes, economic crisis and terrorist attacks has also heightened the significance of SCRM. It has become difficult to predict SC risks due to the changing profile of risk events. Recent examples are the London and Belgian terrorist attacks, which were of a different nature (using vehicles) as compared to normal terrorist attacks. Table 2.3 provides some SCRM definitions from literature.

Table 2. 3: Different definitions of SCRM

Authors	Definitions	Scopes
Chapman et al. (2002;61)	The identification and management of risks within the supply chain, and risks external to it, through a coordinated approach amongst supply chain members, to reduce supply chain vulnerability as a whole.	Identification & management processes
Norrman & Jansson (2004:436)	To collaborate with partners in a supply chain apply risk management process tools to deal with risks and uncertainties caused by, or impacting on, logistics related activities or resources.	Generic processes
Barry (2004: 695)	Effective supply risk [management] requires the identification and monetization of risk events, probability of occurrence, and the firm contingencies for alternative sources of supply.	Generic processes
Finch (2004:194)	A company manages risk in order to protect its assets and profits, and stay in business.	Generic processes
Jüttner (2005:124)	The identification and management of risks for the supply chain, through a co-ordinated approach amongst supply chain members, to reduce supply chain vulnerability as a whole.	Identification & management processes
Singh et al. (2005: 3375)	Focusing on their supply chains in order to reduce uncertainty and increase customer satisfaction, with the ultimate aim of generating greater levels of productivity, profitability and competitiveness.	Generic processes
Tang (2006a: 453)	The management of supply chain risks through coordination or collaboration among the supply chain partners so as to ensure profitability and continuity.	Generic processes
Goh et al. (2007:164–165)	The identification and management of risks within the supply network and externally through a coordinated approach amongst supply chain members to reduce supply chain vulnerability as a whole	Identification & management processes
McCormack et al. (2008:8)	Having the objective to control, monitor and evaluate supply chain risk. The core activity of SCRM is the systematic identification, assessment and quantification of potential supply chain disruptions.	Identification & management processes
Pettit et al. (2010:6)	Management controls create supply chain capabilities, or attributes that enable an enterprise to anticipate and overcome disruptions.	Generic processes
Thun & Hoenig (2011:243)	Characterised by a cross-company orientation aiming at the identification and reduction of risks not only at the company level, but rather focusing on the entire supply chain	Identification & management processes
Sodhi & Tang (2012:303)	Supply chain solutions that ensure supply continues to meet demand in case of a disruption or soon after the occurrence of such a disruption.	Generic processes

Source: Author

Therefore, for the sake of this thesis, the researcher adopted the definition of Ritchie and Brindley (2007:70): "*the management of supply chain risk through coordination or collaboration among the supply chain partners so as to ensure profitability and continuity*". The key objectives of the SC in TAR are ensuring profitability and business continuity or viability.

The main purpose of SCRM is to be viable (Pujawan & Geraldin, 2009). Risk management is a vital part of business strategy and business activities. SCRM improves customer service, avoids delays, avoids major disasters and operational disruptions, reduces costs, increases the chances of quick recovery and improves resilience (Christopher & Peck, 2004).

The typical risk management process is grounded on the basic management process and it includes the following phases: risk identification, risk analysis, risk mitigation and control. Manuj and Mentzer (2008b:205) describe SCRM process as "*the identification and evaluation of risks and consequent losses in supply chain, and implementation of appropriate strategies through a coordinated approach among supply chain members … for supply chain outcomes that in turn lead to close matching of actual cost savings and profitability with those desired*".

According to this definition, there are five steps of the SCRM process:

1. Risk identification
2. Risk assessment and evaluation
3. Selection of suitable risk management strategies
4. Implementation of SCRM strategies
5. Mitigation of SC risks.

Numerous studies have attempted to explain the SCRM process and suggested different stages of SCRM. However, Tummala and Schoenherr (2011) identified six stages of SCRM process based on previous studies, as follows: the first stage, risk identification, to identify potential risk sources. The second stage, risk measurement, involves the determination of the consequences of all possible risks, together with their degrees of impact. It also categorises risks according to their sources or literature provided classification. The third stage, risk assessment, is to identify the most significant risks based on their probability and impact. The fourth stage, risk evaluation, contains two sub-stages: risk ranking and risk acceptance.

Risk ranking, is based on the determination of risk exposure values for each identified risk. Risk acceptance, is to establish the first level of acceptance, then is to classify risk into different levels such as unacceptable, tolerable and acceptable. The fifth stage, risk mitigation, is to determine the most appropriate strategy and management practices for each risk and recognise the right person or party to manage each of the identified risks. The last stage, risk control or monitoring, examines the progress made regarding the implemented risk strategy, and case of any deviations taking corrective measurements to ensure SC performance. Also, Tummala and Schoenherr (2011) argued that traditional methods of risk management are based on single point assessments. They added up the following phases of the traditional SCRM process: contingency plans and other components should also be considered such as drivers, risk categories, supplier/logistics evaluation criteria and performance measures. The different phases of the SCRM process as represented in literature are shown in Table 2.4.

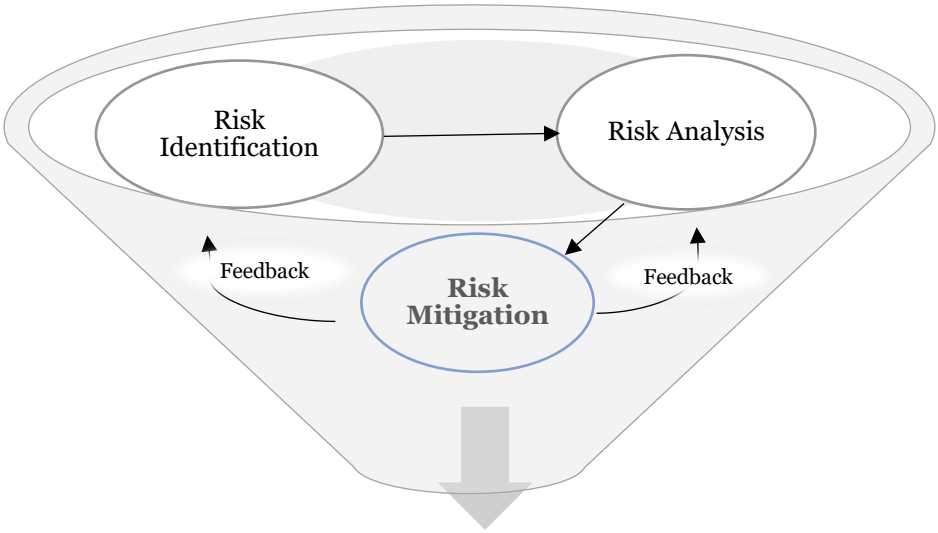
Table 2. 4: SCRM process phases

Source	Risk Identification	Risk Measurement	Risk Assessment	Risk Evaluation	Risk Mitigation	Risk Control
Raiffa (1982)	√	√	√	√		√
Hertz & Thomas (1983)	√	√	√	√		√
Tummala et al. (1994)	√	√	√	√	√	√
White (1995)	√	√		√		
Harland et al (2003)	√			√	√	√
Zsidisin (2003a)	√		√	√	√	√
Jüttner et al (2003)	√	√		√	√	
Finch (2004)	√	√	√	√	√	
Kleindorfer & Saad (2005)	√	√	√	√	√	√
Ellegaard (2008)	√	√	√		√	
Manuj & Mentzer (2008)	√	√	√		√	
Schoenherr et al. (2008)	√	√	√		√	
Knemeyer et al. (2009)	√	√	√	√	√	
Zsidisin & Wagner (2010)	√	√	√			√
Fan et al. (2017)	√	√	√		√	

Source: Author

Despite this variation in depictions of the SCRM process, fundamentally, it involves risk identification, risk assessment and risk mitigation (Hallikas et al., 2004; Kleindorfer & Saad, 2005). Therefore, for the sack of thesis, these three stages of the SCRM process are adopted. Figure 2.1 presents the SCRM framework.

Figure 2. 1: SCRM framework



Source: Author

2.3.1-Risk Identification

Risk identification is an important and essential stage in any SCRM studies (Neiger et al., 2009; Kern et al., 2012). Risk mitigation measures can be just a waste of money and time for a firm without an appropriate risk identification technique. There are a number of techniques that can be applied to identify risks such as interviews, checklists, SWOT analyses, brainstorming, and failure mode and effects analysis (FMEA). However, there is no single 'best technique' for risk identification; it is beneficial to use a suitable combination of techniques for risk identification (Hillson, 2002).

Generally, two approaches are adopted by researchers: the first, is the creation of risk lists. This is a process of producing a full list of risks that may influence the SC performance (e.g., Chopra & Sodhi, 2004; Waters, 2007; Ritchie & Brindley, 2007). However, Kersten et al. (2012) criticised this approach for the following reasons.

1. It is not realistic to identify all potential risks.
2. A decision-maker should be aware of the risk that causes uncertainty. For example, several risks seem harmless and are easily overlooked, but later consequences are very harmful to the SC.
3. An accurate risk identification list is a need further classification or categorization of risks not stop with risks list.

The second approach is the risk classification/categorisation approach, it which focuses on identifying the key sources/types of risks, which cause risk events (e.g., Jüttner et al., 2003; Jüttner, 2005; Blackhurst et al., 2008). It provides a foundation for risk assessment (Jüttner et al., 2003; Blackhurst et al., 2008).

Generally, SC risks are categorized into two main types: operational (internal) risks and disruption (external) risks (Kouvelis et al., 2006; Tang, 2006a; Wu et al., 2006; Olson & Wu, 2010) or high-frequency low-impact (operational) risks and low-frequency high-impact (disruption) risks (Sheffi & Rice, 2005; Oke & Gopalakrishnan, 2009; Sodhi et al, 2012). The operational risks originate from the uncertainty of events (e.g. timing, duration, location and intensity or uncertainties in supply, demand and cost) the frequency of these risks is high, while the impact on the SC is low. On the other hand, disruption risks originate from major natural and man-made disasters. The impact of these risks is much greater than that of operational risks, but the probability is low. However, the risk management of disruption risk should be different from operational risk management. For example, terrorism risk are considered often to have severe impacts in terms of magnitude in the area of their occurrence and are fairly unpredictable and hard to manage (Martha & Subbakrishna, 2002). Table 2.5 shows different risk sources and drivers in the literature of SCRM.

Table 2. 5: Different SC risk sources and drivers

Authors	Sources and Drivers of Risk
Ghoshal (1987)	Macroeconomic, Policy, Competitive and Resource risks
Mason-Jones & Towill (1998)	Environmental risk sources, Demand and supply risk sources, Process risk sources and Control risk sources
Ritchie & Brindley (2000)	Exogenous risks (e.g. technology developments) and endogenous (e.g. the quality of internal financial control systems).
Svensson (2000)	Internal vs. external and atomistic vs. holistic.
Tchankova (2002)	Physical, Economic and Social environment
Harland el at 2003)	Strategic, Operations, Supply, Customer, Asset impairment, Competitive, Reputation, Financial, Fiscal, Regulatory and Legal risks
Jüttner et al. (2003)	Environmental risk, Network-related and Organisational risk
Spekman & Davis (2004)	Physical, Information, Money, Security of internal information systems, Relationship to partners and Corporate social responsibility
Chopra & Sodhi (2004)	Disruptions, Delays, Systems, Forecast, Intellectual property, Procurement, Receivables, Inventory and Capacity.
Sunil & Sodhi (2004)	Disruptions, Delays, Systems, Forecast, Intellectual Property, Procurement, Receivables, Inventory, and Capacity
Cavinato (2004)	Physical network, Financial network, Informational network, Relational network and Innovational network
Christopher & Peck (2004) and Samvedi et al (2013)	Process, Control, Demand, Supply and Environmental risks
Kleindorfer & Saad (2005)	Operational risk and Disruption risk
Jüttner (2005)	Supply, Demand, and Environmental
Wagner & Bode (2006)	Supply-side, Demand-side and Catastrophic
Faisal et al. (2006)	Environmental, Organizational or supply chain related variables
Gibb & Buchanan (2006)	Lack of information sharing and communication, financial weakness and inability to adapt to technological changes of suppliers
Handfield & McCormack (2007)	Suppliers, Customers, and Company
Khan & Burnes, (2007)	Infrastructure, Business controls, Business values, Relationships
Byrne (2007)	Uncontrollable, Somewhat controllable and Controllable
Bogataj & Bogataj (2007)	Supply, Process, Demand, Control and Environmental risks

Tang & Tomlin (2008)	Supply, Process, Demand, Intellectual property, Behavioural risks, Political/social risks
Blackhurst et al (2008)	Disruptions/disasters, Logistics, Supplier dependence, Quality, Information systems, Forecast, Legal, Intellectual property, Procurement, Receivables, Inventory, Capacity, Management and Security risks
Manuj & Mentzer (2008a)	Supply, Operational, Demand, Security, Macro, Policy, Competitive, Resource risks
Manuj & Mentzer (2008b)	Supply, Demand, Operational and Security
Trkman & Mccormack (2009)	Endogenous uncertainty (Market Turbulence and Technology Turbulence) and Exogenous uncertainty (Continuous and Discrete)
Wagner & Bode (2009)	Supply-side, Demand side, Regulatory, Legal and bureaucratic, Infrastructure and Catastrophic
Rao & Goldsby (2009)	Organizational risk, Industry risk and Environment risk
Oke & Gopalakrishnan (2009)	Supply, demand and miscellaneous risks
Kumar el at. (2010)	Internal operational risks and External operational risks
Ravindran et al. (2010)	Value-at-risk (VaR) and Miss-the-target (MtT)
Trent & Roberts (2010)	Operational risk, Natural disasters, Terrorism or political instability and Commercial or market risks
Tummala & Schoenherr (2011)	Demand, Delay, Disruption, Inventory, Manufacturing or Process breakdown, Physical, Supply, System, Sovereign and Transportation
Lin & Zhou (2011)	Risk in the external environment, Risk within the supply chain and Internal risk
Tang & Musa (2011)	Material flow risks, Financial flow risks and Information flow risks
Schlegel & Robert (2014)	Strategic risk, hazard risk, financial risk, and operational risk
Ho et al. (2015)	Macro, demand manufacturing, supply and infrastructural, information, transportation and financial

Source: Author

A literature review on the classification of SC risk sources by Monroe et al. (2014) found 39 different sources of risks in 20 papers, but supply risk, demand risk, process risk, environmental risk and control/business controls were the five most mentioned SC risk sources. Similarly, Ho et al. (2015) argued that the literature simply identified and/or classified the potential risk sources without quantifying and measuring the degrees of negative consequences. In sum, there is no consensus about 'sources of risk' classification in SCRM literature.

IT-related risks (e.g. cyber-attacks, virus attacks, hackers stealing information, the re-routing of products in order to steal them or delay shipments to harm competitors, software bugs and hardware failures) are highly relevant to SCRM, since many SCM functions build on information processing and sharing. The firms have become increasingly technology-dependent and consequently vulnerable to IT-related risks (Chopra & Sodhi, 2004). In addition, modern Enterprise Resource Planning (ERP) systems force firms to open their internal processes and databases both to their suppliers and to customers (Wagner & Bode, 2008), thereby increasing the risk of cyber-attacks. Currently, the cyber risk trends are based on risk from artificial intelligence, intelligent manufacturing equipment, the cloud and Internet of Things, creating risk from systems of machines capable of interacting with the cyber-physical world. Similarly, the integration of new technologies creates cyber risk (e.g. integrating less secured systems in manufacturing and supply chains). Radanliev et al. (2018) said that the economic impact of cyber risk is increased due to the digital economy. According to The World Economic Forum (2012), these are non-traditional risks to the global supply chain and even a small failure of IT could cause rapid and widespread disruption. It is also identified as an increasing risk for the transportation and logistics industry. It can paralyze SC operations (Mandal, 2014). However, the existing cyber risk assessment models are fit to identify the risk impacts of sharing infrastructure. To minimize cyber risk, SC partners need to identify vulnerabilities in their portion of the network and cyber security standardisation and regulation could reduce cyber-attacks (Radanliev et al., 2018).

A large and growing body of literature has investigated IT-related risks in SCRM literature. For example, Dynes et al. (2007) studied SC information system disruption. They found that resilience to cyber risk is not necessarily dependent on the types of technology employed, but rather how the technology is used to enable SC processes and the type of attack experienced. Paté-Cornell et al. (2018) conducted study on cyber security. They suggested that the following measures are needed: first, a general probabilistic risk analysis framework of cyber security; second a systems analysis of cyber risks for a smart and connected electric grid, which would show the optimal level of connectivity; third, the analysis of sequential decisions of software upgrades. Schauer et al. (2018) studied cyber risk in maritime supply chains. They found that they are more vulnerable due to the common

distributed ICT systems, in which various business partners are interacting with each other. As a result of these interrelations, a single business partner can propagate risk and have cascading effects on multiple other systems. Baryannis et al. (2019) identified different SCRM strategies aiming to identify, assess, mitigate and monitor SC risks and made SCRM a suitable application area for artificial intelligence (AI) techniques. In addition, they categorised current SCRM literature according to the AI methodology (ranging from mathematical programming to Machine Learning and Big Data Analytics), and they specified SCRM to address identification, assessment or response.

Big data analytics and machine learning techniques could enhance the accuracy of prediction of SC risks (Baryannis et al., 2019). For example, Fan et al. (2015) examined potential big data sources related to supply chains and then proposed an SCRM framework, which is based on analysis and monitoring supply chain big data to identify emerging risks. Similarly, He et al. (2015) recognized that the predictive capabilities of big data analytics can be incorporated in SCRM process models. However, these studies were of a theoretical nature, without any practical implementation.

Currently, firms are not localized, due to increasing globalization (Hirst & Thompson, 1996). Cross-cultural risk has become significant and understanding cultural differences is increasingly important for global SC (Rungtusanatham et al., 2005; Naor et al., 2010). Cultural difference is as a risk in cross-national business relationships. For example, previous studies have shown that joint ventures have an instability rate of around 30% in developed countries as compared to 45 to 50 % in developing countries (Reynolds, 1984; Fryxell et al., 2002; Gulati & Nickerson, 2008). Hofstede and Hofstede (2005) introduced five dimensions of cultures: Individualism versus Collectivism, Power distance, Masculinity versus Femininity, Uncertainty avoidance and Short-term versus Long-term orientation, as which countries may be distinguishes which influence values and practices. Similarly, the cultural factors such as employees' values, routine and informal behaviour are considered to be critical elements in SCRM (Christopher & Peck, 2004; Ritchie & Brindley, 2007; Sheffi & Rice, 2005; Zsidisin & Ritchie, 2008). According to the SCRM literature, the perception of risk is strongly influenced by cultural and psychological factors and the way risk is perceived can affect how people implement

SCRM practices (Heath and Safety Executive UK, 2001). Therefore, there is a growing need for multi-country and cross-cultural risk research (Naor et al., 2010; Bhattacharyya et al., 2010).

In a SC network sense, there are many nodes, links, relationships and interactions that create supply chains and these supply chains are vulnerable to different internal and external disruptions. The complexity of a SC can arise from two components: the total number of nodes and the total number of forward and backward links, and the flows of materials within tiers of a SC (Craighead et al., 2007). Similarly, network-related risks also arise from interactions between firms within the SC. Any damage caused by suboptimal interaction between the firms along the chain is constitutes a network-related risk. For example, a fire in a supplier factory can trigger a supply risk for all partners further down in the SC (Jüttner et al., 2003; Jüttner, 2005). Wu et al. (2006) defined network risk a as risk resulting from the structure of the supplier network (e.g. ownership, individual strategies of the suppliers, and the supplier's supply network agreements).

Mason-Jones and Towill (1998) suggested five overlapping categories of SC risk sources: environmental risk, demand and supply risk, process risk and control risk. However, Jüttner (2005) classified the environmental, supply and demand aspects as risk sources, and processes and control mechanisms as risk amplifiers. Further, he divided environmental risk sources into two categories: external and internal sources. The external sources are political, natural and social uncertainties, while internal sources are demand and supply environmental risk sources in the SC. Supply risk sources are the uncertainty associated with supplier activities and in general supplier relationships, while demand risk sources are associated with the outbound logistics flow.

There is a large volume of published studies on supply and demand related risk. For example, Svensson (2002) developed a set of dimensions of vulnerability inbound logistics and outbound logistics flows from first-tier suppliers and customers respectively. Cavinato (2004) used governance models to identify risks and risk management practices across multi-tier chains. Cruz et al. (2005) developed a SC network model on the basis of supply and demand sides risk and also allowed physical and electronic transactions. Their model consisted of three tiers of decision-makers: the manufacturers, the distributors, and the retailers.

Manuj and Mentzer (2008b) studied the supply side risks caused by disruption of production and service. They identified five risks: the supplier's inability to meet orders, delivery delays from suppliers and their next-tier suppliers, unexpected bankruptcy of core suppliers, conflicts with suppliers regarding inventory ownership and intellectual property and opportunistic behaviours of suppliers. Agarwal et al. (2011) examined supply side risk and focused on lower tier suppliers, which are usually SMEs. They identified the infrastructural risks of lower tier suppliers. Badurdeen et al. (2014) conducted case study on a Boeing missile guidance system project. They proposed a model that establishes the link between SC network-related risks. However, their model captures Tier-1 supplier specific risks.

Moreover, Kull and Closs (2008) studied second-tier supplier failures in supply chains. Blackhurst et al. (2008) analysed supplier risks in the automotive industry. Babich et al. (2007) and Wagner et al. (2011) studied the financial default risk of suppliers in SC. Tse and Tan (2011) focused on the management of quality risks in global supply chains. Lo Nigro and Abbate (2011) examined the topic of risk assessment and profit sharing in business networks. Lockamy and McCormack (2012) used Bayesian network models to develop supplier risk profiles.

A large and growing body of literature has investigated SC risks. However, there is little research on third party specific risks. This is because the third party providers are embraced in the SC (upstream and downstream), therefore, many authors believe that it is not necessary to specify third party risks. However, SC risks sources are closely linked with thrids risks (Ojha & Gokhale, 2009). McDowell (2016) identified LSP-specific risks such as theft, fraud and corruption, political risks, fires and explosions, loss of reputation or value, macroeconomic developments, changes in legislation and regulation, natural catastrophes, cyber incidents, market developments and business interruption.

2.3.2-Risk Analysis

The key objective of risk analysis is to quantify and assess risks and provide justification for which risks need urgent measures to mitigate. In this phase, the SC risks are assessed subjectively or objectively. This stage is also called risk assessment. At a basic level, risk analysis involves identifying risks and then assessing or mapping them (Sinha et al., 2004; Schlegel & Robert, 2014). It evaluates those SC risks that have a high probability of occurrence and high potential impact and which need necessary action to avoid SC disruptions or catastrophes. Consequently, it assists the decision makers in the cost/benefit analysis of mitigation strategy and prioritises resources to the most disruptive risk (Zsidisin et al., 2004).

There are various risk assessment techniques used in different disciplines. Fundamentally, risk assessment techniques can be divided into two main groups; qualitative (subjective) and quantitative (objective) or divided into formal and informal (Zsidisin et al., 2004). Qualitative techniques apply a subjective assessment of risk probability against the potential severity of the risk consequences to define the overall severity. In other words, they involved making a formal judgement on the consequence and probability. If there are no objective data available, then subjective data (beliefs and judgment) can be useful to assess risk. For example, the Delphi method or expert focus groups can be helpful to access the probability of risk (Tummala & Schoenherr, 2011). Similarly, subjective techniques such as SWOT analysis, historical data, interviews, checklists, expert judgment, risk rating scales, and brainstorming can be used to access SC risks.

On the other hand, quantitative risk analysis employs available data and produces a numerical value, which is used to forecast the probability of a risk. In other words, it assigns fixed numerical values to both the likelihood and impact with a margin of error. It employs the objective techniques such as Felt and Event Trees, Fuzzy logic, Analytic Hierarchy Process (AHP), Parameter Estimation, Five-point Estimation, Probability encoding, Monte Carlo simulation, Incentive models, IBM supplier evaluation model, Bayesian belief networks, Decision trees, Scenario-planning exercises, Multi-stage stochastic model, Disruption analysis network, Risk ranking systems, Game theory, Real options, Cluster analysis, Systems dynamics, stochastic location model, fuzzy-AHP, fuzzy Technique for Order

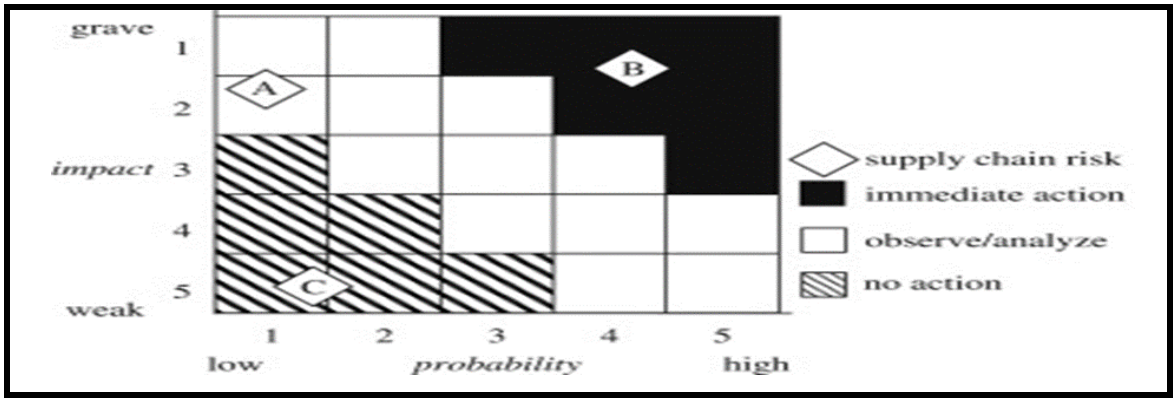
Preference by Similarity to Ideal Solution (TOPSIS), the Supply Chain Operations Reference (SCOR) approach, Dynamic algorithm and War games. However, these techniques have the drawback of leading to subjective outcomes, but time and effort may be lower (Kersten et al., 2012). Bueno-Solano and Cedillo-Campos (2014) also argued that these techniques do not answer a simple cause-effect relationship. They suggested the use of system dynamics is an appropriate technique to assess the risks derived from multiple events in global SCs.

Similarly, practitioners have adopted different risk assessment tools, which are suitable for their risk analysis. For instance, DHL adopted a unique SC risk exposure index methodology for risk assessment. It starts by mapping every node in the firm's SC and even down to their last tier suppliers. It allows DHL to assess the level of risk at each node using a range of proprietary tools including country-level risk maps. As a result, it provides the ins and outs over 20 risk categories in SC, such as the critical of the parts supply, the availability of alternative sources, inventories or buffer stocks in SC disruptions, and on comprehensive surveys of SC mitigation strategies (DHL Resilience 360, 2018). Occasionally, the statistical techniques variance and standard deviation are used for measurement of SC risks, but this is more problematic (Lonsdale & Cox, 1998).

One of the most significant current discussions in SC literature about the assessment of risk. For instance, some argue that risk should be measured objectively (Khan & Burnes (2007). In contrast, researchers such as Kahneman and Tversky (1979), Mitchell (1999) and (Zsidisin, 2003b) believe that the nature of risk is subjective and it should be measured subjectively.

The SCRM literature has a lack of quantitative techniques to capture the more complex realities of SCs. Most quantitative techniques used in SC risk assessment originate from finance and insurance disciplines (Kleindorfer & Saad, 2005; Schlegel & Robert, 2014). Similarly, a large number of studies of SCRM adopted the likelihood (frequency) impact (consequence) matrix (e.g.,Yates & Stone, 1992; Mitchell, 1999, Hallikas et al., 2004; Zsidisin et al., 2004; Waters, 2007; Blackhurst el at, 2008; Thun & Hoenig , 2011; Tummala & Schoenherr, 2011), as illustrated in Figure 2.2.

Figure 2. 2: Likelihood Impact Matrix



Source: Thun & Hoenig (2011)

The scaling of risk values varies between researchers; normally 3 to 5 point scales are used to assess the likelihood and impact. The risks can be represented in a portfolio regarding the magnitudes of "probability" and "impact" based on a Likert-scale (Thun & Hoenig, 2011). The probability-impact-matrix assists decision makers in deciding, which SC risks need immediate action or no action, or to be kept under observation.

2.3.3-Risk Mitigation

Risk mitigation represents the third stage of the risk management process. SCRM adopts different mitigation strategies for SC risks; depending on the nature of the risk, the company, SCs, and the company's objectives. Risk mitigation strategies can reduce, or even avoid the impact of disruption on the SC (Tang & Musa, 2011). However, Chopra & Sodhi (2004) argued that risk mitigation strategies might reduce one type of risk but at the same time increase another type of risk. The decision-makers (managers) should select mitigation strategies on the basis of prioritized risks. This view is supported by Suder & Czinkota (2005:17) who stated that "*if uncertainty criteria are equal to all forms of internationalization, if the geopolitical impact is small and the probability low, a mitigation of risk will not be considered feasible, because a cost/benefit ratio will not be encountered that would lead to reassessing international operations and strategies even in times of crises. If the risk is high, assets can be redistributed in a manner that ensures operational resilience throughout crisis – an evident advantage for the international firm*". For example, the maintenance of a high buffer inventory in anticipation of a disruption may reduce blackout periods. However, in normal conditions, the high buffer inventory may reduce working capital, and cost efficiency and increase operational problems (Tomlin & Wang, 2011). Such

mitigation strategies target to reduction of damage at disruption but have the disadvantages of long-term costs (Chopra & Sodhi, 2014).

SCRM Strategies Classification

A few researchers have divided risk management strategies into two main groups: Proactive strategies and Reactive strategies. The proactive strategies focus on the countermeasures that should be taken before the disruption happens. They are also called preventive strategies in SCRM literature (Sheffi, 2001). In contrast, reactive strategies focus on actions after disruption has happened. The two types of strategies have different purposes and need different tactics (Kaliprasad, 2006). However, Kersten et al. (2012) argued that the classification of strategies in terms of proactive and reactive is sometimes ambiguous and sometimes does not achieve the objective. Instead, they divided mitigation strategies into five basic categories: avoiding, reducing, transferring, sharing or taking the risk. Similarly, Manuj and Mentzer (2008a) divided risk strategies into postponement, speculation, hedging, control/share/transfer, security and avoidance.

In addition, Tang (2006b) categorized SC risk mitigation strategies into four groups such as supply, demand, product and information management. SCRM strategies can be divided into groups: mitigation strategies for risks in general and mitigation strategies for specific risks. In other words, mitigation strategies can be classified as generic strategies, which are capable of coping with any type of risks, and specific strategies that can manage a particular type of risk (Oke & Gopalakrishnan, 2009). According to Abhijeet et al. (2012), mitigation strategies should be categorized on the basis of management level (operational, tactical and strategic) and depend on the nature of risk and requirement. Similarly, there are several SCRM mitigation strategies proposed by many researchers. Table 2.6 highlights some of researchers' proposed strategies for SC risks.

Table 2. 6: SC risk mitigation strategies

Authors	Proposed SC Risk Management Strategies
Smallman (1996)	Learn from past events and mistakes
Mitchell (1999)	Choosing a leading company in the field, Using an approved list of suppliers, Multiple sourcing, Visiting supplier operations and establishing good communications with suppliers.
Abernathy et al. (2000)	Implementation of lean production
Lee et al. (2000)	Information sharing
Zsidisin (2003)	Buffers inventory, Supplier certification programmes
Cachon (2004)	Discount contracts to secure the supplier relationship
Chopra & Sodhi (2004)	Adoption of flexibility and responsiveness
Zsidisin et al.,(2004)	Creating system awareness, Preventing supply discontinuity, Remediating supply interruptions and Managing knowledge
Christopher & Peck (2004)	Collaboration
Herbane et al. (2004)	Strategic partnerships
Callioni et al. (2005)	Application of inventory-driven cost metrics
Fitzgerald (2005)	Secondary manufacturing plan, Sourcing in less risky region or same country.
Kleindorfer & Saad (2005)	Diversification in sourcing, Implementing flexibility and information sharing.
Jüttner (2005)	Reduction of inventory holding
Hartley-Urquhart (2006)	Early- payment programmes
Faisal et al. (2006)	Information sharing, trust building and collaborative relationships between supply chain partners
Tang (2006)	Strategic stock at different locations, Providing economic incentives to cultivate suppliers, Flexible transportation
Gibb & Buchanan (2006)	Educating, skills development and cross-training workforce.
Tomlin (2006)	Adoption of volume flexibility, Contingent rerouting, Sourcing mitigation and optimal mitigation strategies under different scenarios.
Germain & Iyer (2006)	External integration
Ellinger et al. (2006)	Collaboration and Communication
Lee et al. (2007)	Use of information technology
Baker (2007)	Allocation of buffer inventory
Ritchie & Brindley (2007)	Collaborative and capacity sharing approach, establishing long term relationships, partnerships and alliances
Manuj & Mentzer (2008)	Teamwork
Tang & Tomlin (2008)	Designing flexible processes via flexible manufacturing
Anderson & Anderson (2009)	Wider set of stakeholders (shareholders, suppliers, creditors, employees and customers, competitors, government and society)

Trkman & McCormack (2009)	Coordinate, share information
Reade (2009)	Labor-chain management
Bode et al. (2011)	Safety inventories, Redundant suppliers and Flexible production processes
Tang & Musa (2011)	Technological innovations, Skills development and Enhancing quality capacities
Datta & Christopher (2011)	Information sharing and coordination
Christopher & Holweg (2011)	Late product configuration, Increased local-for-local production, Using alternative distribution channels and Introducing vendor managed inventory for greater flexibility
Lavastre et al. (2012)	Communication and information exchange. Accompanying providers/suppliers in improving their performance, Forecast accuracy, Long term continuity in relations with partners, Safety stocks (e.g. vendor-owned inventory or in-house)
Chen et al.(2013)	Supplier collaboration, Customer collaboration and Internal collaboration
Jansen (2016), Pellegrino et al., (2018) and Moretto et al. (2018)	Supply chain finance or supply chain financial strategy

Source: Author

The most frequently mentioned risk mitigation strategies in SCRM literature are SC security strategies, information sharing, collaboration strategies, risk sharing, SC finance or financial SC, flexibility strategies, alternate or standby suppliers, visibility, SC integration, establish a relationship with the customer–supplier, and carrying buffer inventories. In addition, it is important to discuss some key risk management strategies in detail. Therefore, the following sub-sections will explain the different SCRM strategies in detail.

2.4.3.1-Supply Chain Information Sharing

Information sharing means distributing useful information for systems, people or organizational units. In other words, it is defined as the use of information and communication technologies to coordinate decisions and activities between a pivotal firm and partners (Lai et al., 2007). It is the willingness to make strategic and tactical data available for other SC partners involved in the planning process (Skipper & Hanna, 2009). The term 'Information Sharing' can also be referred to mentioned as 'Knowledge Sharing' or 'Information Integration' (Lotfi et al., 2013).

To survive in today's business world, the SC partners need to improve their competitive advantages through information sharing (Zha & Ding, 2005). Information sharing is critical for strengthening relationships (Lages et al., 2005).

Information sharing is the heart of SC collaboration (Min et al., 2005). It is like a glue which holds the SC in a crisis together (Richey, 2009). Similarly, Lotfi et al. (2013) said that it serves as an important approach for the survival of firms and enabler of SC integration. Increasing information flows can reduce uncertainty in the SC (Fiala, 2005) and improve visibility in SC processes through a better coordination of information about the material flow (Soroor et al., 2009).

Information sharing has become a vital feature among businesses as a value-creating factor with the shift from physical and financial assets towards intangible assets (Kocoglu et al., 2011). An effective and efficient information sharing strategy should be capable of reducing costs, raising customer-service levels and should be capable of enhancing the robustness of the SC (Yang et al., 2011). Similarly, information transparency allows firms to select suppliers with lower prices, enabling them to produce and deliver products or services at a lower cost (Chen et al., 2004). It also allows firms to make enhanced decisions on ordering, capacity allocations, production and material planning, through increase visibility of demand, supply and inventory (Ding et al., 2011). However, the current variations in the business practices can produce uncertainty and increase decision-making complexity for firms in selecting various SC information sharing strategies (Yang et al., 2011).

In general, effective information sharing strategies improve mutual communication, which decreases miscommunication and avoids unnecessary errors, thus decreasing transaction costs across the SC (Wu et al., 2006). It is enabling through different communication methods. Usually, communication methods are divided into two groups: First, the traditional communication methods such as telephone, fax, e-mail, written communication and face-to-face contact. Second, advanced communication methods such as computer-to-computer links, electronic data interchange (EDI), enterprise resource planning (ERP) (Carr & Kaynak, 2007). The advanced communication methods are increasing in SCs and provide extended access to information about SC activities (Bhatt, 2000). IT-based technologies can increase the visibility in the SC. For example, RFID, ERP and GPRS are vital information tools for management of SC risks (Tang 2006b; Rao & Goldsby 2009). The IT-based technologies can also help in the intensive interaction between customers and vendors and encourage more effective information sharing (Boyle et al., 2008). However, Carr and Kaynak

(2007) argued that there is no significant influence of advanced communication technologies on SC information sharing performance among firms.

According to Christopher and Lee (2004:391), "*The key to improved supply chain visibility is shared information among supply chain members. Traditionally companies have tended to subscribe to the view that "information is power" and to interpret the phrase as meaning power is diminished if that information is shared*". There are many levels of information shared in a SC, such as business level, strategic level, tactical level, logistics, and many other levels (Lotfi et al., 2013). The key types of information sharing between SC partners are inventory, demand and order information.

Information sharing strategies have also been categorized into three types. First, no information sharing strategy, where no information is shared between the SC partners. Second, where firms share projected net demand with suppliers. Last, where firms share future demand forecasts, present and future order plans with suppliers (Zhao et al., 2002). Similarly, Bagchi and Skjoett-Larsen (2003) and Kulp et al. (2004) classified information sharing into information and knowledge sharing, technology exchange and adaptation, resource and risk sharing, and collaborative planning. In addition, Pandey et al. (2010) identified in more detailed information sharing levels between SC partners such as purchases and sales, inventory status, product development, sales and forecasting, market development, future plan, production cost, technology know-how and order tracking information.

Occasionally, it is the cheaper strategy to share information, rather than having an extra capacity or inventory. SCRM strategies can work significantly better if timely and accurate information is available to SC partners. The information sharing strategy should consist of information about cost related data, process related data, customer needs, customer demand, product-related data and performance metrics (Karaesmen et al., 2002). This view is also supported by Zha and Ding (2005) who stated that some confidential information can be shared among SC partners for effective coordination. Some firms are cautious about sharing information with their SC partners due to fear of unethical use of that information (Zhao el at., 2002). However, Jüttner and Maklan (2011) argued that information sharing strategy may allow the disclosure of confidential information leading to loss of privacy, but it can recover SC redundancy and increase SC flexibility against liquidity risk. A free IS

strategy can improve the firm's response to risk. On the other hand, a poor IS strategy not only affects coordination but also leads to a negative impact on collective decision-making and actions (Bharosa et al., 2010).

According to Fawcett et al. (2007:367), "*The bridges to world-class information sharing are never built and neither the structure nor the culture needed to share information is established*". A major barrier of IS strategy in traditional SCs is the limited understanding of firms about the export markets and their exporting efforts and performance (Andersen, 2006). Lotfi et al. (2013) identified the barrier of IS strategy within the firm as a deficiency of coordinating actions among the units of the firm. In addition, other key barriers of IS strategy are incentive issues, reliability, information privacy, cost and complexity of technology, accuracy, timeless and effective utilization of information (Zhao et al., 2002; Fawcett et al., 2007; Khurana et al., 2011).

2.4.3.2-Supply Chain Coordination

There is a growing interest of practitioners and academic researchers regarding SC coordination. Coordination is a critical factor for successful SCM and many definitions of SCM give more weight to SC coordination for efficiency (Fugate et al., 2006). The exact definition of 'SC coordination' is very difficult. Therefore, there is no unique definition of SC coordination (Arshinder et al., 2008). However, the most commonly recognised definition of coordination in the literature is "*as the process of managing dependencies between activities*" (Malone & Crowston 1993:1). Soroor et al. (2009) also defined coordination as a collective effort to reach goals.

In the SCRM context, better coordination among SC partners can mitigate SC risks, reduce costs and increase the overall competitiveness of the SC (Cachon, 2002; Lee & Whang, 2005). Enhanced coordination and cooperation among SC partners is a vital factor for risk avoidance, reduction, management and mitigation (Kleindorfer & Saad, 2005). The common factors of all the SCRM strategies are coordination and information sharing mechanisms (Datta & Christopher, 2011).

The most frequently mentioned SC coordination strategies in SCM literature are auction, procurement, replenishment, payment, product change, and collaborative product design, speedy, reliable, less error-prone SC operations, good relationships, better market share, good service quality, increased sales and result

in cost-effective (Lee et al., 1997; Lee et al., 2000; Sheffi, 2001; Lee & Whang, 2005; Oshagbemi & Ocholi, 2006). In addition, SC coordination enables the movement of inventories which reduces lead time, reduces the bullwhip effect, reduce the investment cost for specific human resources and facilities (e.g. specific offices or agents to handle contacts and communication), and increasing cash flow to improve the firm's FP (Sahin & Robinson, 2005; Lee & Whang, 2005; Sanders, 2008). For example, General Motors' coordination relationship with its suppliers has reduced vehicle development cycle times from 4 years to 18 months (Gutman, 2003). Moreover, it may encourage the sharing of resources, knowledge and risk in the SC (Lau et al., 2010).

2.4.3.3-Risk Sharing Strategies

Generally, researchers divide SCRM strategies into risk sharing, avoidance, speculation, control, transferring, security, hedging and postponement (Jüttner et al., 2003). According to Chan et al. (2003), risk sharing is the degree to which risks are shared. In other words, it is involves the transfer or sharing of a portion of a risk to reduce or mitigate it (Schlegel & Robert, 2014). In personal life, buying insurance for home, car and life is a risk sharing strategy against any calamity. In the context of the SC, it is defined as situations in which SC partners use more formal policies and arrangements (such as SC contracts) to share the obligations and responsibilities in activities and resources relating to SCRM. These SC risk sharing strategies minimize the cumulative impact of risk on each partners in a SC (Li et al., 2015).

In the context of SCRM, risk sharing is one of the critical enablers and more important for effective and efficient SCRM (Jüttner, 2005; Faisal et al., 2006). The previous studies have reported that risk sharing strategies could not only reduce SC risks but also contribute significantly to long-term oriented cooperation and competitive advantage (Ellram & Cooper, 1990; Martha et al., 1997; Wakolbinger & Cruz, 2011). Some risk sharing strategies are wholesale price contracts, buyback contracts, revenue sharing contracts, quantity-based contracts and buying insurance against any type of risk or sharing product development costs with suppliers. The risk sharing strategies are interrelated with SC contracts. The SC managers always emphasis on that SC contracts, which have some feature of

currency or commodity risk sharing within SC partners (Carter & Vickery, 1988). The success of a SC is mainly based on the long-term commitment of the SC partners and their capacity to share benefits and risks (Harland et al., 2003). A supply chain contract is a coordination tool to incorporate SC partners and consequently enhanced operational performance. It is also specified who will bear the costs when SC disruptions happen (Tang, 2006b; Buzacott & Peng, 2012; Knoblich et al., 2015).

Historically, the insurance policy has been used as a key part of SCRM strategies (Aon Risk Solutions, 2013). Similarly, risk pooling is a significant type of risk sharing. Risk pooling is a practice used by insurance companies to control the risk consequences of catastrophic events. For example, in case of a sizable claim against losses due to catastrophic event, the insurance companies divide that claim among all members of that risk pool. Consequently, single members of the risk pool are protected from large claim payment and avoid bankruptcy (Schlegel & Robert, 2014).

The most frequently mentioned risk-sharing strategies in SCRM literature are quantity flexibility, buyback, profit sharing and full return (Emmons & Gilbert, 1998; Harland et al., 2003; Cachon & Lariviere, 2005; Ojala & Hallikas, 2006; Wakolbinger & Cruz, 2011; Jeong, 2012). There is a large body of literature available to discuss these risk-sharing strategies individually, for example, revenue sharing (Cachon & Lariviere, 2005), buyback policies (Emmons & Gilbert, 1998), profit sharing (Jeuland & Shugan, 1983), quantity discounts (Burnetas et al., 2007), and quantity flexibility (Tsay, 1999). Similarly, payment categories of risk sharing are wholesale price contract (Lariviere & Porteus, 2001), quantity flexibility agreements (Tsay, 1999), and other revenue-sharing schemes (Cachon & Lariviere, 2005). These studies have conducted in low TAR, however, far too little attention has been paid to SC coordination in TAR.

2.4.3.6-Supply Chain Finance

Traditionally, SCs consist of three flows: the physical flows of goods/services, information flows and finance flows (Mentzer et al., 2001). The physical flows refer to the transfer of goods, including raw materials, finished goods, and return/recycle products from the customer and reverse logistics. Information flows refer to the large collection and transfer of information and knowledge between manufacturers, LSPs, retailers, and customers. The financial flows are interconnected with monetary payments between buyers and sellers (Spekman & Davis, 2004). It is important to effectively manage SCs; researchers should no longer focus on physical flow and informational flow only, but also focus on the financial flow (Pfohl & Gomm 2009; He et al., 2010; Wuttke 2013a&b). More and Basu (2013) conceptually divided SC finance into three categories as shown in Table 2.7.

Table 2. 7: SC finance categories

Finance type	Time interval	SC Finance Solutions
Pre-shipment finance	PO issuance to shipment	Raw material financing (to the supplier) Production financing (to the supplier)
Transit finance	Shipment to invoice approval	Vendor-managed inventory financing In-bound & out-bound inventory financing
Post-shipment finance	Invoice approval to payment	Accounts receivable financing (to the supplier) Early payment discount (to the supplier) Accounts payable financing (to the buyer)

Source: More & Basu (2013)

There is a large volume of published studies that address the topics of "Financial supply chain management" (e.g., Fairchild 2005; Wuttke 2013b) and "Supply chain finance" (e.g., Hofman, 2005; Pfohl & Gomm, 2009; Wuttke et al., 2016), the distinction between SC finance and Financial SCM seems to be negligible (Gelsomino et al., 2016). Fairchild (2005) and Bryant and Camerinelli (2013) argued that the SC finance can be segmented into different constituents within financial SCM. However, SC finance is not a wholly new concept, *"it is more the coming together of a number of traditional financing approaches, the increases of electronic exchange of data between organizations and emergence of an alternative source of finance"* (Templar et al., 2016:150).

Supply chain finance Definitions

SC finance can be defined in many ways. Gelsomino et al. (2016) provided a definition of SC finance that reflects two major perspectives. 1) The 'finance oriented' that emphasizes short-term financial solutions, provided by financial institutions involving in accounts payable and receivable. This concentrates on here and now arrangements gave by money-related organizations, tending to creditor liabilities and receivable. 2) The "supply chain-oriented" term focuses on working capital optimisation in terms of accounts payable, receivable, inventories, and sometimes even on fixed asset financing between SC upstream and downstream. However, Steeman (2016) argued that the current literature touches on various SC finance themes and provides guidelines on the definition of SC finance. The researcher has reviewed different definitions of SC finance to bridge the knowledge gap and developing relative measures for this study. The definitions are summarised in Table 2.8.

Table 2. 8: SC finance definitions

Definitions	Sources
SC finance is an approach for two or more organisations in a supply chain, including external service providers, to jointly create value through means of planning, steering, and controlling the flow of financial resources on an inter-organisational level.	Hofmann (2005)
SC finance is the set of products and services that a financial institution offers to facilitate the management of the physical and information flows of a supply chain.	Camerinelli (2009)
SC finance is the inter-company optimisation of financing as well as the integration of financing processes with customers, suppliers, and service providers in order to increase the value of all participating companies.	Pfohl & Gomm (2009)
SC finance is the process of optimising the financial structure and the cash-flow within the supply chain.	Gomm (2010)
SC finance solutions represent a combination of technology solutions and financial services that closely connect global value chain anchors, suppliers, financial institutions and technology service providers. They are designed to improve the effectiveness of financial supply chains by preventing detrimental cost shifting and by improving the visibility, availability, delivery, and cost of cash for all global value chain participants.	Lamoureux & Evans (2011)
SC finance is an integrated approach that provides visibility and controls overall cash-related processes within a supply chain.	Grosse-Ruyken et al. (2011)
Financial SCM is defined as optimised planning, managing, and controlling of supply chain cash flows to facilitate efficient supply chain material flows.	Wuttke et al. (2013a)
SC finance is an automated solution that enables buying firms to use Reverse Factoring with their entire supplier base, often providing flexibility and transparency of the payment process.	Wuttke et al. (2013b)
SC finance can be defined as managing, planning, and controlling all the transaction activities and processes related to the flow of cash among SC (supply chain) stakeholders in order to improve their working capital.	More & Basu (2013)
As the use of financial instruments, practices and technologies for optimising the management of the working capital and liquidity tied up in supply chain processes for collaborating business partners.	Bryant & Camerinelli (2013)
A financial supply chain is the network of organisations and banks that coordinate the flow of money and financial transactions via financial processes and shared information systems in order to support and enable the flow of goods and services between trading partners in a product supply chain.	Blackman et al. (2013)
Financial SCM consists of the holistic and comprehensive activities of planning and controlling all financial processes, which are relevant within a company and for communication with other enterprises.	Popa (2013)
The SC finance approach – according to its broader definition – can represent a step towards connecting theory and practice related to the optimisation of financial flows in supply chains.	Caniato et al. (2016)
SC finance can be defined as financial arrangements used in collaboration by at least two supply chain partners with the aim of improving the overall financial performance and mitigating the overall risks in supply chains.	Steeman (2016)

Source: Author

Various studies have been found on SC finance in non-academic literature, but attentions to this field is still limited in the academic literature. For instance, Hofmann (2013) reviewed only 21 academic articles that dealt with SC finance. On the other hand, Gelsomino et al. (2016) included 109 academic articles in their systematic literature review on SC finance. The majority of articles are based on a case study approach, either a single case (Blackman et al., 2013), or multiple cases (Wuttke et al., 2013 a,b; Caniato et al., 2016; Song et al., 2018), some adopt interviews and survey (Fellenz et al., 2009; More & Basu, 2013; Wandfluh et al., 2016). Similarly, some use simulation models (Iacono et al., 2015; Wuttke et al., 2016; Pellegrino et al., 2018) and others are more theoretical by nature, using conceptual model building (Pfohl & Gomm, 2009; Gomm, 2010; Hofmann, 2011). However, far too little attention has been paid to empirical research in SC finance, especially in the terrorism affected regions.

Financial strategies mainly focus on the financial parts of strategic decisions. According to Bender (2014), the financial strategy has two components; raising the funds needed by an organization in the most appropriate manner and managing the employment of those funds within the organization. Traditionally, financial institutions adopted a strategy of credit rating to evaluate the credit risk of a firm. Similarly, buyers are also frequently evaluate the credit score of suppliers in SCs to avoid future disruption (Moretto et al., 2018).

In the context of SCRM, there are different SC financial strategies such as keeping sufficient amount in banking, financial hedging strategies, credit rating models, long-term contract, revenue sharing, transfer or share currency risk, currency call and put options, factoring and reserves factoring.

2.4.3.5-Supply Chain Security

SC security can be defined as follows: *"the application of policies, procedures, and technology to protect supply chain assets (product, facilities, equipment, information, and personnel) from theft, damage, or terrorism and to prevent the introduction or unauthorized contraband, people or weapons of mass destruction into the supply chain*" (Closs & Mcgarrell, 2004:8). In other words, it is not losing product during the production and transportation processes of the supply chain due to human pilferage.

Since the terrorist attacks in 2001, the focus of SC security changed from theft prevention to counter terrorism (Lee & Whang, 2005). SC security presents several challenges to governments involved in protection against terrorist threats (Belzer & Swan, 2012). Governments play a critical role in the management of SC security by implementing policies, regulations, voluntary programmes and enforcement agencies. Examples include Customs-Trade Partnership against Terrorism (C-TPAT), Fast and Secure Trade (FAST), Container Security Initiative (CSI), Safe and Secure Tradelanes (SST), Advanced Manifest Rule (AMR), the Emergency Planning and Community Right to Know Act (EPCRA) and ISO/PAS 28000. The implementation of these security initiatives can cause extra costs to firms. For example, business costs are expected to increase due to these new security regulations and voluntary programmes such as higher inventories to buffer against disruptions, increased insurance premiums, investment in new technologies, additional security measures and audits, as well as reconfiguring the SC (Zsidisin & Ritchie, 2008). Costs to secure the SC are estimated to reach 151 billion US dollars annually (Russell & Saldanha, 2003). The Organisation For Economic Co-Operation and Development Report (2005) estimated the initial cost to ship owners from 730 million US dollars to 1200 million US dollars per annum. The total annual cost of terrorism and piracy in the maritime industry is estimated to be between 1 billion US dollars and 16 billion US dollars (Chalk 2009). In contrast, SC security initiatives have numerous benefits such as reduction in terrorism, theft, cybercrime, smuggling, counterfeit goods, and damage to goods (Gutierrez & Hintsa, 2006) and play an important role in firms' viability and business continuity (Sarathy, 2006).

Generally, SC security can be divided into three different categories: physical security, information security and freight security (Rice & Caniato, 2003). In another typology, Van Oosterhout et al. (2007) divided SC security measures into two main categories: preventive measurement and corrective measurement. The preventive measurement focus on physical security (e.g. cargo security, facilities security) and nonphysical security (e.g. information security, human resource management security) of the SC in advance. It gives more emphasis on preventing the occurrence of security-related risks in the SC. On the other hand, corrective measurements focus on reducing the impact of security-related risks in the SC. They help firms to return to a normal position as quickly as possible during a time

of crisis. SCM and resilience management are examples of the corrective measures approach (Van Oosterhout et al., 2007).

However, the SCM literature provides little help in understanding SC security (Closs & Mcgarrell, 2004; Hale & Moberg, 2005) and there is a gap in academic research to address security-related issues in SCM. Although a few studies have conceptually studied the significance of security initiatives in the SC (e.g., Sheffi, 2001; Lee & Whang, 2005; Sheu et al., 2006; Autry & Bobbitt, 2008; Closs et al., 2008; Hintsa et al., 2009), they have not been tested empirically. Besides, a large and growing body of literature has investigated SC security practices from in the perspective and experience of developed countries such as the U.S.A and Europe. Whereas, little or no research exists in relation to SC security strategies and performance in TAR such as Pakistan.

Supply chain Security Strategies

After the 9/11 terrorist attacks, SC security costs were raised due to extra security measures. For example, Sheffi (2001) stated that cost of stopping and checking all trucks at the crossing-borders points is highly unsustainable. Therefore, SC security strategy becomes an essential part of corporate strategy, like marketing or financial strategies (Sarathy, 2006). Organizations allocate more time and resources to SC security strategies to handle security issues and increase their performance (Banomyong, 2005). Similarly, increasing terrorism risks, pandemics, cargo theft, chemical diversion, growing public concerns about hazardous material incidents, product counterfeiting, and smuggling and maritime piracy persuaded organizations to develop a long-term SC security strategy (Ward, 2011). Firms' key sustainability objectives should be focused on improved SC security levels and safeguarding society against illegal trade and criminal threats related to international trade and logistics. Security is vital to all SCs but especially for some SCs such as food, feed, pharmaceuticals and chemicals SCs, as incidents in those SCs might have a direct impact on public health and safety (Alliance for Logistics Innovation through Collaboration in Europe, 2014)

The main objective of the security strategy is to increase a SC's ability to sort out what is moving and identify unusual or suspicious elements. Security strategy can integrate governments, firms and ports to protect SCs and avoid unnecessary delays at border-crossing points with the adoption of new SC security regulations

(Manuj & Mentzer, 2008b). However, there is a need for development clear SC security strategies to protect SCs against any potential risk. It also needs time and financial investment in SC security strategies to reduce the possibility of the next disaster to the SC (Giunipero & Eltantawy, 2004). Investment in SC security strategies may lead to better performance of the SC. Mentzer et al. (2001) argued that SC security strategies do not directly increase revenues; however, SC security strategy is planned to avoid costs. Similarly, SC security strategies can reduce SC disruptions, product contamination, SC security breaches and brand destruction. It can also create competitive advantages for firms (Rice & Spayd, 2005). This view is supported by Engel and Prummel (2007), who write that SC security strategies can reduce theft and losses, enhance planning, increase customer loyalty and employee commitment, reduce the number of delayed shipments, lower inspection costs of suppliers and increase cooperation with firms, reduce the number of safety incidents, reduce crime and vandalism, and improve security and communication between SC partners. A secure SC can lead to higher visibility, improved SC efficiency and customer satisfaction, reduction in lead-time and overall cost reduction (Zailani et al., 2015). However, Thibault et al. (2006) argued that the strategy of higher SC security of firms may create an increase in rates, which can jeopardize their relationships with customers.

Several academic studies have examined the relationships between some government SC security initiatives (strategies) and efforts on SC performance. For instance, Eye for Transport (2006) found that customers' concern and government pressure are the main reasons which forced the firms to implement these SC security strategies. Barnes and Oloruntoba (2005) analysed the impacts of new security strategies on the maritime industry and their significance in reducing maritime-vectored terrorism. However, they found that the inappropriate implementation of these SC initiatives could affect the competitiveness of logistics services. Sheu et al. (2006) examined how C-TPAT certification affects on international SC collaboration. They suggested that most firms benefited from C-TPAT certification through border inspections, lower costs, and higher customer satisfaction. Thibault et al. (2006) also interviewed and surveyed top managers from shipping importers and port authorities. They found that SC security strategies benefited most from the cooperative relationships between the government and industry. Vance (2008) found that with the speedy change to new

security requirements, firms are improving their communication channels through their international SCs to stay well informed of new initiatives. However, MacPherson (2008) found that SC security strategies are disrupting international SCs in significant ways. They affected the Canada-U.S. commercial relationship by imposing extra shipment and distribution costs and have a significant impact on small-to-medium sized firms.

Much of the current literature available on SC security strategies pays particular attention to high-likelihood, low-impact type of risk. It focused on a more stable environment. However, far too little attention has been paid to high-impact and low-likelihood risks (Chopra & Sodhi, 2004; Oke & Gopalakrishnan, 2009).

2.4.3.6-Facilitation Payment (Corruption/Bribe)

Corruption has many connotations and interpretations, changing according to time and place (Rose-Ackerman & Palifka, 2016). Corruption, bribery and lobbying are terms that in literature are frequently used interchangeably, but in the practical sense, they are quite different concepts. Corruption is defined as "*the abuse of entrusted power for private gain*" (Anokhin & Schulze, 2009:465). In an organizational context, corruption is defined as an misuse or exchange of resources for personal advantage at the expense of the firm or society (Anand et al., 2004). Corrupt practices includes giving exclusive gifts to customers or other stakeholders in order to strengthen the relationship and safeguarding future contacts (Cheung & King, 2004) and bribing a government official in order to speed up certain procedures (de Jong et al., 2012).

Bribery is defined as "*trying to persuade someone, typically illegally or dishonestly, to act in one's favor by offering a gift of money or other attractive inducement"* (Schlegel & Trent., 2014:148). In other words, it tries to beat the existing rules or policies. There is also a difference between bribery and lobbying. Lobbying is defined "*as taking the form of campaign contributions or influence-buying through other means, as an activity that aims at changing existing rules or policies*" (Yim et al., 2017:223). According to Grzywacz et al. (2004), bribe can be a kind of 'toll fee' that businesses need to pay to avoid daily disturbances. For example, if firms refuse to offer a bribe to officials, it may a disadvantage for firms and they may be treated unfairly. Consequently, businesses pay bribes to receive better treatment from officials, not to gain any exclusive advantages. However,

corruption is not just about bribery. It extends beyond bribery and includes other practices of discretionary power in the public sector (Ng, 2010).

Similarly, Ng (2010) argued that bureaucratic corruption may not necessarily be bad for business in theory. Due to this reason, corruption is frequently mentioned in literature as 'greasing the wheels' (Tian et al., 2017). This view is supported by Graeff (2016) and Hanousek and Kochanova (2016) who write that sometimes corruption works in a business's favour, for example, the use of bribe to acquire business contracts. However, the firm's corruption practices are usually undisclosed to the public (Apergis & Apergis, 2017).

Corruption can be divided into "grand" (political corruption) or "petty" (bureaucratic corruption), depending on the level of power, trust, money and self-gain involved in the fraud (Rose-Ackerman & Palifka, 2016). For example, bureaucratic corruption can increase red tape-ism and cause longer delays in processes. Occasionally, red tape-ism is also use as a tool to get more bribes.

In the context of doing business, the U.S Congress Report (2010) reported the corruption risk in the context of Afghanistan. The report concluded that the Taliban and local warlords take between 10-20% of total project investment as bribes to provide protection. Similarly, the LSPs need to pay bribe every month U.S $ 1,000 to $10,000 to Afghan officials. The report blames the United States and international community for the political economy of security corruption in Afghanistan. Riley (2013) conducted a study on 114,000 business experts in 107 countries. He concluded that one in four people had paid a bribe in the past years. In some countries, the bribery rates are more than 50 per cent such as India, Cambodia, Ghana, Senegal, Cameroon Tanzania, Zimbabwe Kenya, Libya, Mozambique, Uganda, and Yemen. On the other hand, the developed countries have the lowest bribery rates less than seven percent such as the UK, United States, Belgium, Australia, Malaysia, Portugal, Denmark, and Finland.

Corruption is a key SC risk, but a poorly understood phenomenon (Silvestre et al., 2018; Monteiro et al., 2018). However, a few researchers have been able to draw attention toward corruption in SCM. For example, Mont and Leire (2009) investigated Swedish organisations regarding socially responsible purchasing. They found the key barriers to socially responsible purchasing are following; high levels of corruption in some countries of supply, a lack of resources for supplier audits, difficulties in ensuring that all suppliers fulfil the Code of Conduct,

differences in culture and management style and low levels of social standards. Basu (2014) studied corruption in the SC from another perspective, global illicit SC such as illegal goods and services, trafficking of illegal narcotics, endangered wildlife, prohibited weapons, stolen antiques, illegal migrants and sex workers. He proposed a conceptual model based on transaction cost theory.

Different studies have studied corruption in different contexts. For example, Arnold et al. (2012) studied the German companies inclination towards corruption in operations and SCM. They identified four factors, which force a firm toward corruption: organizational complexity, corporate culture, internationality and functional complexity. Clemente and Evans (2014) studied the NATO SC in Afghanistan. They concluded that these supplies are a significant resource for the Afghan economy and government. However, they argued that these supplies significantly increase the levels of corruption. Silvestre et al., (2018) conducted a case study on Brazilian beef SC corruption. They found that the stakeholder collaboration strategy could increase the risk of corruption in some cases, and identified two specific relationships (business and politicians, business representatives and regulators/law enforcement representatives) where corruption can be embedded in the SC. In addition, they suggested the SCRM practice could provide insights for policymakers and regulators/law enforcers to identify corruption frauds in the SC. Monteiro et al. (2018) conducted a systematic literature review on corruption in SCM literature. They found that limited studies focused explicitly on corruption in SCM literature and stressed a need for research on corruption to achieve sustainability in the SC. Therefore, there is a definite need for further research on corruption, especially the use of corruption (bribe) as tool of SC risk mitigation.

2.3.4-Management Outcome/Performance

SC risk management performance is highly dependent on the SC's holistic management (Sandhu & Helo, 2010). Consequently, SRCM performance evaluation is a critical activity of SCM, and both academics and practitioners have assessed SC performance over several decades (Ganga & Carpinetti, 2011). The main purpose SCM is to achieve the goals of minimum cost and maximum profit for the firm and influence overall performance (Wisner, 2003).

According to Hendricks et al. (2009), the SCRM literature provides a better understanding of the relationships between a set of risk management strategies and its impact on the SC performance. However, measuring SC performance continues to present a challenge to academics as well as practitioners. SC performance measurement is a key to assess the efficiency of SC operations in response to disruption and "*even a small reduction in logistics costs, or narrowing of this gap between emergency operations and normative state would yield large savings"* (Whiting & Ayala-Ostrom, 2009:1083). A supply chain disruption is an accidental, problematic situation that leads to SC risk, for example, the negative deviation from the estimated value of a certain performance measure, causing some negative significances for the company (Wagner & Bode, 2006). Therefore, in performance measure should consider any risk reduction (Hendricks & Singhal, 2003; Breg et al., 2008).

SC performance measures are also called SC metrics. They can be categorised as functional indicators and end-to-end SC indicators. The Supply Chain Council introduced the SC operations reference (SCOR) model in 1996. This model provides performance measures based on the five decision areas (plan, source, make, deliver, return) in a SC. Beamon (1998) divided the SC performance into qualitative categories (customer satisfaction, flexibility, information and material flow integration, effective risk management, supplier performance) and quantitative (cost minimisation, sales maximisation, profit maximisation, inventory investment minimisation and return on investment maximisation). Similarly, Gunasekaran et al. (2001, 2004) provided a framework to promote a better understanding of SC performance measurement at strategic, tactical, and operational levels and they also identified the list of key performance metrics. Further, Huang and Keskar (2007) and Keskar (2007) divided the SC performance into three comprehensive categories: Supplier (costs, assets), Product (reliability, responsiveness, flexibility) and Society-related (safety, environmental).

In the context of SCRM, Colicchia et al. (2013) categorised SC performance into three measures; environmental, operational and financial. Generally, it is classified into two types operational and FP (Chen et al., 2004; Fullerton & Wempe, 2012; Diehl & Spinler, 2013; Jenatabadi & Ismail, 2014; Okongwu et al., 2015).

Operational performance measures include reliability, consistency quality, delivery speed, volume flexibility, schedule flexibility, delivery speed, specific costs,

customers' satisfaction, rapid confirmation of customers' orders, on- time deliveries, handling of complaints and quality. On the other hand, FP metrics such as economic value added (EVA), return on investment (ROI), profits, net income and return on asset (ROA) are widely discussed in the literature.

Table 2. 9: Summary of SCRM stages study in literature

Source	Risk Identification	Risk Analysis	Risk Strategies	Outcome
Zsidisin et al. (2004)	√	√		
Peck (2005)	√		√	
Ritchie & Brindley (2007)	√	√	√	√
Faisal el at. (2007)	√	√	√	
Manuj & Mentzer (2008)			√	
Blackhurst et al. (2008)	√	√		
Ellegaard (2008)				√
Wagner & Bode (2008)	√	√	√	
Oke & Gopalakrishnan (2009)	√	√	√	
Stecke & Kumar (2009)	√	√	√	
Neiger et al. (2009)	√			
Zsidisin & Wagner (2010)	√	√		
Thun & Hoenig (2011)	√	√		
Christopher et al. (2011)	√			
Yang (2011)	√	√	√	
Kern et al. (2012)	√	√	√	√
Lockamy & McCormack (2012)		√		√
Vilko & Hallikas (2012)	√	√		
Li et al. (2013)			√	
Diehl & Spinler (2013)	√			√
Samvedi et al. (2013)	√	√		√
Pettit et al. (2013)	√	√	√	√
Vedel & Ellegaard (2013)			√	√
Markmann et al. (2013)	√	√		
Punniyamoorthy et al. (2013)	√	√		
Wieland (2013)			√	
Lockamy III (2014)	√	√	√	√
Urciuoli et al. (2014)	√	√		
Yang et al. (2014)	√	√	√	√
Chang et al. (2015)	√	√		
Zailani et al. (2015)			√	√
Moslemi et al. (2016)	√	√		
Revilla & Saenz (2017)			√	√

Source: Author

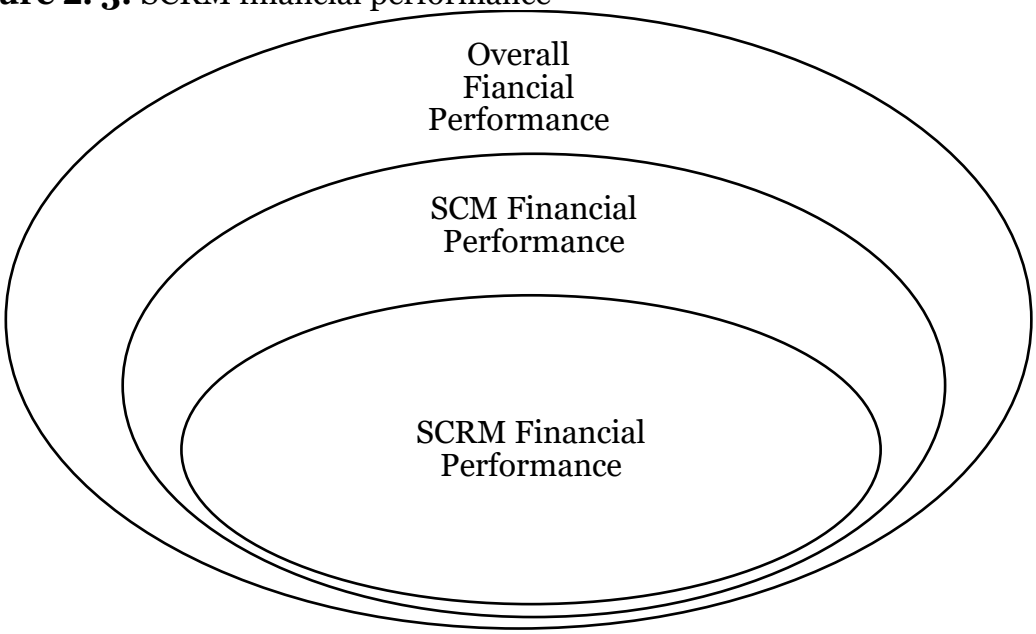
Table 2.9 provides a summary of different SCRM stages adopted in the literature. The following conclusions can be drawn from this table: First, a large number of studies has been conducted to identify risks in SC. Second, the majority of studies coducted different techniques to assess SC risk (e.g. Likelihood Impact Matrix) at the risk analysis stage and it also includes different segments (e.g. risk measurement, risk classification and risk evaluation). Third, a limited number of studies have discussed the SCRM strategies. Fourth, a few studies have also showed SCRM impact on SC performance. Last, so far, there has been little discussion about holistic approach of SCRM.

There has been more focus on operational performance measures (e.g. delivery performance and customer satisfaction) in SCRM literature (Shi & Yu, 2013). Therefore, the impact of SCRM on firms' operational performance is beyond the scope of this study and the researcher only focuses on the FP of SCRM.

2.4-Supply Chain Management and Financial Performance

It is very important for managers to know whether and how SCM contributes positively toward a company's FP. Consequently, they direct their SC investments and resources to increase competitive advantages and improve financial performances (Shi & Yu, 2013). Figure 2.3 shows an outline of SCRM financial performance.

Figure 2. 3: SCRM financial performance



Source: Author

A large number of studies have attempted to explain SCM impact on FP. For example, in the context of purchasing management, Ellram and Liu (2002) studied the purchasing management influence company's FP such as profitability, cash flow, business growth and asset utilization. They find that purchasing management improves overall firm-level efficiency and has significant contributions towards profitability and growth. Similarly, Chen et al. (2004) developed an effect-chain model to clarify the extent to which strategic purchasing improves customer responsiveness and contributes to FP. They find that strategic purchasing is closely linked with several financial metrics, such as the percentage of profit in sales, return on investment and average net income before tax.

In the context of information technology, Zhu and Kraemer (2002) indicate that there is a strong correlation between firms' e-commerce competence and FP of manufacturing companies. They suggest that it is critical for traditional companies to coordinate their information technologies with e-commerce competence to achieve better FP. Similarly, Byrd and Davidson (2003) examine the impact of information technology on the SC financial performance. They employ three financial metrics (ROI, return on equity (ROE), and market share) and find that IT and firm FP is positively associated with each other. Moreover, Dehning et al. (2007) analyse the financial impacts of the IT-based SC in manufacturing firms. They find that IT-based increases gross margin, market share, inventory turnover, return on sales, and reduce selling, general, and administrative expenditures. It has a positive impact on FP, especially in the high-tech industry.

A multi-method study (web-survey, consultation, interview, and statistical analysis) on the significance of SCM to FP conducted by D'Avanzo et al. (2003) finds that the cost reduction is still key objective of SCM and many companies use the SCM as strategic locations to increase their shareholder wealth and improve their competitive advantages. They also find that there is a strong correlation between FP and SC characteristics (SC depth and sophistication). Jiang et al. (2006) examine the relation between outsourcing decisions and firm-level operational and financial metrics. They employ the event study method to illustrate the better performance of outsourcing firms against non-outsourcing firms. They find that outsourcing significantly reduces costs, but fails to enhance the outsourcing firm's productivity and profitability.

Presutti and Mawhinney (2007) employed the financial metric of EVA. They found that SCM processes could be strategically connected with an overall business strategy to achieve desirable FP. Similarly, Swink et al. (2010) found that leading SCM companies have significantly better performance than their competitors in terms of financial, operational and market measures. They found that some financial ratios such as ROA, Selling General, and Administrative Expenses (SG&A) /sales, and working capital/sales would be powerful indicators to distinguish between leading companies and their competitors. Lanier et al. (2010) examined the FP of concentrated supply chains (CSCs) at both firm and chain levels. The term CSCs refers to SCs, in which at least 10 percent of their total transactions are made through SC partners. They found that mainly downstream chain members at firm level capture the profitability benefits of SC membership, but cash cycle benefits are distributed throughout the SC, although at chain-level, the CSCs achieve better FP. Similarly, Ellinger et al. (2011) found that the leading companies recognized by industry experts for SCM capability have significantly higher Z-score statistic (Altman, 1968) than their close competitors and industry averages. Cao and Zhang (2011) examined the SC collaboration impact on FP. Their empirical finding shows that collaboration has a significant positive impact on FP. In addition, Jajja et al. (2016) analysed the data from 296 organizations in India and Pakistan. They found a positive relationship between a firm's strategic SC focus (lean and responsiveness) and key supplier practices (quality, cost effectiveness, delivery, and flexibility), which in turn has a positive impact on firm performance (operational, quality and market, and financial).

Similarly, some studies evaluate FP in the different contexts of SCM. Such as SC outsourcing (e.g., Gilley & Rasheed, 2000; Hayes et al., 2000; Jiang et al., 2007; Kotabe & Mol, 2009), SC strategic purchasing (e.g., Murray et al., 1995; Ellram & Liu, 2002; Baier et al., 2008), SC information technology (e.g., Zhu & Kraemer, 2002; Filbeck et al., 2005; Wu et al., 2006), JIT and Total Quality Management (e.g., Fullerton et al., 2003; Kannan & Tan, 2005). Similarly, SC integration (e.g., Hitt et al., 2002; Hendricks et al., 2007; Mitra & Singhal, 2008; Kim, 2009; Craighead et al., 2009; Lanier et al., 2010), SC collaboration (e.g., Ou et al., 2010; Flynn et al., 2010; Cao & Zhang, 2011), SC information sharing capability (e.g., Hsu et al., 2008) and SCM trust and commitment (e.g., Kwon & Suh, 2004). However, far too little attention has been paid to FP of SCM literature (Shi & Yu, 2013).

2.4.1-Supply Chain Risk Management and Financial Performance

Numerous studies have attempted to examine the SCRM impact on performance. For example, Levy (1995) conducted a case study and used a simulation model to study the impact of demand uncertainty and supplier reliability on the SC performance of different SC designs. Suwanruji & Enns (2006) employed a simulation model to study the risk between inventory and delivery performance in a stochastic, multi-echelon SC containing production and distribution functions. Li et al., (2006) employed the Directed Acyclic Supply Network (DASN) model and Impact Network (INet) model to find the impact of a disruption on the performance of the SC. They found that the timely sharing of disruption information can avoid losses and enhance the agility of firms while improving the stability and performance of the whole SC.

An exploratory study was conducted by Breg et al. (2008) on how the companies measure the performance of their SCRM programme. They developed a tentative framework based on a quality model to measure the SCRM performance and suggested the indicators for SCRM performance: reducing risk consequences, addressing the right risk sources and developing the right risk management processes. Wakolbinger & Cruz (2011) developed a framework to examine the effects of information management and risk sharing contracts in the SC. In particular, they examined the impact of strategic information acquisition and sharing on SC disruption risks and costs, and assessed the SC performance of risk-sharing contracts. Their model allows managers to evaluate the impact of strategic information acquisition and information sharing activities on their key goals, profit and risk.

Similarly, Saghafian and Van Oyen (2012) developed a model to analyse the true value of two SCRM strategies: contracting with a secondary flexible backup supplier and monitoring primary suppliers to obtain disruption risk information. The combination of these two strategies can enhance performance and assist the SC to be resilient toward disruptions and vulnerabilities. A large-scale empirical research on upstream SCRM (Kern et al., 2012) reported that companies who have high capabilities in three risk management process stages (risk identification, risk assessment and risk mitigation) show superior SC performance with a reduction in risk occurrences and impact on the SC. They found that the SCRM supports the

operational and strategic preparedness of organizations towards a wide range of SC risks. Son and Orchard (2013) studied the impact of two inventory-based mitigation policies: R-policy (maintaining strategic inventory reserves) and Q-policy (using larger orders) on performance during SC disruption. They found that the R-policy performs consistently better than the Q-policy in terms of product availability measures.

SC risks may have long-term negative effects on a FP (Tang, 2006a). However, all the above studies mention only the SCRM impact on SC performance; they do not specifically study the SCRM impact on FP. A few studies have assessed the impact of SC disruption on FP in the context of SC risks. For example, Hendricks and Singhal conducted a series of empirical studies to analysis the financial impacts of various types of SC disruptions, such as SC-specific glitches and disturbances, SC investment, production or shipment delays, and SCRM strategies.

In the context of SC-specific glitches and disturbances, Hendricks and Singhal (1997) were the first researchers; they used event study to analyse the SC disruption impact on shareholder wealth. They found that the announcement of delays in the SC has significantly negative impacts on shareholder wealth. Besides, they also identified that the industry competition, business diversification and firm size are linked to the scale of impacts. Hendricks and Singhal (2003: 506) defined a SC glitch as "*a firm's inability to match demand and supply*". They used a sample of 519 glitch announcements and assessed both short-term and long-term effects of glitch announcements on shareholder wealth. Specifically, they found that there is an abnormal decrease (10.28 percent) in shareholder wealth after the SC glitch announcement and leading companies have a less negative market reaction as compared to companies who have higher growth prospects which experience a higher negative reaction. Further, the capital structure (debt/equity ratio) of a company is little affected by the market's reaction. Similarly, Hendricks and Singhal (2005a) employed a sample of 827 SC glitch to study the equity risk of the firm. They found that the average abnormal stock returns of companies are nearly −40 percent over a three years period (one year before and two years after the disruption announcement date). They also observed that the majority share price droped in the year before the announcement, because the market partially anticipate the SC disruption. On the day of the announcement and during the year

after the announcement of disruption, the stock price has negative abnormal performance due to the market under-reaction. Consequently, the equity risk is increased by 13.50 percent after the SC glitch announcement. Hendricks and Singhal (2005b) analysed 885 SC glitch announcements of publicly traded firms, as compared to control samples of the same size and industry. They found that the SC glitch is linked with negative performance, the glitch announcements on average decreases return on sales (ROS) and ROA by -13.78 percent and -2.32 percent respectively. In addition, companies do not quickly recover from the negative economic consequences of disruptions. For example, their operating income, sales, total costs, and inventories do not recover even two years after the glitch announcement. Hendricks and Singhal (2008b) employed a sample of 838 SC disruption announcements between 1989 to 2001. However, the results of this study are similarly to the results in Hendricks and Singhal (2003), albeit with different sample size and time scale.

In the context of SC investment, Hendricks et al. (2007) analysed the impact of investments in SCM, Enterprise Resource Planning (ERP), and Customer Relationship Management (CRM) systems on companies long-term stock market performance and profitability by using financial ratios (e.g. ROS and ROA). They indicated that adopters of the SCM system have positive returns on their share price as well as improvements in profitability. In contrast, adopters of the ERP system have slight improvement in profitability but not in stock returns. Adopters of CRM have no improvements in either stock returns or profitability.

With regard to production or shipment delays, Hendricks and Singhal (2008a) employed data from 450 public limited firms to analyse the relationship between product introduction delays and financial ratios. They found that product delays have a statistically significant negative effect on profitability, while there is a positive correlation between ROA and stock price performance around the product introduction delay announcement. In particular, the impact of product delays on abnormal ROA is more negative for smaller companies and companies that are more profitable before the delay announcements.

In the context of SCRM strategies, Hendricks et al. (2009) empirically tested the effectiveness of three SCRM strategies (operational slack, geographically diversification, and vertical relatedness) on stock market reaction to SC disruption.

They found that the market reactions are less negative when companies have a better operational slack strategy and a high degree of vertical relatedness, while companies that are more geographically spread have a more negative market reaction.

To the best of the researcher's knowledge, only a few studies in the SCRM literature investigate the relationships between SC risk and FP (e.g., Hendricks & Singhal, 2003, 2005, 2008a, 2008b; Tomlin, 2006; Hendricks et al., 2009). However, these studies were only conducted in the context of SC disruptions and impact on FP. Hence, there is a need for research to examine the holistic relationships between SCRM and FP at industry and country levels.

2.5-Terrorism

2.5.1-History

Terrorism as a tactic is over 2,100 years old. It is an old technique originating with tyrranicide (the killing of tyrants) to please the gods. Regicide (the killing of kings) happened quite regularly during the Roman age. The best example of such terrorism was the assassination of Julius Caesar in 44 BC. Another early terrorist group was the Sicarii in 66–73 BC, a Zealot-affiliated religious sect fighting against the Romans in Jerusalem. The Sicarii opposed the law requiring Jews to pay taxes to Rome and refused to acknowledge the power of the Roman Emperor. They were convinced that a political revolution could come only through violent acts. Therefore, they adopted terrorism as their tactic (Matusitz, 2013).

In the 11th century in Persia, the Assassins were a religious group, who used suicide attacks against King Saladin and later resisted the Ottoman Empire. From the 13th to the 19th century, in India, many worshippers of the Hindu Goddess Kali (the destroyer) were famous under the name Thugees (from which the English word thug originates). Thugees strangled people (mainly travellers) with a noose in the name of Kali and then robbed, ritually mutilated, and buried them. They killed 20,000 people per year (Martin, 2003).

The first time terrorism became an issue on the international agenda was in 1934, when the League of Nations declared it illegal and punishable. Li and Schaub (2004) studied international terrorist incidents within 112 countries from 1975 to 1997. They found that the Middle East had the highest percentage of international

terrorist incidents and Europe was categorised in the second position. Africa, Asia, and the Americas suffered significantly less international terrorist attacks. However, America experienced the most horrific attack on its soil in 2001, committed by extremists (Al Qaeda). The Al Qaeda killed more people than the Irish Republican Army had killed in thirty-five years (Matusitz, 2013). Intriligator & Coissard (2008) argued that terrorism is found in every region of the world, culture or religion, so it need not be linked to Islamic extremists. For many, however, the notion of terrorism currently evokes images of Muslim extremists such as the 9/11 attackers. According to a Gallup poll, however, only 7 % of the 1.3 billion Muslims in the world completely justified the 9/11 terrorist attack (Esposito & Mogahed, 2007).

2.5.2-Definition of Terrorism

According to the Oxford dictionary, the word “terror” is a Latin word meaning “to frighten”. Therefore, a terrorist is a person that intends to frighten others through fear. According to Laqueur (1987), the terms “terrorism” and “terrorist” are only about 200 years old and 109 different definitions of terrorism were provided by various writers between 1936 and 1981, while Simon (1994) reported 212 different definitions of terrorism. Table 2.10 highlights the most common definition of terrorism in literature.

Table 2. 10: Terrorism definitions

Authors/ Organizations	Definitions
League of Nations (1937)	All criminal acts directed against a State and intended or calculated to create a state of terror in the minds of particular persons or a group of persons or the general public.
Rapoport (1977)	The use of violence to provoke consciousness, to evoke certain feelings of sympathy and revulsion.
Alexander et al. (1979:4)	The threat or actual use of force or violence to attain a political goal through fear, coercion, or intimidation.
United Nations (1999)	Criminal acts intended or calculated to provoke a state of terror.
Crenshaw (2001)	Communicate a political message.
Czinkota et al. (2004:45)	The systematic threat or use of violence, often across national borders, to attain a political goal or communicate a political message through fear, coercion, or intimidation of non-combatant persons or the general public.
Black (2004:9)	Unilateral self-help by organized civilians who covertly inflict mass violence on other civilians.
Van Fleet & Van Fleet 2006:764)	Terrorism refers to intentional, premeditated, and sometimes retaliatory, actions on the part of one or more individuals to create extreme stress or fear among others that lasts long enough to accomplish the purpose of furthering the perpetrator's own views.
Sandler & Enders (2007:288)	The premeditated use or threat to use violence by individuals or sub national groups against non-combatants to obtain political or social objectives through the intimidation of a large audience, beyond the immediate victims.
Europol (2007:9)	Terrorism is not an ideology or movement, but a tactic or a method for attaining political goals.

Source: Authors

The result of this lack of a universal definition is best explained by the pessimistic comment, *"One state's terrorist is another state's freedom fighter*". Defining terrorism is not a simple matter, because there is no single internationally accepted definition of what represents terrorism, and the terrorism literature abounds with competing definitions and typologies (Hyslop & Morgan, 2014). However, most definitions of terrorism converge on the notion that violence, or the threat of violence, is employed to frighten or intimidate people.

2.5.3-Types/Categories of Terrorism

The present world is confronting lethal terrorist attacks as compared to history. Today, the motivation of terrorists has changed from nationalism or separatism to religious ideology and fundamentalism. Laqueur (1987) compared the old terrorism with new terrorism. Old terrorism is terrorism that attacks only selected targets, while new terrorism is indiscriminate and causes as many fatalities as possible. Terrorism has different types and categories. It is a common mistake, to view the word terrorism as only associated with Islamic extremists. There are many different types of terrorist groups or networks worldwide (Intriligator & Coissard, 2008). Table 2.11 highlights the types of terrorism in literature.

Table 2. 11: Terrorism categories/types

Authors/Organizations	Terrorism Categories/Types
Van Fleet & Van Fleet (2006)	Political and religious fanatics, average citizen turned terrorist, criminals acting as terrorists, insane terrorists and internal terrorists or psycho-terrorists.
Europol (2007)	Islamist terrorism, ethno-nationalist and separatist terrorism, Left-wing terrorist groups and Right-wing terrorist groups.
Schmid (2011)	Acts of terrorism as/and crimes, acts of terrorism as/and politics, acts of terrorism as/and warfare, acts of terrorism as/and communication and acts of terrorism as/and religious crusade/jihad.
Locatelli (2014)	State terrorism, state-sponsored terrorism, terrorism perpetrated by private actors
Sandler (2015)	Domestic terrorism and transnational terrorism

Source: Author

It is important to define criteria for the classification of terrorism and, consequently, make comparison possible and vital for both qualitative and quantitative research (Locatelli, 2014). There is also a need for a distinction between attacks related to insurgency, terrorism and even organised crime (Europol, 2007). However, the problem of classifying terrorism, terrorist groups and attacks has been widely discussed in the literature (Locatelli, 2014).

In addition, a Europol (2007) report showed that religious terrorism is responsible for fewer attacks on businesses as compared to ethno-nationalist, separatist and

left-wing terrorism in Europe. This is because religious terrorism is more indiscriminate, seeking to cause as many casualties as possible, while separatist terrorist groups reflect extreme leftist elements in their agenda and target businesses. Stecke and Kumar (2009) classified the terrorist attacks that can affect the SC performance as follows: attack on infrastructure, violence, mass killing, ethnic killing, biological, chemical, and nuclear terrorism, hoax or propaganda intended for terrorism, political assassination, sabotage of transportation media, cyber terrorism and wars.

2.6-Supply Chain and Terrorism Risk

The concept of terrorism-related risk in SCRM became prominent in the literature in 2001 (Zegordi & Davarzani, 2012). Whilst there is extensive literature available on SCRM, SC disruption and SC security, only a limited number of studies deal with terrorism-related SCRM and how to secure SC activities from terrorist attacks (Sheffi, 2001). A few researchers have conducted studies on terrorism-related risks affecting different activities of SCs such as SC logistics performance (Czinkota et al., 2005; Bueno-Solano & Cedillo-Campos, 2014; Zeneli et al., 2018), SC security performance (Sheffi, 2001; Thibault et al., 2006; Macpherson and McConnell, 2007; Marlow, 2010; Reilly et al., 2012; Lu, 2018), SC resilience (Cox et al., 2011; Urciuoli et al., 2014), communication between SC partners after terrorist attacks (Degeneffe et al., 2009) and the impact of terrorism on employees working in those SCs (Reade, 2009).

Similarly, while SC security is widely discussed in the SCRM literature, studies in the new SC security regulations due to terrorism-related risk and their impact on SC performance are limited (Sheu el at, 2006). Markmann et al. (2013) analysed the influence of terrorism-related risk on global SC security, and other studies are related to specific sectors. For example, Barnes & Oloruntoba (2005) and Raymond (2006) examine the new security initiatives' impact on the maritime SC. There are some studies on transportation security in the context of terrorism-related risk (Prentice, 2008; Ekwall, 2010; Reilly et al., 2012; Strandberg, 2013). Nganje et al. (2008) and Pinior et al. (2015) discussed food SC security and bio-terrorism. A few studies addressing SC disruption management in context of terrorism-related risk (Stecke & Kumar, 2009; Knemeyer et al., 2009), include not only operations performance (Bueno-Solano & Cedillo-Campos, 2014; Kauppi et al., 2016), but also

FP (MacPherson, 2008; Ni et al., 2016). Several studies have examined the relationships between government initiatives and security strategies and efforts to avoid terrorist threats (e.g., Sheu et al., 2006; Vance, 2008; Ni et al., 2016). However, far too little attention has been paid to systematically investigate the literature on SC and terrorism and it can also answer the RQ 1 of this study.

2.6.1-Systematic Literature Review

For today's researchers the Systematic Literature Review (SLR) has become a crucial method for addressing the burgeoning volume of information generated by books, journals, conferences and work-shops (Fettke, 2006). SLR adopts a "*replicable, scientific and transparent*" process (Tranfield et al., 2003:209). It plays a significant role in evidence-based practices and differs from the narrative literature review in terms of being a comprehensive and unbiased search (Tranfield et al., 2003).

Recently, it has been employed for searching literature of SCRM (e.g., Colicchia & Strozzi, 2012, Kim et al., 2016; Fan & Stevenson, 2018; Khan et al., 2018). In order to extract and analyse the large volume of information and data generated by the scientific community, the researcher deployed a novel combination of SLR, text mining and network analysis. These methods enabled the researcher to systematically identify and select existing studies, evaluate them against set criteria and analyse them, producing valid results by limiting research bias. The SLR approach used in this study consisted of the following major steps.

Database and Article Selection

Research articles and their related citation data were collated from the EBSCO Host, Science Direct, Emerald Insight, Web of Science, Scopus, Summon (University of Hull) and ABI/INFORM. These are well-established databases and comprehensively cover scientific sources. To identify the relevant research articles, the researcher first developed a basic set of keywords and their derivatives (e.g. terror*, supply chain) using guidelines from the literature (Tranfield et al., 2003). To begin with, ten articles (from highly cited journals) related to SCM and SCRM were reviewed to identify the initial list of keywords, and three brainstorming sessions were conducted with three SCM academics and two SC practitioners. These five experts were selected for their specialist knowledge of terrorism-related

risk in global SCs. This process delivered the set of initial keywords (and derivatives) used in the subsequent database search to harvest a further set of articles, which were used to generate a list of additional keywords used with high frequency in this field. The researcher subsequently refined these keywords with a set of five SC risk experts in order to validate his search. As a result, the researcher identified the following set of keywords:

(1) Terror* and Supply Chain Risk
(2) Terror* and Supply Chain Disruption
(3) Terror* and Supply Chain Vulnerability
(4) Terror* and Supply Chain Uncertainty
(5) Terror* and Supply Chain Resilience
(6) Terror* and Logistics
(7) Terror* and Transportation
(8) Terror* and Maritime
(9) Terror* and Strategic Decision-Making
(10) Terror* and Supply Chain Security

A condition was imposed that these search strings had to be included within the title, abstract and/or keywords for a research paper to be considered. The asterisk (*) was also used to find related words (e.g. terrorism, terrorists related to terror*). In this process, the researcher only considered peer-reviewed articles, written in English and published from 2001 to 2016. The researcher selected 2001 as the start date because this was when the issue of terrorism in the context of SCs was first introduced (Sheffi, 2001). This procedure reduced the bibliographic data to a manageable level: the initial search revealed 1,371 research papers. Following the deletion of duplicates, 801 research papers met the initial inclusion criteria as shown in Table 2.12.

Table 2. 12: The number of articles and duplicates in each database

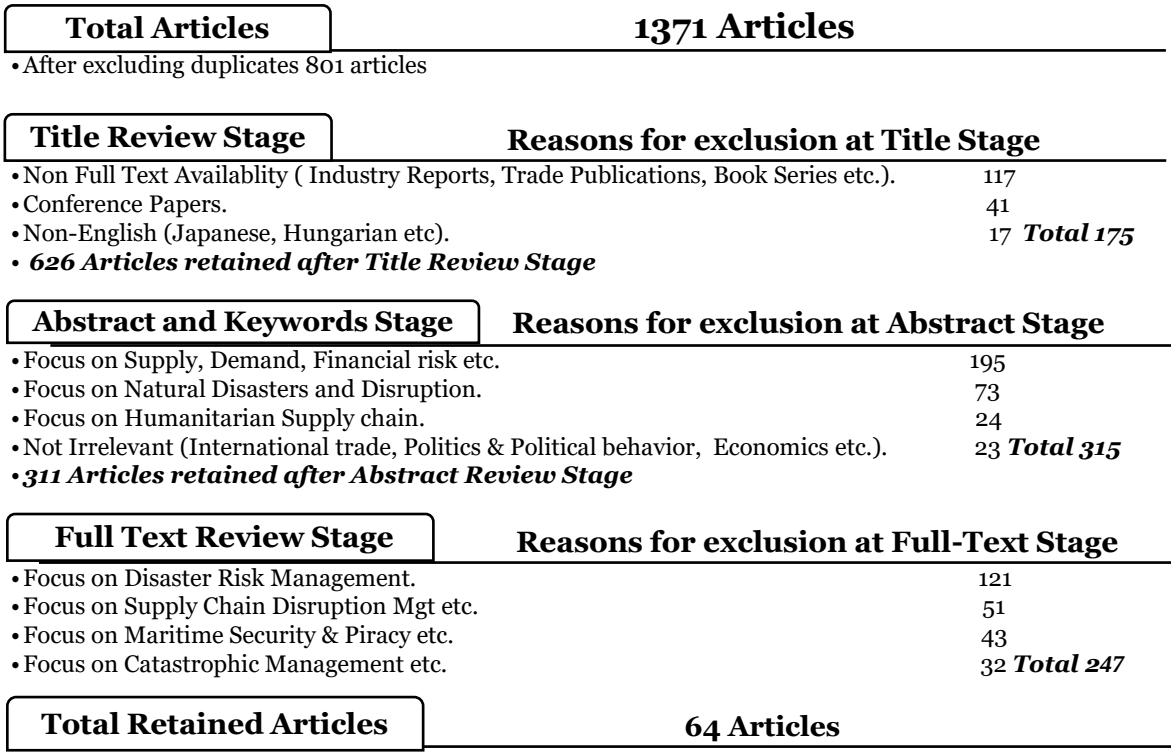
Search Terms	EBSCO Host	Science Direct	Emerald Insight	Web Science	Summon	Scopus	ABI/ INFORM	Total
SC Disruption and Terrorism	14(2)	4(1)	0	21(3)	24(6)	22(4)	13(2)	98 (18)
SC Risk and Terrorism	28 (9)	5(2)	10	40(12)	38(12)	48 (21)	17(9)	186(65)
SC Vulnerability and Terrorism	1	2	4(4)	11(7)	10(6)	17(8)	5(2)	50(27)
SC Resilience and Terrorism	1(1)	1	3(2)	5(5)	4(3)	6(4)	3(2)	23(17)
SC Security and Terrorism	6(4)	4(3)	7(4)	33(20)	65(28)	45(21)	26(14)	186(94)
Maritime and Terrorism	0	17(4)	4(2)	6(3)	13(9)	74(7)	13(9)	127(34)
Strategic DM and Terrorism	4	2	5(2)	8(6)	23(15)	19(16)	14(12)	75(51)
Logistics and Terrorism	14(5)	3	15(8)	19(5)	122(8)	32(14)	16(2)	221(42)
Transportation and Terrorism	34(6)	5(1)	16(5)	5(4)	136(120)	85(15)	124(71)	405(222)
Total	102(27)	43(11)	64(27)	148(65)	435(207)	348(110)	231(123)	1371(570)

Source: Author

Article Evaluation and Coding

The researcher evaluated each paper by screening its title, abstract and keywords. In this step, the researcher set a series of inclusion and exclusion criteria to capture only those articles related to terrorism-related risk in the context of SCRM and security. Thus, generic SC studies on risk management or security were excluded from the initial data set, unless they also addressed terrorism and its risks related to SCRM and security.

Figure 2. 4: A decision tree showing the reasons for excluding articles at each stage



Source: Author

Figure 2.4 shows a decision tree for excluding papers at each stage. Furthermore, the researcher excluded conference papers. The pre-defined selection criteria were then applied to the abstracts of the remaining 626 papers to identify articles that addressed terrorism-related risk and its effects on SCRM and security. The abstract review stage resulted in the exclusion of a further 315 articles. Finally, the full texts of the remaining 311 articles were reviewed and this resulted in the exclusion of a further 247 articles. The systematic procedure eventually yielded 64 research articles that satisfied the complete set of predetermined inclusion criteria.

The 64 collected research articles were then coded in terms of general information (e.g. titles, authors' names, year of publication and journal name) and additional categories (e.g. disciplines, centric view of data, industries, research methods, focus of studies and university/schools/departments/institutions names) were identified. In order to mitigate the risk of introducing a subjective bias, two SC risk experts were engaged in the process of compiling this database and the preliminary result of coding was then validated by the third expert. This process was repeated until a consensus was reached between the experts.

Using the variable features and additional categories, the researcher coded and prepared a separate data set for network analysis. This data set was prepared based

on the final set of research articles stored and used for network analysis in Gephi software. The subsequent procedures allowed us to categorisation of interesting and relevant papers for citation analysis. The researcher then examined networks and their clusters, to identify the knowledge gaps and contributions from various disciplines and countries.

The combination of triangulated methods (SLR, text mining and network analysis) deployed in this study constitutes a methodological innovation in ensuring the cross-validation, reliability and validity of qualitative data reviewed.

2.6.2- Findings from SLR, Text Mining and Network Analysis

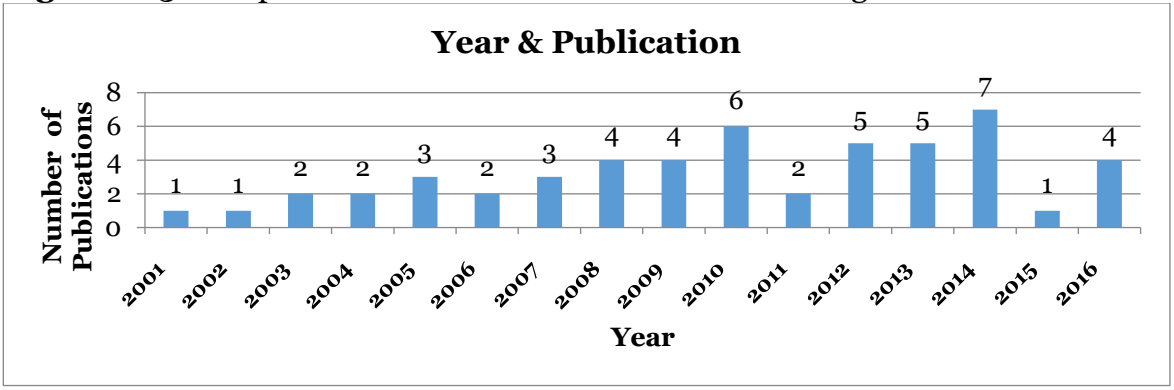
This section presents the descriptive results from the SLR, followed by the text mining analysis and network analysis.

2.6.2.1-Descriptive Findings

Year of Publication

The articles were analysed with respect to the year of publication. As shown in Figure 3.5 this clearly reveals that the topic of terrorism-related risk in the SC context has been gaining increasing attention since 2001 particularly progressing from 2010. Of the 64 articles analysed, 34 articles were published between 2010 and 2014.

Figure 2. 5: The publication trends on terrorism risk management



Source: Author

Content analysis

Table 2.13 shows the profile of the terrorism-related risk literature, defined in terms of research methods, disciplines, the core focus of studies, geo-location-specific (centric) view of data and industry sectors.

Table 2. 13: The status of terrorism-risk literature (n=64)

Methods	Discipline Base	Core Focus	Centric view of Data	Industry Sector
Qualitative (53%)	SC security (67%)	Terrorism Risk Analysis (25%)	Global (45%)	Maritime (40%)
Conceptual (44%)	SCRM (23%)	SC security Initiatives (23%)	**N. America 33%**	General (37%)
Review (3 %)	Food SC security (5%)	Mitigation Strategies (20%)	*U.S.A (27%)*	Transportation (11%)
Delphi Analysis (2%)	Energy SC (3%)	SC security Risk Analysis (13%)	*U.S.A & Canada (3%)*	Food (8%)
Case study (2%)	SC HRM (2%)	Catastrophic risk Analysis (6%)	*Canada (3%)*	Energy (2%)
Focus Group (2%)				
Quantitative (41%)		Terrorism & Piracy Risk Analysis (6%)	**Europe 4% (Total 10%)**	Logistics Service Providers (2%)
Survey (12 %)		Supply chain Performance (5%)	*UK (2%)*	
Simulation Model (11%)		Shopping Mall Security (2%)	*Germany (2%)*	
Math Model (11%)			*Swiss (2%)*	
Descriptive analysis (5%)			**Asia 12%**	
Data mining techniques (2%)			*Southeast Asia (3%)*	
Mixed Method (6%)			*India (3%)*	
			Sri Lanka (2%)	
			South Asia (2%)	
			Middle East (2%)	

Source: Author

The distribution of articles with respect to the type of research method is shown in the first column of Table 2.13. More than half of the articles followed a qualitative methodology, while 41 percent focused on quantitative methods. A few of the articles employed mixed techniques. Articles were classified as deploying a qualitative methodology if the research was based primarily on conceptual theories, or deployed methods such as Delphi analysis, focus groups, literature reviews and case studies. Articles classified as deploying quantitative methods were based on surveys, simulation, mathematical modelling, descriptive analysis, and other data mining techniques: none of the studies used the combination of methods utilized in the current study. The second column shows that 67 percent of the articles focused on the discipline of SC security (maritime and land transportation), while others dealt with various aspects of SCRM; 23 percent of the papers discussed terrorism as a catastrophic risk factor in SCRM, 5 percent of the articles focused on food SC security in the face of terrorism-related disruption, 2 percent discussed strategies for effective communication between SCs after terrorist attacks and 2 percent analysed effects of terrorism- related risk on SC employees.

In the third column, we categorize our 64 sample articles according to the core focus of the papers. The majority (25 percent) of articles assessed terrorism risk and 20 percent suggested mitigation strategies, 23 percent of the articles analysed the impact of security initiatives on the performance of businesses and ports, 12 percent of the articles assessed terrorism risk in the SC security context and fewer than 10 percent focused on catastrophic risk analysis, terrorism and privacy risk analysis, SC performance and shopping mall security.

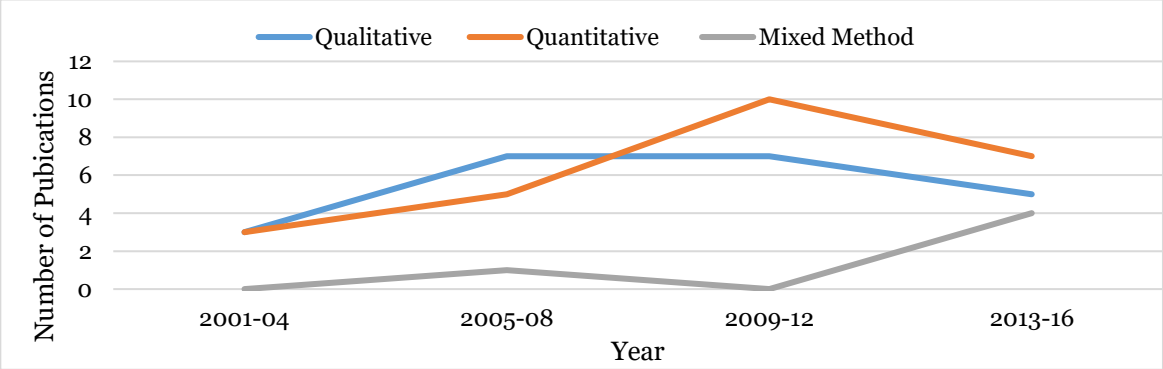
The selected articles are also classified with respect to geographical scope, as shown in the fourth column ("centric view of data"). The geographical analysis of the literature showed that the majority of the articles took a global view (45 percent), followed by ones focusing on North America (33 percent) and the USA (27 percent). A limited number of articles focused on Asian or European contexts. Only one article investigated terrorism-related risk in the context of an area that was itself endemically affected by terrorism (Sri Lanka).

The main purpose of classifying articles with respect to industrial sectors was to establish the extent to which different TRM strategies and effective decision making have been evaluated empirically in particular sectors. The classification of articles with respect to industrial application is shown in the last column of Table

3.13. Most of the articles focused on maritime (40 percent) and land transportation (11 percent) industries. The "General" category covers a mix of different industries and the corresponding articles either reported multiple case studies or presented interviews/surveys in various industries; 8 percent of the selected articles were focused on bio-terrorism-related risk in food supply, and our analysis suggests a lack of research on other aspects of terrorist impact on food logistics service providers and on other important sectors (e.g. energy logistics providers).

With regard to methodological orientation of the papers analysed, this study found an encouraging trend in the use of mixed methods in recent years.

Figure 2. 6: The number of articles by methods over the time



Source: Authors

Figure 2.6 illustrates that the gap between the numbers of qualitative and quantitative studies has almost disappeared. Another interesting finding is that quantitative methods became increasingly popular in the period 2009–2012.

2.6.2.2-Text Mining

Text mining is a data mining method that is customized for the analysis of natural language (Indurkhya & Damerau, 2010). It is defined as a non-trivial process, which identifies valid, novel, potentially useful and ultimately logical patterns in data (Frawley et al., 1992). It is a process to identify patterns, and relationships between data and for formation of a model, which can provide valuable information or knowledge (Ting el at, 2012).

In order to use the computational power of text mining methods, the selected articles were imported into Nvivo for cross-validation and to ensure that they specifically addressed terrorism-related risks in SCM and to determine the key themes Word clouds were used to visualize the focus of their content.

Figure 2. 7: Most frequently used words in articles and Word cloud

Words	Count	%
Security	4783	1.45
Terrorism	3248	.99
Chain	2393	.73
Risk	2300	.70
Management	2232	.68
International	1573	.48
Maritime	1516	.46
Transport	1472	.45
Cost	1365	.41
Port	1294	.39
Attacks	1049	.32
Trade	967	.29
Ships	943	.29
Economics	889	.27
Development	818	.25

Source: Author

Figure 2.7 shows an example of such cross checks, mainly focusing on terrorism, security and SCRM. The analytics from this figure confirm the validity and reliability of the selection process in identifying a final set of articles focusing on the core area of interest for this study. It also ensured the validity and reliability of the final articles and their text selected for further analysis, covering the main purpose of this study.

2.6.2.3-Thematic Analysis

Thematic analysis is defined as "*a method for identifying, analysing and reporting patterns (themes) within the data*" (Braun & Clarke 2006:6). However, thematic analysis also interprets various aspects of the research area (Boyatzis, 1998). Thematic analysis assists in searching across a data set to find repeated patterns of meanings. It is the best technique when a researcher is exploring an under-researched area or with participants whose points of view on the research topic are not known (Braun & Clarke 2006). Thematic analysis identified two main themes in the selected articles: SCRM strategies and effective decision-making.

SCRM Strategies against Terrorism

The literature has suggested mostly proactive mitigation strategies, while limited articles have focused on reactive strategies. A summary of terrorism risk mitigation strategies proposed in the literature is presented in Table 2.14.

Table 2. 14: Terrorism risk management strategies adopted by scholars

Authors	Approaches
Sheffi (2001) and Pero & Sudy (2014)	Buffer stock, Knowledge backup, Shipment visibility, Improved collaboration, Risk pooling (*postponement, build-to-order, product variability reduction and centralized inventory management*), Sharing information and security.
King (2005)	Security, Ensuring accountability, Creating smart borders, Recapitalizing the coast guard, Reforming immigration services, Container Security Initiative, 24-hour rule for cargo declarations, Customs-Trade Partner- ship Against Terrorism, Operation Safe Commerce by the Transportation Security Administration.
Barnes & Oloruntoba (2005)	Contingency and Business continuity planning.
Hale & Moberg (2005)	Secure site locations.
Manning et al. (2005)	Rapid response to incidents, Adequate resources available for investigation, Preparedness planning and Developing surveillance systems.
Suder & Czinkota (2005) and Degeneffe et al. (2009)	Communication strategies.
Nguyen (2006)	Joint patrols, Joint training exercises with regional Coast Guard and marine police.
Nganje et al. (2008)	Policy incentives and Cost-effective strategies.
Stecke & Kumar (2009)	Proactive Strategies, Advance-Warning Strategies, Coping Strategies and Cost Benefit Trade-Offs of Mitigation Strategies.
Cox et al. (2011)	Conservation, input substitution, Inventories, Excess capacity, Relocation, Resource un-importance, Import substitution, Export substitution, Technological change, Production recapture, Logistics raffinement.
Belzer & Swan (2012)	Shift Risks.
Shah (2013)	Intelligence, Information sharing, Crisis response, Finances for internal security and the nation's legislation for battling terrorism.
Bhattacharya et al. (2013)	Inventory strategies and Information sharing with collaborators.
Urciuoli et al. (2014)	Portfolio diversification, Flexible contracts, Transport capacity planning and Safety stocks.
Shan & Zhuang (2014)	Subsidization.

Source: Author

Effective Decision-Making Practices

The thematic analysis reveals that almost 40 percent of the articles address the issue of effective decision-making in the face of terrorism-related risk. The articles are identified in Table 2.15 and the findings shows a number of approaches to effectively making decisions against terrorism risk.

Table 2. 15: Effective decision-making practices

Authors	Effective decision-making practices
Sheffi (2001), Marlow (2010) and Yang et al. (2014)	Decisions regarding SC security practices
Thissen (2004)	Decisions about prevention measures and relevant practices
Barnes & Oloruntoba (2005)	Decisions regarding crisis situations
Hale and Moberg, (2005)	Decisions for selection of secure site location
Czinkota et al. (2005)	Decisions about Make-or-Buy and foreign market entry
Suder & Czinkota (2005)	Decisions about performance of SC security
Thibault et al. (2006)	Decisions regarding funding
Degeneffe et al. (2009)	Decisions about consumer needs and concerns
Stecke & Kumar (2009)	Robust decisions during supply chain disruption
Taquechel (2010)	Decisions about trade-offs security cost
Cox et al. (2011)	Decision-making in allocating the resources on risk-based manner
Aggarwal & Bohinc (2012)	Decisions about mitigating the impact of black swan events (e.g. Terrorism)
Reilly et al. (2012)	Decisions about which routes to use with what frequencies in response to these prohibitions and the underlying threat of terrorism.
Markmann et al. (2013)	Long-term decisions for risks
Wang & Ouyang (2013)	Decisions of investment in transportation security
Shan & Zhuang (2014)	Decisions about subsidization
Pinior et al. (2015)	Decisions in the supplier selection process
Navarrete & Esteban (2016)	Decision- making regarding the issue of food defense

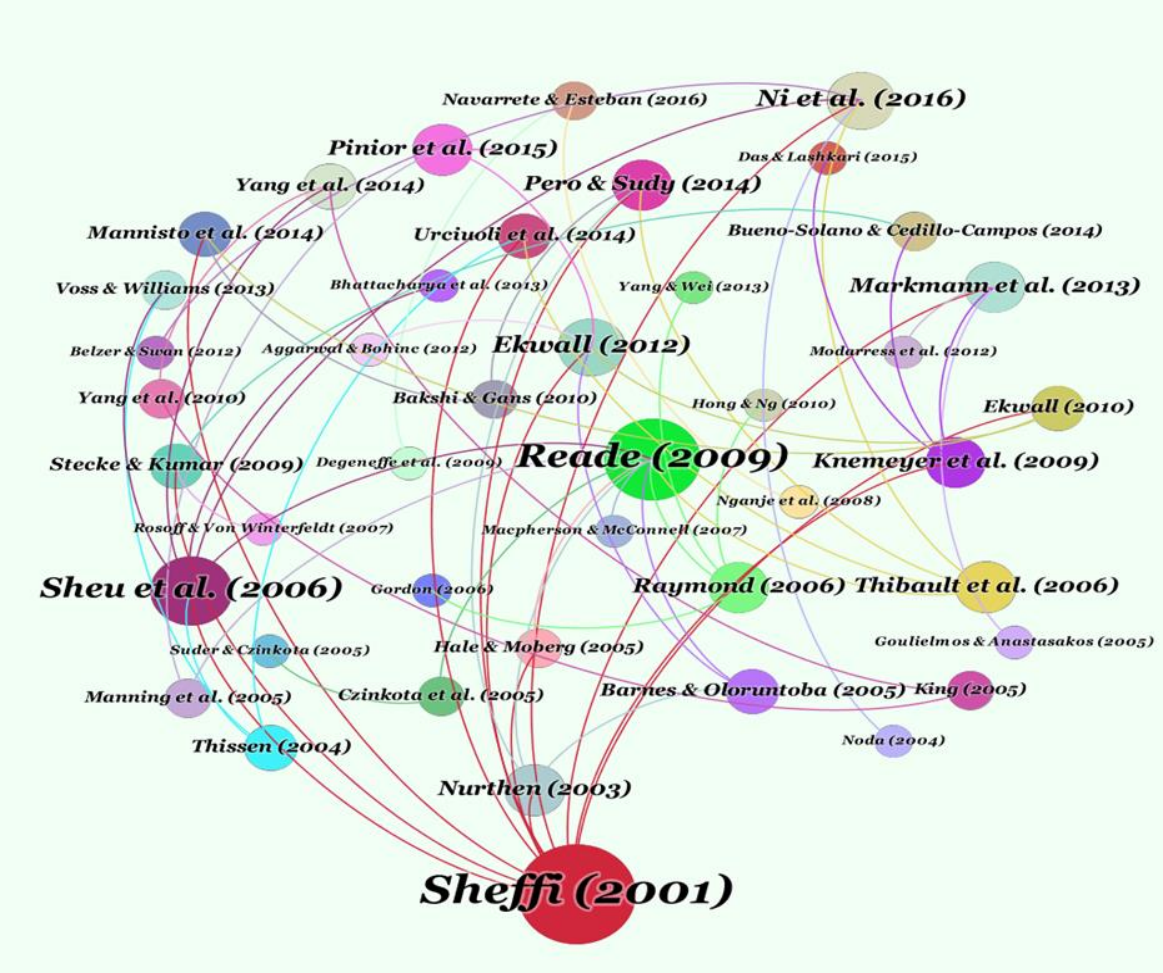
Source: Author

2.6.2.4- Citation Network Analysis

A new methodology of systematic literature network analysis (SLNA) introduced by Colicchia and Strozzi (2012), which combines SLR with the citation network analysis to reveal dynamics of the research filed. It provides a powerful tool to identify established and emerging areas of literature (Xu et al., 2018).

The results of citation network analysis are presented in Figure 2.8. The network shows the reviewed papers (depicted as nodes in the network) and their related citations (depicted as colour-coded directed links/edges between nodes). The size of node and font represents the number of citations associated with each paper and the colour of edges represents the source paper that is cited in the target paper. This reveals clusters of papers addressing particular topics in the research domain, as summarized in the following paragraphs.

Figure 2. 8: Evaluation of terrorism and SCRM related studies (network analysis)



Source: Author

The most cited paper (Sheffi, 2001) first addressed the topic of terrorism risk in SC management. He discussed the SC investments and re-organization needed to prepare for terrorist attacks in terms of the challenges of dealing with the aftermath.

Certifications

The second most cited paper is by Sheu et al. (2006). They examined several cases to determine how certifications such as the Customs-Trade Partnership against Terrorism (C-TPAT) affect international SC collaborations. The third most cited paper was by Thibault et al. (2006). Their findings suggested that the new SC security measures created stronger public–private collaborations.

Similarly, Voss and Williams (2013) investigated the C-TPAT programme and found that it encourages firms to voluntarily improve their security competence and their SC partners and C-TPAT certified firms have better performance in terms of security performance, firm performance, and resilience than noncertified firms. Ni et al. (2016) found that early adopters of C-TPAT were not driven by economic benefits but rather by the need to minimize their exposure to the risks associated with failing to satisfy the goals associated with C-TPAT.

Economic Considerations and Geography

Thissen (2004) examined the increase in transportation costs due to the indirect effects of terrorist attacks on transport infrastructure. He also developed an approach for government to find the most vulnerable economic links in the infrastructure network and proposed to use a spatially applied general equilibrium model in the new economic geography tradition to measure the indirect economic effects. Prentice (2008) provided a qualitative analysis of the benefits of security and developed a taxonomy of security benefits in four dimensions: sovereignty protection, terrorism prevention, interdiction of illegal activities, and personal security. Further, he identified direct and indirect benefits of security and classified them into tangible and intangible.

Further, Knemeyer et al. (2009) developed a process to proactively plan for catastrophic risk events (i.e. terrorism) through an integration of diverse research streams linked to risk management. Bueno-Solano and Cedillo-Campos (2014) studied SC disruptions due to terrorism and their impact on global SC

performance. They found that terrorist attacks can increase current inventory levels by 600 percent due to increased security measures on international borders.

Identification and Management of Risks and Threats

Ekwall (2012) analysed the nature of four antagonistic threats (threats: theft, terrorism, smuggling and piracy) and concluded that antagonistic threats are wicked problems. Reade (2009) found that there is a statistically significant negative relationship between employees' sensitivity to terrorism and employees' attitudes toward the company, team and job.

Czinkota et al. (2005) investigated the association of terrorism with marketing strategy and operations. They found that firm production, distribution, sourcing, pricing, communications, and general business strategy decisions are influenced by terrorism. Stecke and Kumar (2009) studied the robustness and mitigation abilities in SCs. They found that terrorist attacks can increase the vulnerability of US business and developed a catastrophe classification scheme that matches different types of catastrophes with a variety of mitigating strategies. Markmann et al. (2013) quantified man-made risks in global SCs and analysed stakeholder perceptions and communication processes. Degeneffe et al. (2009) studied communication among SC partners and government agencies before, during and after a terrorist attack. They found that "*people can be grouped based on their general attitudes and values in such a way that their diversity can be captured in a simple framework of segments each reflecting striking differences in the level of concern over potential terrorist attack*" (p.365). Pero and Sudy (2014) developed an approach to assist managers in selecting activities, methods and technologies of SC security, without reducing its efficiency. Yang et al. (2014) introduced a novel fuzzy evidential reasoning approach for the quantitative analysis of port facility security assessments. They used the major key security performance indicators and identified current port facility and security assessment practices.

In addition, Männistö et al. (2014) and Urciuoli et al. (2014) identified the most prominent potential security threats to SCs as terrorism, piracy, and wars. They also discussed the comprehensiveness of the portfolio of strategies built by the EU to deal with scarcity issues. Kauppi et al. (2016) studied high operational contingencies risks (terrorism, natural hazard and political instability) in the context of SCI and SCRM. They found that firms in riskier countries used combined

arcs of external SCI and risk management practices and this achieved the best operational performance.

However, the first systematic literature review was conducted by Khan et al. (2018) on terrorism-related risk in the SC. They revealed a number of key themes in the field of SCRM linked with terrorism, relevant mitigation strategies and practices for effective strategic decision making and identified key knowledge gaps in the literature.

Maritime Terrorism and Piracy

Barnes and Oloruntoba (2005) examined the complexity of interaction between ports, maritime operations, SC vulnerabilities, and security initiatives. They suggested the following measurements against terrorism: improving crisis management capabilities within ports, a new classification arrangement for mapping vulnerability within ports and SCs, examining the goodness-of-fit of security initiatives against business efficiency and competitiveness, and training for crisis management capabilities to mitigate the threat of maritime terrorism. In the context of Southeast Asia maritime terrorism, Nguyen (2006) found that piracy and maritime terrorism are a significant risk. They have different motives. Pirates are interested in physical value, while maritime terrorists are following political objectives. In addition, Raymond (2006) found that there are inherent weaknesses existing in the maritime industry that can be exploited by terrorist groups with maritime capabilities to target SCs linked with specific geographical areas.

In addition, Marlow (2010) also highlighted some of the key problems relating to piracy, terrorism, regulatory approaches and economic problems resulting from maritime security measures. Hong and Ng (2010) critically reviewed four international legal conventions (Suppression of Unlawful Acts (SUA), the United Nations Convention on the Law of the Sea (UNCLO), the Proliferation Security Initiative (PSI) and the International Ship and Port Facility Security (ISPS) Code) to address piracy and maritime terrorism. They offered several constructive recommendations to improve legal conventions and their effectiveness in controlling and deterring piracy and maritime terrorism that threatened the security of the maritime industries after 2008.

Agro-Terrorism

Nganje et al. (2008) studied agro-terrorism to identify the security incentives and cost-effective strategies for preparedness and response to terrorism risk in the milk industry sector. They developed game-theory models to evaluate the investments in security measures and found that the assumption of losses due to terrorism risk can forced firms to invest in security measures. Similarly, MacPherson (2008) examined the impact of the U.S. Bio-terrorism Act on Canadian food products exporters. He identified that the Bio-terrorism Act has disrupted cross-border SCs in significant ways, damaged the Canada-U.S. commercial relationship and increased extra shipment and distribution costs. Pinior et al. (2015) suggested a contingency plan and simulation model for agro-terrorism to mitigate the consequences. They found that 39 per cent of the milk producers could minimize the damage through this contingency plan.

Transportation Industry

There is a large volume of published studies investigating terrorism in the transport industry. For instance, Rosoff and Von Winterfeldt (2007) conducted a scenario study (the terrorist attack of radiological dispersal device on the ports of Los Angeles and Long Beach) by using qualitative judgment. They found that the chances of a successful attack were about 10–40% and high radiological amounts would be limited to a relatively small area with limited health effects. However, the financial costs from a shutdown of the ports due to the contamination could result in significant losses in billions of dollars. Cox et al. (2011) studied the resilience of the passenger transportation system toward terrorist threats, using the real-world case of the 2005 London subway and bus bombings. They developed a wide range of metrics, based on flexibility, vulnerability, and resource availability to cope with a terrorist attack. Similarly, Strandberg (2013) studied terrorist attacks targeting rail bound traffic. He provided an empirical overview of the frequency and characteristics of attacks on rail and identified an increase in religiously motivated terrorist attacks on rail. Wang el at. (2014) investigated the environmental changes and project characteristics influence the allocation of security-related Airport Improvement Program (AIP) grants in the aviation industry. They found that the longitudinal distribution of security-related funds differs from other types of transportation funding in terms of their different responses to terrorist and

economic events. In addition, they provided an insight on how the government allocates financial resources to transportation security.

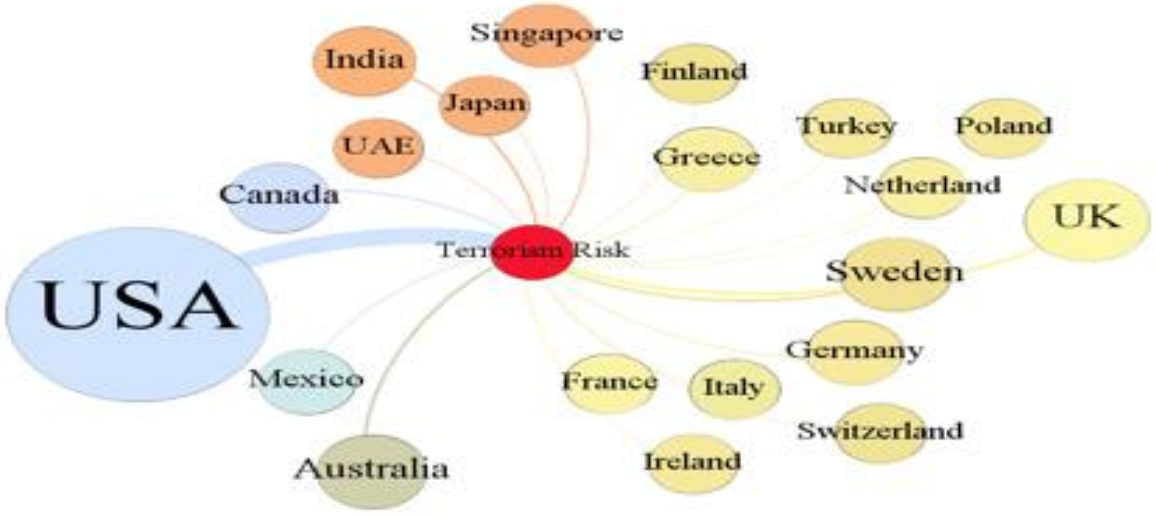
Contributions by Disciplines and Countries

The analysis of the contributions by different disciplines and countries is depicted in Figures 2.9 and 2.10. The findings show that the largest cluster of contributions originated from business schools, mainly focusing on SCRM, SC security, maritime and food SCs. The second largest contribution was from engineering schools. They emphasized energy SCs, SCRM, transportation and SC security. The third largest cluster of contributions was from maritime departments, focusing on SC security in the maritime industry. The rest of the clusters comprised contributions from various social science disciplines, including economics, law, political science, geography, defense and strategic studies. They generally focused on SC security, food, energy and transportation industries.

Figure 2. 9: Contributions by types of schools

Source: Author

Figure 2. 10: Contributions by universities, operating from specific countries



Source: Author

It is notable that the main contributors (business schools, engineering and maritime institutes) historically are not specialised in combatting terrorism. The analysis of the countries that the research is based in shows that US universities comprise the largest cluster (40 percent of the total selected articles 64), followed by European universities (34 percent) with Asian institutions contributing only seven articles. In addition, 28% of articles were funded by government institutions (e.g., United States Department of Homeland Security (DHS) five papers, European Union Seventh Framework Programme three papers and German Federal Ministry of Education and Research two papers).

2.7-Research Gaps

After a critical review of SCRM literature, the following research gaps are identified:

1. According to an analysis of the SCRM literature, more literature is available in American and European contexts. There is clear evidence of a lack of research on SCRM in the context of developing countries, especially in the context of TAR. The gap in this field of knowledge needs further exploration (Stecke & Kumar, 2009; Colicchia & Strozzi, 2012; Shi & Yu, 2013; Ho et al., 2015; Wiengarten et al., 2016; Fan & Stevenson, 2018; Khan et al., 2018).
2. The literature review revealed that a significant volume of research has been conducted to identify risks in SCs and to provide categorisations/ classification of risks that can best describe the features of SC risks. However, the

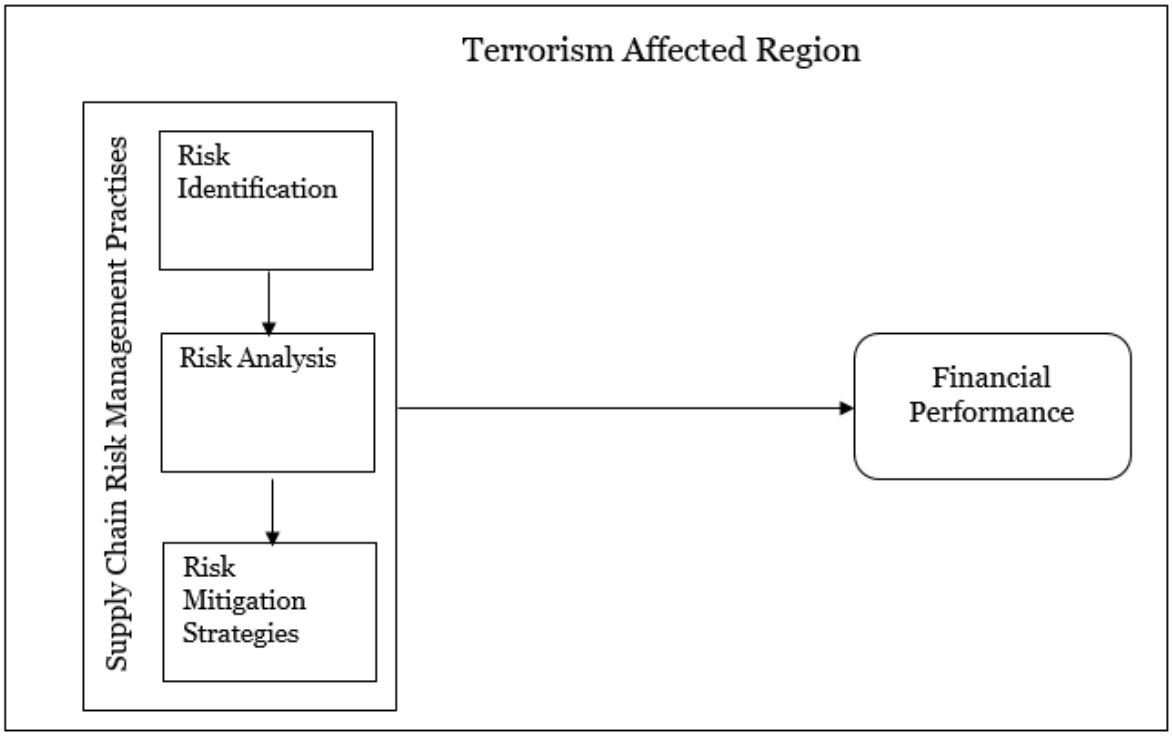
identification of SC risks in TAR is still limited even through numerous studies try to identify risks in SCs. There is need of research to identify the nature and types of SC risks in such an area (Jüttner et al., 2003; Ho et al., 2015; Khan et al., 2018).

3. Most studies in the field of SCRM have only focused on one or two stages of the risk management process. There is need of a holistic approach to identify the SC risks as well as to analyse risk management strategies and their impact on SC performance (Ritchie & Brindley, 2007; Abhijeet et al., 2012; Shi & Yu, 2013; Prakash et al., 2017; Fan & Stevenson, 2018).
4. All the above strategies and frameworks are suggested in the context a more stable environment or low TAR. However, to the best of the researcher's knowledge, none of them was designed or suggested for SCRM in TAR. Therefore, it will be the interest of this study to explore SCRM mitigation strategies and how companies manage the SC risks in such a region (Williams et al., 2008; Stecke & Kumar, 2009; Fan & Stevenson, 2018).
5. Several studies have examined the impact of SCRM on SC performance, but there is still a lack of research and understanding on the relationships between a set of strategies for managing risks and its impact on performance (Colicchia & Strozzi, 2012; Lavastre et al., 2014). Moreover, to the best of the researcher's knowledge, there is a lack of research to examine the SCRM strategies impact on SC performance, especially in TAR.
6. The literature has generally discussed SCM impact on SC performance and a vast volume of literature is available on the SCRM impact on SC operational performance (Cousins et al., 2004). In addition, the majority of studies in SCRM literature are focused on American and European contexts and the context of TAR has rarely been touched and needs further research. Therefore, this knowledge gap needs further exploration on SCRM impact on supply chain FP (Shi & Yu, 2013).
7. Four frequently used data analysis methods are found in the SCRM literature review: Structural Equation Modelling (SEM), event study, correlation analysis, and multivariate regression. However, these methods only interpret the causal relationships among variables. They cannot show whether or to what degree FP is related with SCRM strategies (variables). These decisions about causal relationships are based on researchers' judgment (Shi & Yu 2013). Therefore,

there is a need for more rigorous research method (Manuj & Mentzer, 2008b; Prakash et al., 2017). fsQCA applies both research methods qualitative and quantitative. fsQCA allows the assessment of equifinality and complex causality with multiple contingencies in organizations (Ragin, 2008; Fiss, 2012; Duşa, 2017).

8. A few studies in SCRM literature have adopted the COSO framework (e.g. Zsidisin & Ritchie, 2008; Curkovic et al., 2013; Scannell et al., 2013) . However, little attention has been paid to the COSO framework in the context of a TAR. Similarly, the contingency theory is widely use in SCRM literature. However, these studies were conducted adopted in more stable environments. There is a lack of research on the use of contingency theory in a highly terrorism-affected environment. The conceptual framework of this study is shown in figure 2.11.

Figure 2. 11: Conceptual Framework



Source: Author

2.8-Summary

This chapter has provided the theoretical and conceptual foundation for this study. Specifically, starting from SC risk, SCRM process, SCRM strategies, SCRM performance and FP were explained and discussed. The researcher also discussed the definition, types of terrorism and its effect on global SC. Each concept was explained primarily with definitions and the flow of research conducted. The concept of SCRM financial performance was also introduced because this study involves the relationship between SCRM strategies and FP.

A critical review of the literature shows clearly that SCRM has drawn remarkable attention from researchers over the years. Nevertheless, the researcher found only limited studies have been done on the holistic approach of SCRM process and SCRM FP. In addition, the literature has generally discussed SCRM and FP in low terrorism affected regions. To the best of the researcher's knowledge, there is a lack of research to identify the SC risk, SCRM strategies, and evaluate SCRM strategies impact on FP in TAR. Therefore, further research is needed.

Chapter Three

Background

3. 1 Introduction

This chapter presents the environment of the Pakistani logistics/supply chain industries in the context of terrorist threats. After 2005, the number of terrorist attacks was tremendously increased in this area, which not only escalated civilian fatalities but also increased cost and damage to businesses. Section 3.2 discusses the general economic, social and political indicators of Pakistan, and section 2.3 discusses the current logistics capabilities of Pakistan. The number of global terrorist attacks and frequently targeted civilian and military institutions, and how it such attacks affect the global economy are discussed in section 3.4. In section 3.5, discusses the number of local terrorist attacks, their targets, and identifies the most terrorism-affected areas in Pakistan. The impact of terrorism the supply chain in Pakistan is discussed in section 3.6. Finally, section 3.7 concludes this chapter.

3.2- Economic, Social and Political Overview of Pakistan

Pakistan was established in 1947. Historically, Pakistan was a part of India. Primarily Hindus, Muslims and the British had ruled the area included in the current Pakistan. Pakistan was also the home of the earliest human settlements and six most populous nations in the world. Pakistan is bordered by Afghanistan to the west, India to the east, Iran to the southwest and China in the far northeast. Pakistan also has a coastline along the Arabian Sea and the Gulf of Oman in the south. The economy of Pakistan is the 40th largest economy in terms of GDP in the world (The World Bank, 2018b).

Table 3. 1: Key economic indicators of Pakistan

Key Economic Indicators	Currency / %
Current account balance	-18.8 US $ billion
Imports of goods and services (% of GDP)	17 %
Exports of goods and services (% of GDP)	8 %
Gross domestic product (GDP)	304,951.82 US $ million
GDP per capita	5,527.38 US $
Inflation, consumer prices	3.7 %
Unemployment (% of total labour force)	4 %

Source: The World Bank (2018)

Table 3.1 presents summary statistics for key economic indicators of Pakistan. The existing main economic crisis in Pakistan is the current account balance, since the difference between import and exports of goods and service is nine percent of GDP. Therefore, the value of the Pakistani rupee against the U.S. dollar has decreased due to demand for import payment in dollars. The external debt is also increased in terms of local currency, which increases inflation in the country (The World Bank, 2018b).

With regard to economic indicators such as GDP and per capita income in comparison with other regional countries, Pakistan is better than only Afghanistan, Nepal and Bangladesh. Pakistan has a low inflation rate as compared to regional countries such as Iran, Bangladesh, Sri Lanka and Afghanistan. Pakistan is slightly better than China and Sri Lanka, and far better than Iran and Afghanistan in terms of unemployment (The World Bank, 2018b).

Figure 3. 1: Pakistani Gross Domestic Product (GDP) since 2001

Source: Author (Based on data of The World Bank, 2018)

Figure 3.1 shows percentage growth of Pakistani GDP continuously increased after 9/11 until 2007. This can be explained by a huge American denomination and investment due to Pakistan being a frontline state against terrorism and global financial institutions also rescheduling her debt payments (Husain, 2004). In 2008 and 2009, a huge fall in GDP growth account for two main reasons: The external reason was the worst global financial crisis, which seriously affected not only the developed world's economy but also the developing markets such as Pakistan. This led example, the decline in Pakistan's exports and a slowdown in

foreign direct inflows. The interneral reason was that the macroeconomic environment of country is affected by the rise the in the war on terror (Economic Survey of Pakistan, 2009). However, the GDP growth rate has gradually improved since 2012, which may be an effect of evolution of democracy in the country. Other major factors are better security condition that improved the performance of the services, agriculture and industrial sectors, and low interest rates which contributed to the growth in private sector credit (The World Bank, 2018b).

Political and social indicators affect each country's competitiveness. Table 3.2 provides some of the key social indicators of Pakistan. Social indicators are numerical measures that define the well-being of a country in these key indicators. The social indicators shows that Pakistan has a worst performance in social sector development.

Table 3. 2: Key social indicators of Pakistan

Key Social Indicator	%, No, Year
Corruption	117/180 countries
Ease of doing business	147/190 countries
Rule of law	105/113 countries
Freedom of speech	139/180 countries
Human development	147/188 countries
Population	197 million
Population growth (annual %)	2%
Literacy rate, (% of people ages 15 and above)	57 %
Life expectancy	66 years
People using safe drinking water services (% of the population)	36%
Physicians (per 1,000 people)	0.9 Physicians
Hospital beds (per 1,000 people)	0.6 Beds

Source: (The World Bank, 2018b; Reporters without borders, 2018; The World Justice Project, 2018; United Nations Development Programme, 2018; Transparency International, 2018).

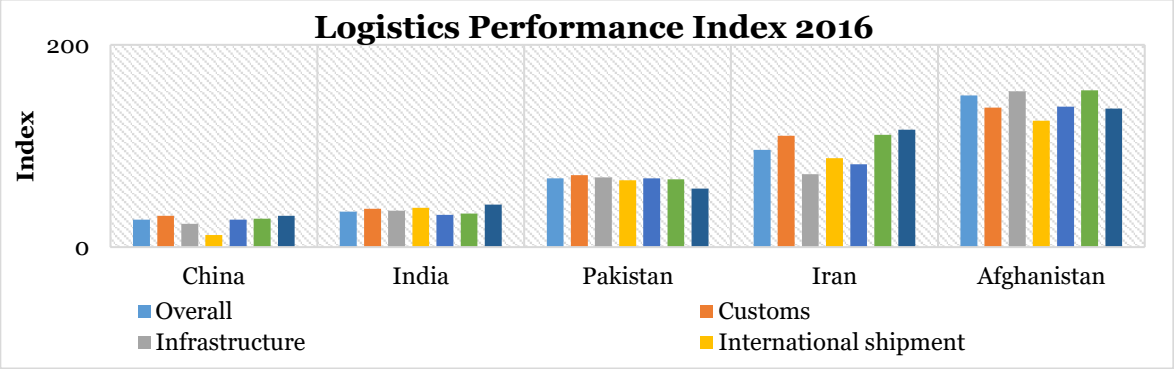
2.3-Pakistan Logistics Industry

The logistics industry plays a vital role in improving the global competitiveness of an economy, as well as in contributing to the efficient running of the supply chain, domestically. A well-organized transport and communication system reduces production and transaction costs in deprived areas, which helps to provide an incentive for domestic trade (Gannon & Liu, 1997). There is a positive correlation between global trade competitiveness and an efficient transport sector (The International Trade Centre, 2012). According to The Global Logistics Market

Research report (2018), global outsourced logistics market will be valued at 15.5 trillion US dollars by the end of 2023, with 7.5 % annual growth.

The geographical location of Pakistan has the potential to reap huge economic benefits as a centre for regional trade (The World Bank, 2015). Central Asia, China, India, and Iran are among the dynamic economies with which Pakistan could connect (Sanchez-Triana et al., 2013). According to the Security & Exchange Commission Of Pakistan (2017), there are 1,598 registered logistics companies in Pakistan, out of a total of 80,700 companies and 983 foreign companies. Nevertheless, the logistics industry in Pakistan is growing very fast. For example, it was estimated in 2008 at 500 million U.S. dollar per year (The World Bank, 2008). In 2015, the logistics industry in Pakistan was estimated at approximately 30.77 billion U.S. dollar (Research & Markets Report, 2016).

Figure 3. 2: The comparison of Pakistani logistics performance with neighbouring countries



Source: Author (based on LPI data Arvis et al., 2016)

Pakistan has the 68th position in the world (among 160 countries) in terms of logistics performance, which significantly improved from 2014 to 2016 by 0.42 points (Arvis et al., 2016). Figure 3.2 illustrates the comparison of Pakistan's logistics performance in terms of performance, customs, logistics infrastructure, international shipment, logistics quality and competence, tracking and tracing and timeliness with neighbouring countries. Pakistan has better logistics performance than Afghanistan and Iran, but poorer performance than China and India. The latter counties are most populous and the larger economies in the world, and have already graduated to the next stage from developing countries. Pakistan is also better in performance than other regional countries such as Nepal, Bangladesh and Kazakhstan (Arvis et al., 2016). China is aggressively involved in the infrastructure development process of Pakistan in the form of the China-Pakistan Economic

Corridor (CPEC) project. China is investing huge amount to build ports, economic zones, roads and highways in Pakistan (Vaswani, 2017). Therefore, it is predicted that it will have a further significant impact on the LPI score and ranking of Pakistan (Ramay, 2016).

Table 3. 3: Key logistics indicators of Pakistan

Key Logistics Indicator	Days, Nos, Million
Time to import	18 days
Time to export	21 days
Container port traffic (TEU)	3 million
Air (transport freight)	249.8 (million ton-km)
Railways (goods transported)	3301 (million ton-km)
Investment in transport with private participation	303 US $ million

Source: The World Bank (2018)

Table 3.3 shows Pakistan's key logistics indicators. The term time to import refers to a country's is lead-time to import goods and services. The import lead-time is one indicator of trade facilitation. In terms of import days, the figure compares favourably with neighbouring countries: Afghanistan has 91 days, Iran has 37 days, India has 21 days and China 21 has days. Pakistan is thus doing better than its neighbouring countries, even better than China and India (The World Bank, 2018b).

The export lead-time refers to the time taken to export goods and services to another country. In terms of export days, Pakistan is performing better than its neighbours in the region (e.g. Afghanistan 86 days and Iran 25 days) in exporting goods, expect India and China. Similarly, container throughput is a measure of the number of containers handled over a period. It indicates the productivity of seaports and it measured by 20-foot equivalent units (TEU). The TEU of Pakistani seaports shows that, Pakistan's container handling capacity is less than that of other regional countries (The World Bank, 2018b).

Air (transport freight) and railways (goods transported) refer to the volumes of freights by air and rail. They indicate that the competence of air and rail in carrying goods. They are measured in metric tons times kilometres travelled. Pakistan is only better than Afghanistan in airfreight. In terms of railway freight, Pakistan capability is low in regional countries. Similarly, in terms of the

investment in transport with private participation, Pakistan is better than Iran (The World Bank, 2018b).

According to the Economic Survey of Pakistan (2017), the transport industry grew by 3.94% in 2016. Transport, Storage and Communication is a sub-sector of the services sector, and it is sharing 22.3 % in the services sector. Overall, services sector is contributing 13.27 % in the total GDP. Besides, logistics plays a significant role in the improvement of economic activities in all sectors of the economy, directly and indirectly. Currently, the logistics sector account for about 2.3 million jobs, 6 per cent of the employed total labour force (The World Bank, 2015).

The major issues in the logistics industry in Pakistan are the following:

- Low quality infrastructure
- Long travelling times and poor reliability
- Lack of enough intermodal connections with railroads in ports and inland distribution centres
- The requirement of border crossing agreements
- Several regulations
- Shortage of trained logistics staff
- Need of coordination between the different participants in the supply chain
- Need of new information technologies and volatility in the business environment, which obstruct the country's economic growth (Sanchez-Triana et al., 2013).

In addition, increased motorization and poor urban planning have resulted in significant traffic congestion in urban areas. These factors reduce the competitiveness of the country's exports and internal trade, increase the cost of doing business, and constrain Pakistan's capability to integrate into global supply chains (Jamal 2011; Sanchez-Triana et al., 2013). The inefficient logistics performance costs Pakistan’s economy 5% of GDP every year (Economic Survey of Pakistan, 2014). There is a growing realization within the Government of Pakistan that the sustainability of economic growth is strongly linked to the efficiency of the transport system (The World Bank, 2008).

The transport freight industry consists of the following modes of transportation in Pakistan: Road, Railways, Air and Sea.

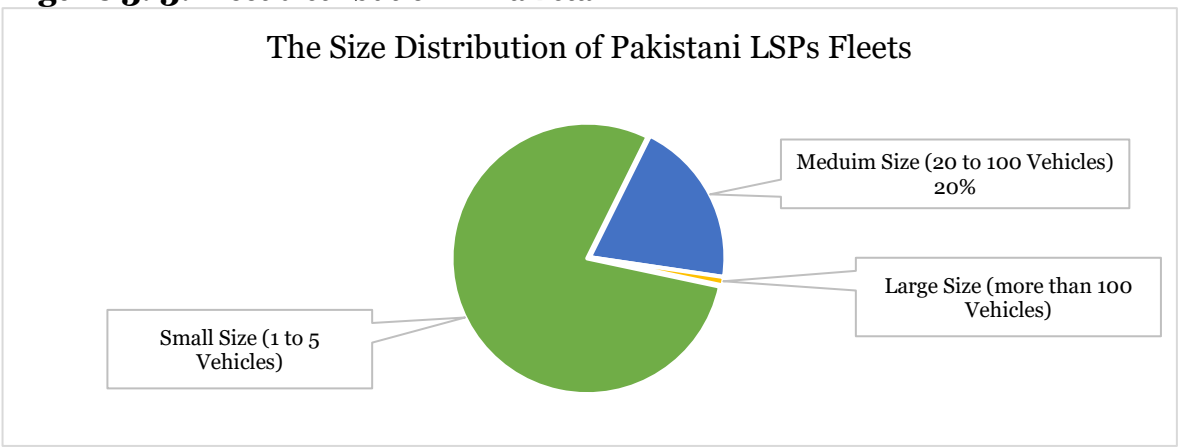
Road

Road transportation is the most significant means of transport of goods within the country and to neighbouring countries. In Pakistan, roads handle over 96 % of total freight traffic (Economic Survey of Pakistan, 2014). The total length of roads in Pakistan is 264401 km. The National Highways network includes 39 motorways, highways, expressways and strategic roads with a total stretch of 12,131 km. The National Highways constitute 4.2 % of the total road network and carry more than 90% of freight traffic. The mainstream of freight traffic moves along the south-north 1,760 km of the N-5 highway, which is Pakistan's longest highway and runs from Karachi to Torkham on the Afghan border (Economic Survey of Pakistan 2017).

Pakistan's road density is low (0.32 km/square km) as compared with other countries in the regional such as Bangladesh (1.7 km/square km), Sri Lanka (1.5 km/square km), and India (1.0 km/square km). There are about 8.8 million vehicles on the road with a growth of 10 per cent annually and the figure is projected to increase to over 70 million by 2030. The road logistics industry is deregulated and mainly dominated by the private sector (The World Bank, 2015).

According to Gallup (2016), the registered freight transport has increased by 73% over the last 15 years. Among the LSPs industry of Pakistan, 79% are small size fleet operators, who generally own fewer than five vehicles. The majority of small operators LSPs are situated in the port city of Karachi and controlled by the Pashtun ethnicity, 20% fleets owned by who have more than 10 vehicles, and 1 % is composed of large companies who have more than 100 vehicles (The World Bank, 2008). Figure 3.3 shows the distribution of fleet size in Pakistan.

Figure 3. 3: Fleet distribution in Pakistan



Source: The World Bank (2008)

During the past 20 years, the revenues per km have decreased in real terms by 1.4 % on average per year (The World Bank, 2006). Many LSPs operate long hours and overloading while travelling at low speeds of 20–25 km per hour, compared to 80–90 km per hour in Europe (Sanchez-Triana et al., 2013). Road freight takes an average of 3-4 days between seaports and the Afghan border or far north of the country (a distance of 1,417–1,929 km).

The Pakistani logistics industry is extremely competitive, characterised by many small operators, low barriers to entry and low freight rates. It also suffers from, long travelling times, low quality and poor reliability, which affect the country's economic growth. In addition, the poor urban planning has caused significant traffic congestion in urban areas. The regional roads also received comparatively little governmental attention. Transport inadequacies and congestions significantly reduce the connectivity between factories and markets (Sanchez-Triana et al., 2013).

According to the latest World Health Organization (WHO) data published on Road Traffic Accident Deaths in the world. Pakistani death toll on road reached to 27,081 or 2.22% of total death, which in relative terms indicates a rate of 15.42 deaths per 100,000 population. Pakistan ranked 104 in the world. In contrast, the observed rates in developed countries range between 3 and 10 deaths per 100,000 residents. However, Pakistani roads are safer than those of neighbouring countries such as Iran (30.32 deaths per 100,000 population and rank 38), India (22.51 deaths per 100,000 population and rank 67), Afghanistan (18.73 deaths per 100,000 population and rank 90) and China (17.50 deaths per 100,000 population and rank 94) (World Health Organization, 2017).

Railways

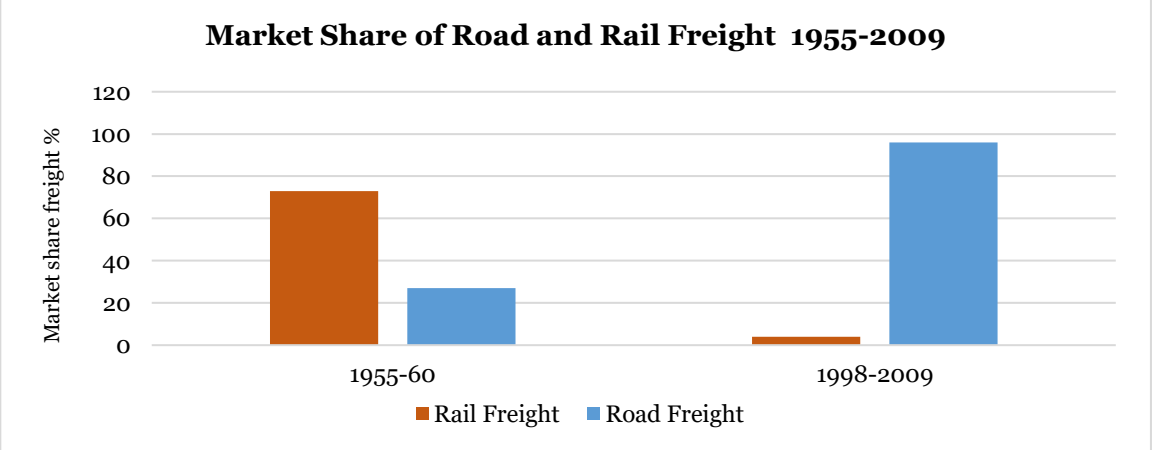
Generally, Pakistan does not rely on the most efficient mode railway for goods transport due to it less complex transportation system and structure of the supply chain. Rail usually has a competitive advantage over road freight for longer distances and for the transport of bulk supplies (The World Bank Group, 2012).

The network of Pakistan Railways (PR) consists of 7,791 km of rail track, 451 locomotives, 1,732 passenger coaches and 15,948 freight wagons. However,

between 1991 and 2011, total rail track length decreased by 11%, from 8,775 to 7,791 km (Economic Survey of Pakistan, 2017a).

Currently, Pakistan railways take 21–28 days to transport goods upcountry at a distance of approximately 1,800 km, which is four to seven times slower than in the United States and China, respectively (Sanchez-Triana et al., 2013). Rail freight inefficiencies are costing the Pakistani economy about 150 billion PKR per year, and low-quality service is affecting Pakistan's regional competitiveness. Rail freight services productivity is roughly one-eighth that of Chinese Railways, one-third that of Indian Railways, and half that of Thai Railways (The International Trade Centre report 2014). Railways were used as a major mode of transportation in Pakistan in the 1960s; they carried 73 % of total freight traffic as compared to less than 4 % by 2011. The rail market share shrank gradually due to government ownership and inefficiency (The World Bank Group, 2012). Figure 3.4 shows a comparison of rail freights and road freights since 1955.

Figure 3. 4: Changes in market share of road and rail freight



Source: (The World Bank Group, 2012)

The main obstacles to Pakistani railway's (PR) efficiency are the lack of good railway infrastructure, equipment and advance technology, which causes significant logistics inefficiency, safety hazards and longer lead-time. First, the most of the PR is outdated with low-speed wagons. Second, the railway's telecommunication and signalling system are old-fashioned and cause delays as well as safety hazards. In addition, other major deficiencies in PR are subsidization of passenger services by freight and of the non-core network by the core network, running several unnecessary lines, non-offering supply-driven services, and failure

to downsize staff, streamline operations, and failure to reduce costs and tariffs (Sanchez-Triana et al., 2013).

Air

Pakistan has continued growth in air transportation. Pakistan has 44 operational airports, although only eight of them are service international flights. Approximately, 15 million air passengers use these airports annually. There is one major public sector airline, Pakistan International Airlines (PIA) and a few private airlines (The World Bank, 2015).

PIA came into existence in 1955. Currently, it operates to 50 destinations, including 28 international and 22 domestic. It had 27% of international share and 65 % of the domestic share in Pakistani air market during 2016 (The World Bank, 2015). However, PIA is faced with various challenges such as corruption, mismanagement, increasing competition in the aviation market, fleet constraints, and the law & order situation in Pakistan (Economic Survey of Pakistan, 2017a). Moreover, over the last 16 years, the size of the PIA fleet (from 45 to 38 planes) has decreased by 16% (Gallup, 2016).

The share of airfreight is very low in Pakistan due to outdated cargo-handling facilities, and insufficient parking and landing facilities. According to the Consulting Logistics Group (2006), the frequency of all Pakistan's international airports to Frankfurt is 10 flights per week, while the frequency from Mumbai (India) to Frankfurt is 19 flights per week, including a full freighter (MD-11) that flies three times a week. Therefore, Mumbai has a capacity of 300% more export by air. Similarly, the total capacity from all Pakistani airports to Amsterdam (the centre of European Fresh Food distribution) is four flights per week, while in Mumbai, exporters have access to eight weekly flights.

The air freight dwell times (the time the cargo spends at the port until clearance and the Customs Processing Time) at Pakistani airports are two to three times longer than the actual transport time, a normal delay is 4–7 days. This has a negative impact on the supply chain, such as damaging customer satisfaction and increasing the supply chain costs (Consulting Logistics Group 2006). However, the new Islamabad International Airport is expected to handle an annual traffic of 100,000 metric tons of freight (Sanchez-Triana et al., 2013).

Sea

There are three major seaports in Pakistan: Karachi Port Trust, Port Qasim Authority and Gwadar seaport. Pakistan has also 14 dry ports that can handle high volume of external trade. Port transportation in Pakistan increased by 6% per annum during the 2000-2005, with container traffic recognising the highest growth, at 15% per annum. The sea freight rates for container and bulk cargoes are marginally better to some major markets (The World Bank Group, 2012).

The Gwadar port became operational in 2008. Gwadar port is the largest seaport in Pakistan, with a 50 km seafront and 10,000 hectares of port backup area. The two ports in Karachi can handle more than 83 million tons of cargo, which are 95% of all Pakistani international trade. Karachi port handled the majority of Pakistan's international trade traffic (50 million tons) in 2015-2016 and Port Qasim Authority handled 33.3 million tons' freight traffic in 2015-2016. Similarly, the Gwadar Port has handled around 6.329 million metric tons of dry bulk cargo since 2008 (Economic Survey of Pakistan 2017). Major challenges of seaports are post-customs delays, lack of rail services and logistical facilities to take containers out of the port (Sanchez-Triana et al., 2013).

3.4-Global Terrorism

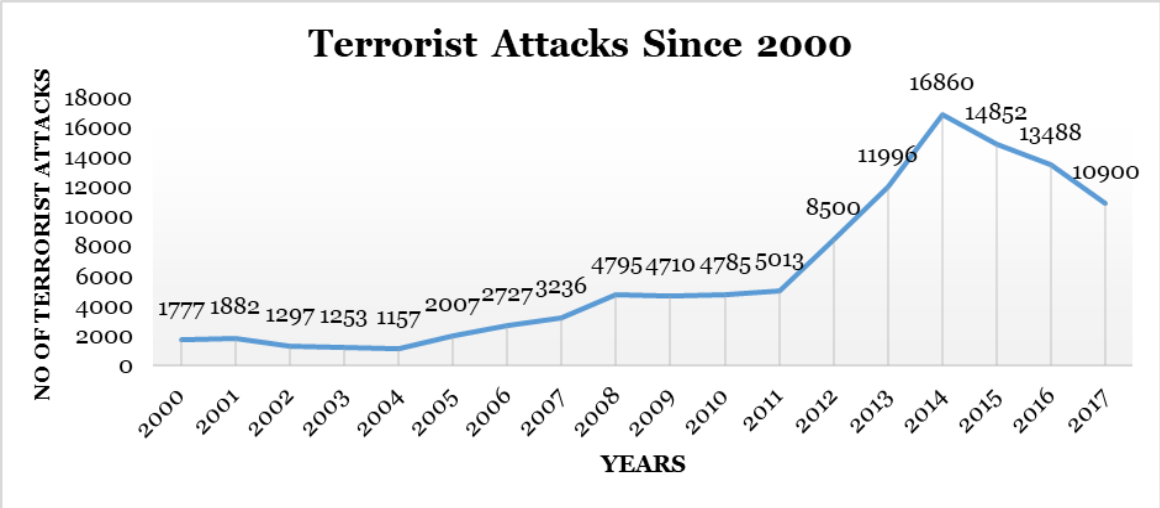
The impacts of terrorism are usually sudden and dramatic. However, they can be conceptualised in at least three distinct clusters: First, the direct impact in terms of lives lost and injuries inflicted. Second, the direct and indirect economic costs or destruction of key assets. Last, are what can be broadly labelled social and political terror, which has a direct influence on the economy of countries and the behaviour of individuals (Hyslop & Morgan, 2014).

The frequency of terrorist attacks in many countries has decreased. On the other hand, they continue to spread to more countries. Figure 3.5 provides a summary of the number of global terrorist attacks in the last 20 years. Since 2008, the number of terrorist attacks has significantly increased and in 2014 reached a peak with 16860 terror incidents. However, terrorism has dropped significantly in the epicentres of Syria, Pakistan, Afghanistan and Nigeria, which are the countries most affected by terrorism and (with Iraq) responsible for three-

quarters of all deaths from terrorism in 2016 (The Institute for Economics & Peace 2017).

After the horrifying 2001 attack in the U.S., the awareness of global terrorism has increased in the world, because it claimed nearly three thousand lives and left more than six thousand individuals injured. The 9/11 total direct cost was US$27.2 billion, including the loss of physical assets (14 billion for private businesses, 1.5 billion for state and local government and 0.7 billion for the federal government) and rescue and clean-up (11 billion). The indirect loss was estimated 5% of annual GDP or half a trillion US dollars (Looney, 2002).

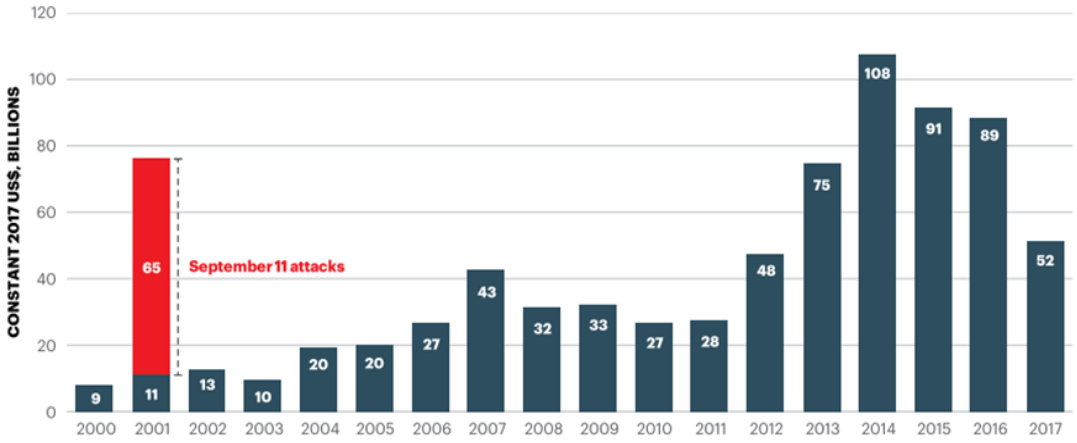
Figure 3. 5: Number of terrorist attacks worldwide since 2000



Source: Author (Based on data of START, 2018).

Terrorism costs billions of U.S. dollar to the global economy. However, the economic cost of terrorism is small relative to other major forms of violence. For example, it was account for only 1 % of the total global violence cost and reached 14.76 trillion US dollar or 12.4% of global GDP in 2017 (Institute for Economics & Peace, 2018). The U.S.A alone has spent or taken on obligations to spend more than 3.6 trillion U.S. dollar on the 'war on terror' in Iraq, Afghanistan, Pakistan, Syria and Homeland Security from 2001 to 2016 (Waston Institue, 2016).

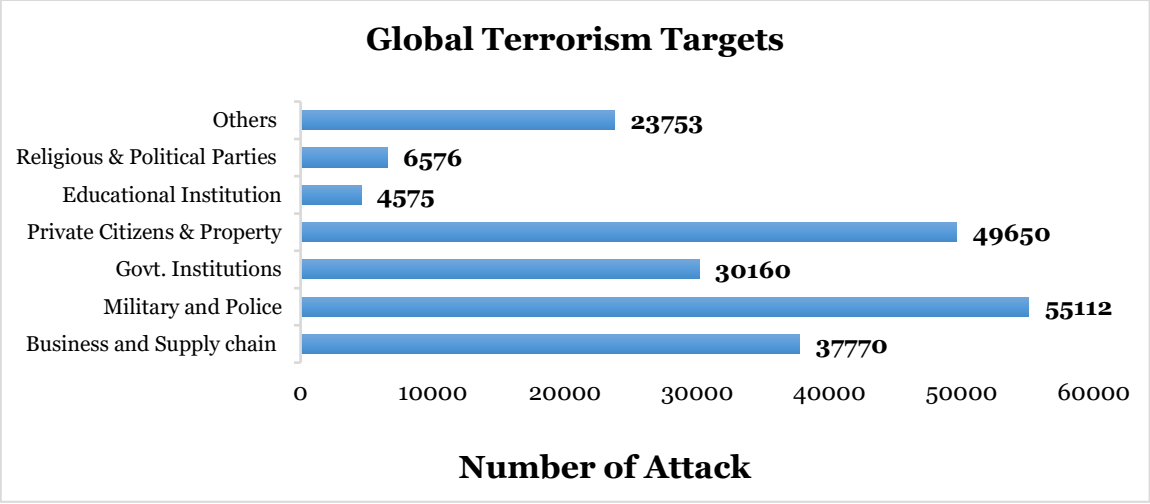
Figure 3. 6: The impact of terrorism on global economy from 2000 to 2017



Source: Institute for Economics & Peace (2018)

Figure 3.6 reveals that there was a sharp increase in the impact of terrorism on the global economy in 2001 and another form 2011 to 2014. Terrorism's indirect impacts are potentially strong and wide-ranging. The indirect costs of terrorism are triggered not only by a terrorist attack itself but also by the reaction of the government's actions and markets. For instance, Toyota, Ford, and DaimlerChrysler faced a huge disruption to the flow of materials into their North-American assembly plants after the 9/11 due to the closure of borders (Sheffi, 2001). However, the estimated figures for indirect cost are conservative, due to failure to consider the indirect impacts on business (declines in buyer demand and interruptions in value and supply chains) investment, new policies, regulations and laws, deteriorating international relations and other costs associated with security measures (Czinkota et al., 2005).

Figure 3. 7: Targets of global terrorism since 1970



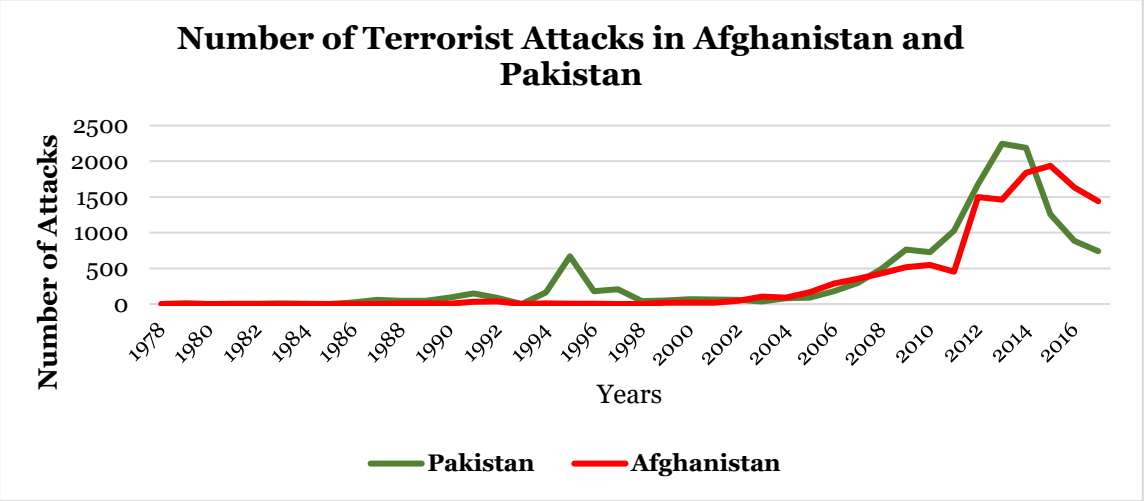
Source: Author (based on START 2018)

Figure 3.7 shows the number of terrorist attacks on different sectors. According to Johnston and Nedelescu (2006), terrorism has increasingly shifted from military targets to civilian targets, including individuals and business activities. For example, 4,522 terrorist attacks targeted military and police as compared to 8,966 attacks on private citizens and civil properties, business and supply chain, other government institutions and political and religious parties in 2016. Since 1970, 31,196 terrorist attacks have targeted businesses, transportation, maritime, airports and aircraft. The number of deaths in terrorist attacks on business and the supply chain is approximately 2,000 deaths and it accounted for 7% of deaths of all attacks in 2015 (START 2018).

3.5-Terrorism in Pakistan

Terrorism has been an evil act common and conducted daily over the last three decades and has been responsible for the physical and or structural violence experienced by many people in Pakistan. According to the Global Terrorism Index (2017), Pakistan is among the top ten most terrorism affected countries in the world. It is droped to fifth in 2017, from second in 2014. In terms of fatalities, there were 956 deaths from terrorist attacks in 2016, which is the lowest number since 2011. This is a 12% decrease from 2015 and a 59% decline from the peak in 2013. Similarly, 153 suicide attacks happened in South and Southeast Asia and 93% occurred in Afghanistan and Pakistan in 2016. The majority of terrorist attacks are along the Afghanistan and Pakistan border. However, there has been a 20% increase in attacks in the north of Pakistan, which reflects the presence of the Taliban in that area. Terrorism in Pakistan is now at its lowest level as compared to 2006. Pakistan was the sixth deadliest country with 1,086 deaths in 2015. However, the number of deaths decreased by 12% in 2016 as compared to the previous year (The Institute for Economics & Peace, 2017).

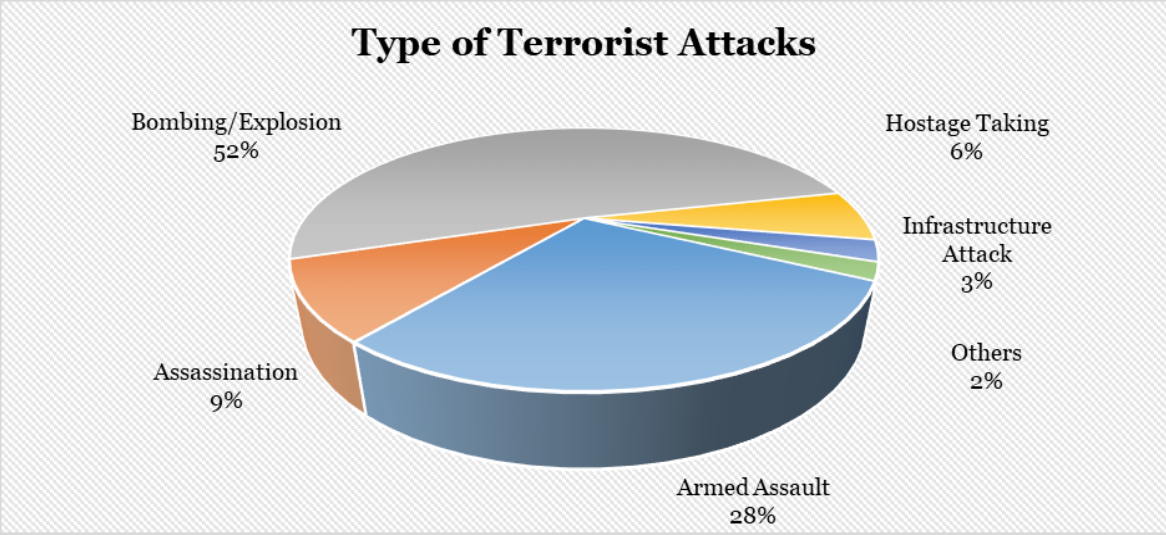
Figure 3. 8: The terrorist attacks in Afghanistan and Pakistan from 1978 to 2017



Source: Author, Based on START data (2018)

Figure 3.8 reveals that there has been a sharp drop in terrorist attacks after 2014. The reductions in deaths and number of attacks have been significantly associated with two factors: First, the Tehrik-i-Taliban Pakistan (TTP) alone has been responsible for at least 4,500 deaths of Pakistanis, which account for over half of all deaths from terrorism by known groups. They were also responsible for 283 deaths in 2016, which is 30 % of total deaths from terrorism (The Institute for Economics & Peace, 2017). The Pakistani Army started a military operation in the Federally Administered Tribal Areas 'Zarb-e-Azb' against TTP in mid-2014, which destroyed the TTP's sanctuaries in the north of Pakistan or pushed them deep into Afghanistan. Second, the Karachi port is main hub for trade and handles more than 90% of the international trade of Pakistan. This metropolitan city is notorious for political target killing as well as religious terrorism. In 2015, a military operation was started, which restored law and order in the city (Economic Survey of Pakistan 2017).

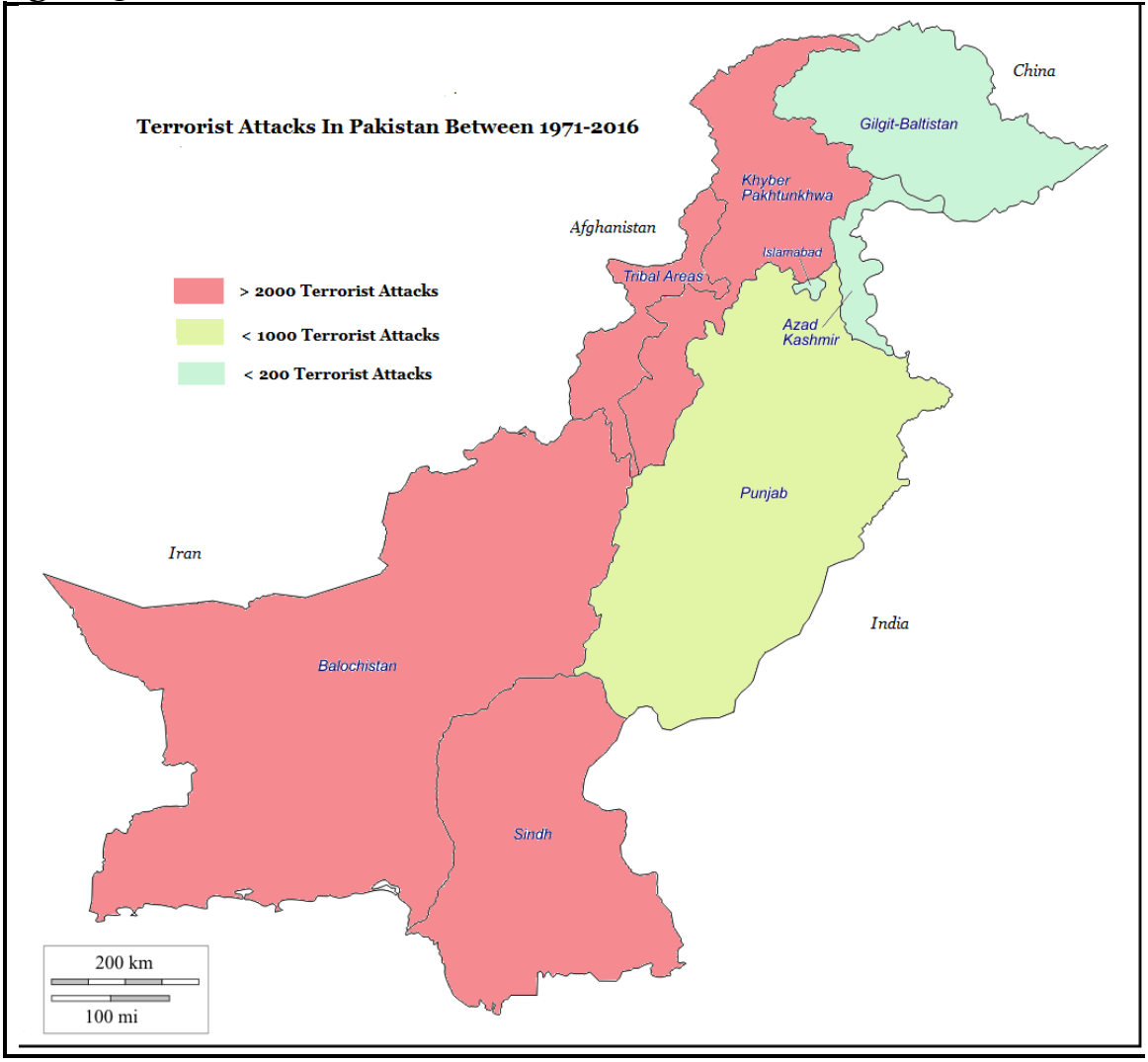
Figure 3. 9: Type of terrorist attacks in Pakistan



Source: Author based on START data (2018)

Figure 3.9 indicates that more than half (7,259 cases) terrorist incidents occurred in form of bombing/explosive (suicide attacks, the improvised explosive device (IED), and missiles attacks), followed by 3,952 incidents of armed assault (firearm, incendiary, or sharp instrument). The rest of 2423 terrorist incidents happened in form of assassination, infrastructure attacks, hijacking and hostage taking (kidnapping) and unarmed assault (START 2017).

Figure 3. 10: Distribution number of terrorist attacks in Pakistan



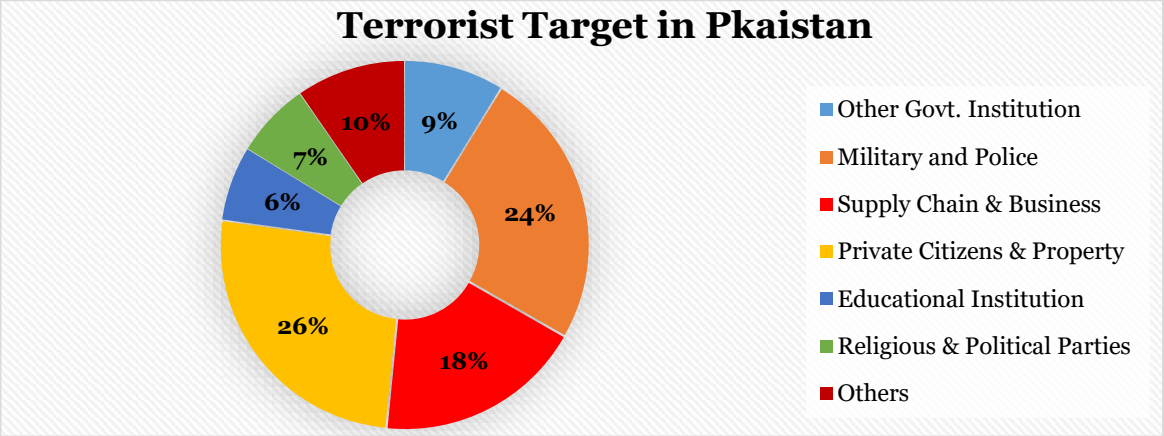
Source: Author (based on START data 2018)

Pakistan is divided into four provinces and four areas administered directly by the federal government for historical and administrative reasons. As shown in figure 3.10, the four provinces include the Punjab, Sindh, Khyber Pakhtunkhwa and Baluchistan, and the federally administered areas are Islamabad Capital Territory, Tribal Areas, Gilgit-Baltistan and Azad Kashmir. Since 1970, terrorist incidents have mostly occurred in the four provincial capitals—Karachi (2616, 19%), Peshawar (881, 6%), Quetta (775, 6%) and Lahore (222, 2%) and the country capital Islamabad (134, 1%). Figure 2.10 also highlights that the Tribal areas, Sindh, Khyber Pakhtunkhwa and Baluchistan were the most terrorism-affected areas as compared to Punjab, Islamabad, Gilgit-Baltistan and Azad Kashmir.

According to START (2017), there are 82 terrorist groups involved in terrorism, with four types of motives; sectarian, ethnic, political and religious. The language-

based and race-based terrorist groups are mainly based in Sindh (especially in Karachi) and Baluchistan, while the sectarian and religious terrorist groups operate all over Pakistan.

Figure 3. 11: The distribution of Terrorist targets in Pakistan



Source: Author based on START Data (2017)

The results obtained from the START database in terms of the terrorist targets in Pakistan are summarised in Figure 3.11. Attacks on private citizens and property remained in first place with 3,693 terrorist incidents against them. Security forces (police and military) were the second important target for terrorists, with 3,531 incidents. Businesses and the supply chain were the third favourite target for terrorists, with 2,637 incidents. Mehtabdin et al. (2013) conducted a study on the business climate in Pakistan, which indicated that the business climate of Pakistan is very risky in nature and confronting a number of random threats including terrorism. Businesses and the supply chain were probably targeted for two reasons: they are a soft target and unprotected, and they are easily available in large numbers.

Similarly, educational institutions, religious & political parties and other government institutions were terrorists attacked. Educational institutions (especially girls' schools) are targeted because the Taliban believe that their education is un-Islamic. Equally, the Taliban target music and barbers' shops because they believe that listening music and shaving off one's beard are against Islam. Other organisations and individuals such as journalists and media, tourists and Non-Government organizations (NGOs) were also targeted.

3.6-Terrorist Attacks on Supply Chain in Pakistan

The U.S. mainly relied on Pakistani supply routes to continue the war on terror in Afghanistan. Approximately 75 % of all NATO and U.S. supply chain (including fuel, food, construction material, and unit equipment) for Afghanistan, moved overland through Pakistan (Rondeaux & Pincus, 2008). Usually, the U.S. containers reach Karachi and Bin Qasim seaports and then are transported by land with the help of Pakistani LSPs companies and the National Logistics Cell (a Pakistani military-controlled transportation company). However, Pakistan does not permit U.S. military containers to discharge or upload military cargo at Pakistani port facilities (Ryan, 2009). Pakistani supply routes to Afghanistan are unreliable and vulnerable due to terrorism (Eshel, 2009). A few large terrorist attacks on the supply chain in Pakistan are presented in Table 3.4.

Table 3. 4: A few large terrorist attacks on the supply chain in Pakistan

Year	Terrorist Events	Source
2008	44 trucks & 220,000 gallons of fuel lost due to attacks	Solis (2009)
2008	23 commercial trucks destroyed in Tribal Area	Ryan (2009)
2008	Insurgents set fire to 40-50 oil tankers	Rondeaux & Pincus (2008)
2008	160 trucks destroyed at two terminals in Peshawar	Ryan (2009)
2008	Destroyed military helicopter engines valued $13 million	Rondeaux & Pincus (2008)
2009	130 Pakistani drivers killed and 450 trucks destroyed	Gulati, 2012
2010	Insurgents set fire to 30 oil tankers in Islamabad and killed six drivers	U.S Congress Report (2010)

Source: Author

The U.S. Transportation Command reported that allow 15% supply chain losses in Pakistan due to high security risk in that region (M. Gulati, 2012). Similarly, the U.S. Transportation Command reported that the ground logistics suffered more than 1,100 terrorist attacks in 2010 (Schwartz et al., 2012). Figure 3.12 reveals the significance of terrorist attacks on the supply chain in this region.

Figure 3. 12: NATO supply trucks scorched by insurgents

Source: news.com.au

3.7-Summary

This chapter has provided an overview of the context of this study, in particular, the social, economic and political condition of Pakistan, comparison with other regional countries. Then, it has presented the logistics capabilities and resources (land, sea, air and railways) of Pakistan compared with those of neighbouring countries and its location significance in the global supply chain.

Specifically, after the 9/11 attacks, global terrorism was dramatically increased, leading the U.S.A to start a war on terror. Pakistan is a frontline state against terrorism. This chapter discussed and analysed the number of global terrorist attacks and their effect on the world economy. Similarly, it discussed and classified terrorist attacks in Pakistan in terms of the types of terrorist attack, terrorist targets and most terrorism affected areas in Pakistan. In addition, this chapter has discussed terrorism impact on logistics /supply chain activities in Pakistan. It is significant to understand this highly terrorism affected context for effective SCRM practices and their impact on FP. The next chapter describes how empirical research was designed and conducted in order to address the research gaps.

Chapter Four

Methodology

4.1-Introduction

The purpose of this chapter is to describe the methodology for this study. Following the introduction, it restates the research questions and aim. Section 4.2 presents the research design, philosophical paradigms, research approaches and methodological choices. Research methods, data collection techniques and qualitative data reliability and validity for the exploratory study are discussed in section 4.3. Section 4.4 presents the research method, data collection techniques and quantitative data reliability and validity for the confirmatory study. The research ethical issues for this study are discussed in section 4.5. Sections 4.6 and 4.7 discuss the time horizon and the use of research triangulation. The last section provides a summary of the methodology.

4.1.1-Research questions and aim

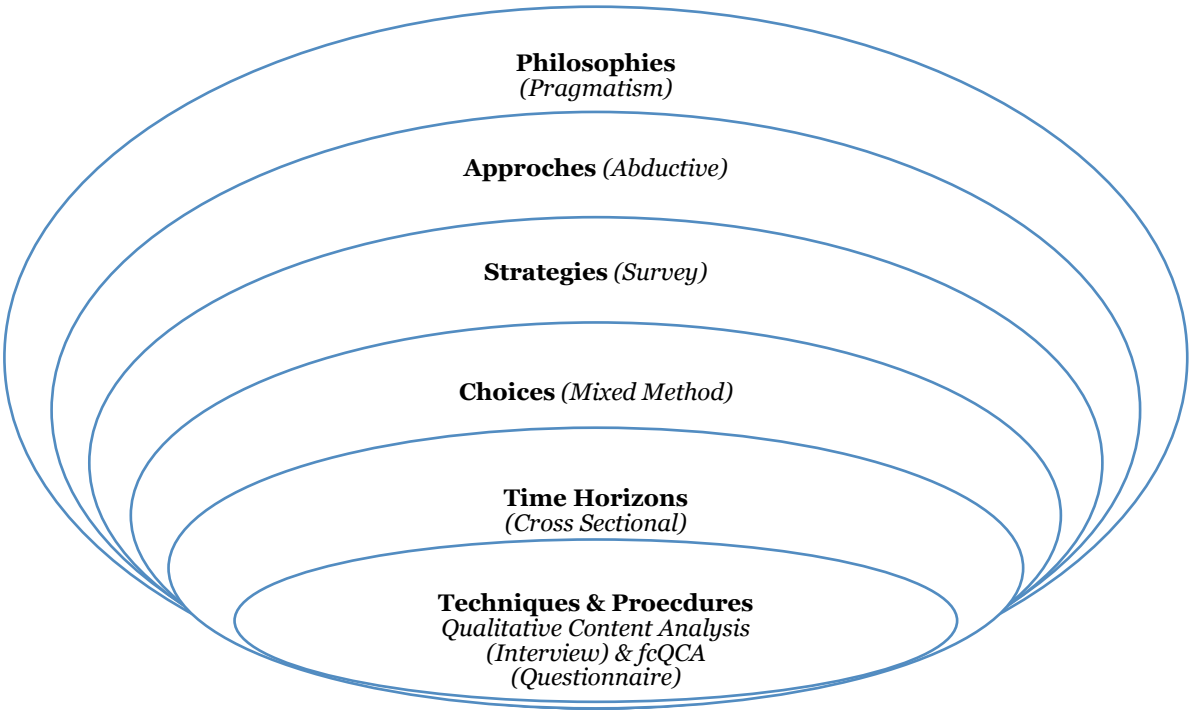
- **RQ1:** *What is the current state-of-the-art in SCRM literature on terrorism risk?*
- **RQ2a:** *What are the supply chain risks in a TAR (Pakistan)?*
- **RQ 2b:** *What are the most frequent risks to the supply chain in that region?*
- **RQ 3a:** *What are the SCRM mitigation strategies employed by the firms in that region?*
- **RQ 3b:** *What are the main risk management strategies to be considered?*
- **RQ 4:** *What is the impact of the SCRM strategies on firms' financial performance?*
- **RQ 5:** *What is the impact of the war on terror on logistics service providers in that region?*

The main aim of this study is to determine the impact of SCRM strategies on firm's FP in a TAR. To achieve this, the study addresses all four phases of the SCRM process, namely, risk identification, risk analysis, risk mitigation and the outcomes of SCRM practices. Moreover, this study identifies the impact of WoT on local logistics industry.

4.2-Research Design

Research design is defined as a "*plan of study used as a guide in collecting and analysing data*" (Churchill, 1999:29). McDaniel and Gates (1999) said that it is the scheme of the research that aims to discover the answer to the research questions and test hypotheses. It assists the researcher to outline the research and type of exploration. Therefore, research design is a sequence of tasks which directs the data collection and analysis technique to answer the research questions (Bryman & Bell, 2007). Saunders et al. (2009) presented a comprehensive framework for research, which was selected for this study. The framework, and the research choices made for each element, are shown in Figure 4.1.

Figure 4.1: Overview of research design



Source: Adapted from Saunders et al. (2009).

4.2.1- The Philosophical Stance

Maylor and Blackmon (2005) define the research philosophy as the logical questions that assist the researcher in the selection of methodology and approach. Therefore, deciding the philosophy is an important research task that guides the researcher on how to conduct the research, collect data, and analyse it. There are two major ways of thinking about research philosophy: Ontology and Epistemology. Further, both these philosophies can eventually decide and

influence the subject being researched and interprets into four different world-views such as positivism, interpretivism, realism, pragmatism (John W. Creswell, 2013).

Ontology

Ontology deals with the "*nature of reality*" and questions whether reality is outside social actors or they construct it. Bryman (2008) said that it is the understanding of knowledge in the social context. Further, Saunders et al. (2009:110) stated that "*this raises questions of the assumptions researchers to have about the way the world operates and the commitment held to particular views*". Ontology has two extreme positions: Subjectivism or Constructionism and Objectivism. Objectivists assume that reality is objective, external and already exists. In contrast, subjectivists behave that reality is socially constructed by social actors and needs to be interpreted in the contemporary context of social actors (Bryman & Bell, 2007). According to Oral and Kettani (2015:296), in supply chain management, "*ontological assumptions define our world of SCM as a general knowledge framework, and epistemological assumptions and the knowledge created through them create the perceived reality of SCM*".

The philosophical stance of this study is an objectivist ontology. This study concerns many variables, such as SC risks, SCRM strategies and FP; these are objective research concepts that affect firm performance. The application of theories from related fields needs deductive testing. The SCRM field has a tradition of practice-oriented and solution-based research. Therefore, it needs to explore applicability and generalizability, which are conditions of the objectivist paradigm. Research on tangible resources, such as supply chain and logistics networks links SCRM to natural science.

Epistemology

Epistemology concerns the nature of knowledge and questions what can be known or should be regarded as acceptable knowledge (Bryman & Bell, 2007). According to Creswell (2003), it is a question of "*how we know it*". Epistemology deals with what kinds of knowledge can be constructed and what is believed as true and valid (Burrell & Morgan, 1979). Epistemology is also divided into two main different streams: positivism and interpretivism. The positivist approach began in the late

19th century when people rejected metaphysical theory and stressed the need for scientific research. Positivists believe that knowledge is only acceptable when a phenomenon is quantifiable, measurable and testable. Positivism adopts the natural science methodology (Bryman & Bell, 2007). In other words, positivists only acknowledge that knowledge which is acquired through scientific experimentation. They argue that researchers should study social phenomena in the same fashion as natural scientists do (May, 2011). Benton and Craib (2001:23) said that positivists accept scientific methods in social science and further summarised the features of positivism as follows:

- The empiricist account of the natural sciences is accepted.
- Science is valued as the highest or even the only genuine form of knowledge.
- Scientific method, as presented by the empiricists, can and should be extended to the study of human mental and social life, to establish these disciplines as social sciences.
- Once reliable social scientific knowledge has been established, it will be possible to apply it to control, or regulate the behaviour of individuals or groups in society.

However, Positivists frequently apply statistical methods to analyse causal relationships among variables. On the other hand, interpretivists believe that social actors create knowledge of phenomena in their context and the researcher needs to interpret the subjective understandings of those social phenomena in their context to create knowledge (Saunders et al., 2009). In other words, interpretivists attach weight to the relationships of human beings within the social world.

According to Saunders et al. (2009:598), pragmatism a position that *"argues that the most important determinant of the research philosophy adopted is the research question, arguing that it is possible to work within both positivist and interpretivist positions. It applies a practical approach, integrating different perspectives to help collect and interpret data"*. It emphasises on common sense, practicality and reactions. In addition, researchers believe that a problem can be resolved by selecting different techniques, methods and procedures. Thus, it brings the concept of a mixed method (a combination of qualitative and quantitative research). It rejects the traditional dualisms (objectivism and subjectivism) and believes that research is influenced by the social, historical, political as well as other

contexts (Creswell, 2013). Jackson (1987) said that it suggests a better paradigm for management science.

This study have been based upon pragmatism (Tashakkori & Teddlie, 2003). Because of research questions are the most central factor of the philosophical stance and two epistemology or ontology positions may be suitable for answering particular questions in the this study (Saunders et al., 2009). For example, this study adopted qualitative method to explore SC risks and strategies, which deals with interpretivism paradigm. In contrast, it might have been based on positivism epistemology because, first, this study seeks to explain causality of SCRM strategies with FP. Second, the concepts are operationalized. Third, a generalisation of research is followed through statistical probability. Last, a large sample size is required (Easterby-Smith et al., 2002). Such a stance is consistent with dominant trends in this field of research. The SCRM literature contains a significant amount of operations research that is frequently grounded in the engineering fields and the positivist paradigm. In addition, the researcher believes that supply chain risk, strategies and FP are objective entities and so an objectivist positivist stance can best answer the research questions.

Axiology

Axiology deals with the researcher's beliefs, culture and values, and their influence on the study. Heron (1997) said that the researcher demonstrates axiological aptitude by clarifying his values about research and how he goes about doing it. Saunders et al. (2012:116) stated that "*it is the process of social enquiry with which we are concerned here. The role that your own values play in all stages of the research process is of great importance if you wish your research results to be credible"*. Positivists consider that research is value-free and not biased. On the other hand, interpretivists argue that beliefs, values, and culture cannot be separated from the researcher, and for that reason research is biased (Denzin & Lincoln, 2000).

With regard to axiology, there are three issue, which can significantly influence the exploratory part of this study. First, the researcher is a follower of Islam. The religion of Islam presents two main foundations of absolute reality to its followers: the Quran and the 'Sunnah and Hadith' (sayings and doings of the Prophet of Islam). Followers of Islam are strongly instructed (without any question) to follow

these two foundations, as an absolute reality. However, Muslims also adopt Ijma (a brainstorming process of Muslim scholars to confront multifaceted issues in Islam and provide new solutions). Generally, Ijma indicates a positivist stand. Second, the researcher is from Pakistan, a country that is extremely collectivist and where social standards and values are part of every activity of social life. Further, Pakistani culture reflects beliefs that a single absolute reality already exists, which leads to a preference towards the objective and generalisable stance of the quantitative study. However, with the revolutionary growth in social media, along with the trends toward education and urbanisation, there is a visible change in previous long predominant beliefs and philosophies. Third, the researcher has experience of the logistics industry. The Pakistani logistics industry has extensively suffered from a variety of factors, especially from terrorism during the WoT. The researcher has seen terrorist attacks on SC, fire, use of child labour, underpaid workers and workforce discrimination.

The above argument shows that the researcher has bias and a value-laden approach to study on SC from a risk perspective. Therefore, unavoidably, these biases and experiences will affect the research process. However, in various sections of this chapter it will be demonstrated how the researcher tried to minimise biases in the exploratory phase.

4.2.2-Research Approaches

The above-mentioned philosophical stances further feed into the research approach. Research approaches are largely divided into two types: inductive and deductive. However, Spens and Kovács (2006) mentioned three types of research approaches, namely, deductive, inductive and abductive.

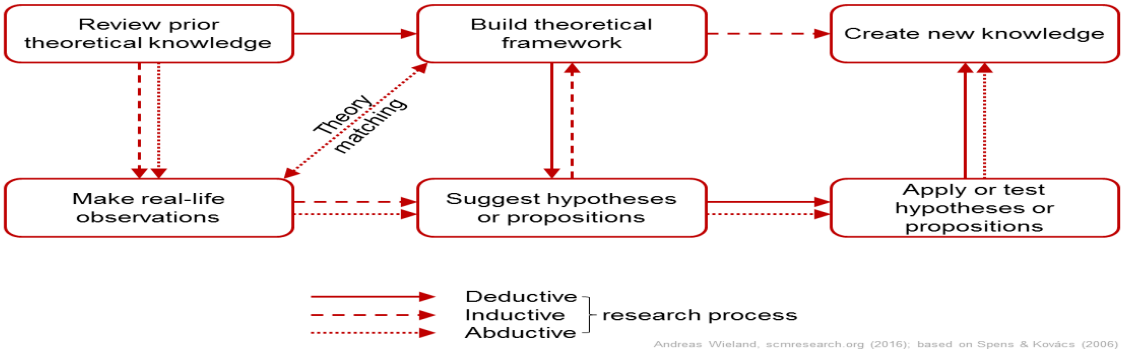
The main aim of an inductive approach is to develop a new theory. In other words, the inductive approach refers to theory building from empirical data. It is strongly linked to the interpretivist paradigm. Usually, the inductive approach adopts qualitative methodologies (Ghauri & Grønhaug, 2005).

The deductive approach is a process of theory-driven reasoning used to explain or predict empirical observations. In other words, it is a theory testing process that validates hypotheses generated from theories. Philosophically, the deductive approach is strongly linked with positivism (Bryman & Bell, 2007).

The inductive approach examines a research topic in the actual context, exploring qualitative data observed through observations or interviews. On the other hand, the deductive paradigm employs quantitative data. However, the key difference between the approaches lies in what comes first, data or theory (Saunders et al., 2009).

The abductive approach is an iterative, theory-matching process that travels back and forth between theory and empirical study (Spens & Kovács, 2006). It differs from a deductive approach in that it drives to know a phenomenon from a new conceptual background (Dubois & Gadde, 2002). On the other hand, it also differs from an inductive approach because it aims to form a new theory through a theory testing process (Spens & Kovács, 2006). Figure 4.2 provides a comparison of the three approaches.

Figure 4.2: Deductive, inductive, and abductive approaches to research



Source: Adopted from Spens & Kovács (2006)

Authors on research methodology ague that there is no right or wrong approach. Therefore, the selection of an approach depends on the researcher; however, it is partly determined by the nature of the research, the researcher's philosophical position and the aim of the research (Collis & Hussey 2009).

This study adopted the abductive approach, which combines both inductive and deductive reasoning, following the advice of Spens and Kovács (2006), who suggest that the concept of abduction can generate the development of new theories in this discipline. They also argue that the reason why the SC discipline does not have a rich legacy of theory development is mainly due to its established deductive approach. From the perspective of the abductive approach, it is very reasonable to mix both qualitative and quantitative strategies.

4.2.3-Metholodogical Choices

Research methods are selected to meet the research objective and to answer the research questions (Saunders et al., 2012). According to Creswell (2003), there are three research methods; qualitative, quantitative and mixed methods. Bryman and Bell (2007) argued that there are only two methods, quantitative and qualitative, explaining their distinctive features in the research design and data collection methods.

Qualitative Research

Creswell (2003:20) described the qualitative approach as characterized by "*participatory knowledge claims, narrative design, and open-ended interviewing".* According to Bryman and Bell (2007), qualitative method deals with interpretations, subjectivity, explanations, meanings and understanding of social actors in their context. Hence, observations, interviews and questionnaires are the main tools of data collection. Qualitative research method also uses strategies of inquiry such as narratives, phenomenology, ethnography, grounded theory studies or case studies (Saunders et al., 2012). Based on the above-discussed characteristics of qualitative research, the following table 4.1 presents some of the major strengths and weaknesses of this research strategy.

Table 4.1: Strengths and weakness of qualitative research

Strengths	Weaknesses
Open-ended	Qualitative research is too subjective
Dynamic and flexible and thus allows more freedom to researcher	Difficult to replicate due to the unstructured approach to research
Provides in-depth understanding of the research topic	Cannot be generalized because it is impossible to know how findings can be generalized to other settings
Enables intellectual creativity to flourish	Lack of transparency because it does not tells what the researcher did and how the researcher drew conclusions
Generates rich and in-depth database	Lack of reliability due to interactive or participatory nature of research
Affords an abundant source of ideas	

Source: Gordon & Langmaid (1988) and Bryman & Bell (2007)

Quantitative Research

According to Creswell (2003), the quantitative research approach is associated with post-positivist knowledge claims, an experimental strategy of inquiry, and pre-and post-test measures of attitudes. It involves the collection of numerical data and reveals the relationships between variables (Bryman & Bell 2007; Saunders et al. 2012).

Malhotra (2009) said that quantitative research deals with objectivity; it focuses on the quantification of data and finding frequencies, applies statistical models to draw inferences and seeks causality relationships. The quantitative approach involves a process of hypothesising, theory formulation, preliminary data gathering, data analysing and deductive results (Sekaran & Bougie, 2013). However, the main weakness of the quantitative research is that it gathers only the data asked for in the questions (Partington, 2002). This view is also supported by Teddlie and Tashakkori (2009) who write that quantitative research is less nuanced and cannot fully capture rich discourse between subjects in their natural environment. Table 4.2 compares the difference between the qualitative and quantitative research methods.

Table 4.2: Differences between qualitative and quantitative research

Qualitative Research	Quantitative Research
Concerned with understanding behaviour from actors' own frames of reference	Seeks the facts/causes of social phenomena
Close to the data: the "insider" perspective	Removed from the data: the "outsider" perspective
Grounded, discovery-oriented, exploratory, expansionist, descriptive, inductive	Ungrounded, verification-oriented, reductionist, hypothetico-deductive
Process-oriented	Outcome-oriented
Valid: real, rich, deep data	Reliable: hard and replicable data
Holistic	Particularistic

Source: Blaxter et al. (2006)

Mixed Methods Research

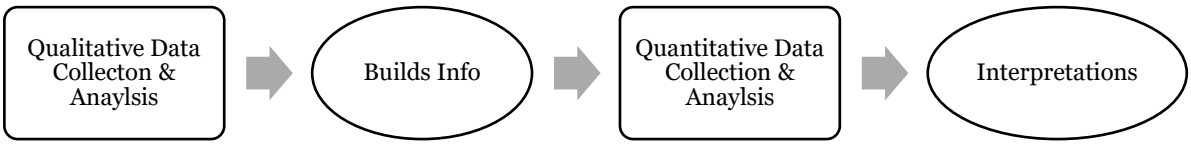
Johnson et al. (2007:123) explained that "*mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches ----for the purposes of breadth and depth of understanding and corroboration*". In other words, it involves the use of qualitative and quantitative data together to acquire a complete understanding of the research questions (Creswell, 2013).

There are many designs applied in mixed methods research. However, Creswell (2013) identified the three most common designs used in social science: first, convergent parallel mixed methods, in which the researcher merges qualitative and quantitative data in order to provide a comprehensive analysis of findings. Second, explanatory sequential mixed methods, which begins with quantitative data collection and analysis of data, and uses these findings as the basis for qualitative research. Last, exploratory sequential mixed methods, which is the opposite of the explanatory sequential design. The design begins with qualitative research to explore the problem, analyses the data and uses the results to construct quantitative research.

The advantage of mixed methods research is to develop a research strategy that is effective in exploiting the advantages of both methods, whilst neutralising the "costs" or "risks" linked with each method (Creswell, 2013). However, qualitative and quantitative data do not merge easily. There are potential difficulties in establishing the validity of mixed methods research (Bryman, 2008).

This study employs a multi-method strategy that combines qualitative interviews and use of a quantitative questionnaire. Mixed methods research was used to explore and analyse the phenomenon of SCRM in the context of a TAR. Creswell (2003:22) supported that "*a mixed methods design is useful to capture the best of both quantitative and qualitative approaches*". The researcher aims to capitalize on the strengths of each method rather than relying only on a single methodology. An exploratory sequential mixed methods design was applied in the study, as shown in Figure 4.3.

Figure 4.3: Exploratory sequential mixed methods design



Source: Creswell (2013)

The qualitative data helped the researcher to explore the social reality of operating in TAR, through managers' perceptions and perspectives, meanings, deep insights and interpretations about the phenomenon of SC risks and SCRM strategies in the region of interest. Then, quantitative data enabled testing of the relationship

between SCRM and FP (Creswell, 2013). Therefore, the researcher divided this study into two phases: exploratory study and confirmatory study.

4.3-Phase One: Exploratory Study

This section explains the research method adopted for the exploratory study to explore the SC risk and SCRM strategies and to identify the impact of the WOT on the local logistics industry; in order to answer the RQ2, RQ3 and RQ5.

4.3.1-Research Interview

The research interview method is widely used in qualitative research and its inherent flexibility makes it attractive (Bryman & Bell, 2007). The interview is usually designed to get answers from interacting with people to answer the research question or problems (Mason, 2002). Easterby-Smith et al. (2002) described the interview as one of the best data collection methods when the research problem is complex and rich information is required for a comprehensive analysis. Although the interview is a widely accepted technique for data collection in business research (Bryman & Bell, 2007). Therefore, this study employed interview to collect the qualitative data.

Interviews can be of different types, especially in terms of the structure and size of the sample, such as structured, semi-structured, and unstructured (Jankowicz, 2000). Table 4.3 summarises the most common types of interviews used in business research.

Table 4.3: Different types of interview

Types of Interview	
Structured Interview	Pre-set questions to be followed in an orderly manner
Unstructured Interview	Does not follow any pre-set criteria
Semi-Structured Interview	Partly involves pre-set questions but remains rather flexible as the interviewer can probe into a topic of interest with follow-up questions
Focus Group Interview	Multiple respondents are asked to develop ideas about a certain topic and the interviewer records the data
Group Interview	Specific questions are asked from a group of people
Computer Assisted Interview (CAI)	Questions are flashed onto the computer screen and interviewers can enter the answer of the respondents directly into the computer

Source: Lowe (2007) and Sekaran & Bougie (2013)

Semi-Structured Interview

There are many types of interview for empirical research. According to Converse and Schuman (1974:53), '*There is no single interview style that fits every occasion or all respondents*'. For instance, structured interviews are more suitable for a questionnaire survey and associated with the positivistic paradigm (Collis & Hussey, 2009), while with unstructured interviews it is difficult to control the range of topics as these are informal and conversational style interviews, leading to difficulty in analysis, especially to compare and contrast (Collis & Hussey 2009). On the other hand, focused group interviews are hard to manage for a sole PhD researcher. Further, it is unrealistic to assume that the type of interviewees that this research is interested in could be available at one time, in one place.

According to Alvesson and Deetz (2000), the semi-structured interview is the most common of all qualitative research methods and a very useful method to obtain deeper insight into the research target, as an exploratory study (Saunders et al., 2009: Bryman & Bell, 2015). It is designed to identify the interviewee's awareness, knowledge, and understanding relevant to the issue (Mason, 2002). The researcher has a list of pre-specified general form questions on a specific issue, which is used as an interview guide. It allows the interviewer to follow any method he or she likes to seek a much greater level of information. It also allows the interviewee to respond in any manner he/she likes (Bryman & Bell, 2007). Similarly, Qu and Dumay (2011) also mentioned some advantages of semi-structured interviews such as flexibility, accessibility, intelligibility, the capability of disclosing important and often hidden facets of human and organisational behaviour. However, the interview is not the primary method for data collection in a quantitative research, but it is frequently used in the pilot study to gather preliminary information before a survey is designed (Qu & Dumay, 2011).

Semi-structured interview was employed for this study to explore SC risk and SCRM strategies in a TAR. Due to the University of Hull health and safety regulation, which did not allow the researcher to collect data personally in a highly terrorism affected area. The researcher employed Skype interview, this has the advantage of extending access to participants and is useful in situations such as wide geographical access, hard to reach populations, and access to dangerous or politically sensitive sites (Opdenakker 2006; Mann & Stewart, 2000). In the next

section, the researcher will describe in detail the sampling of relevant respondents for this study and how data were collected.

4.3.2-Data Collection Strategy

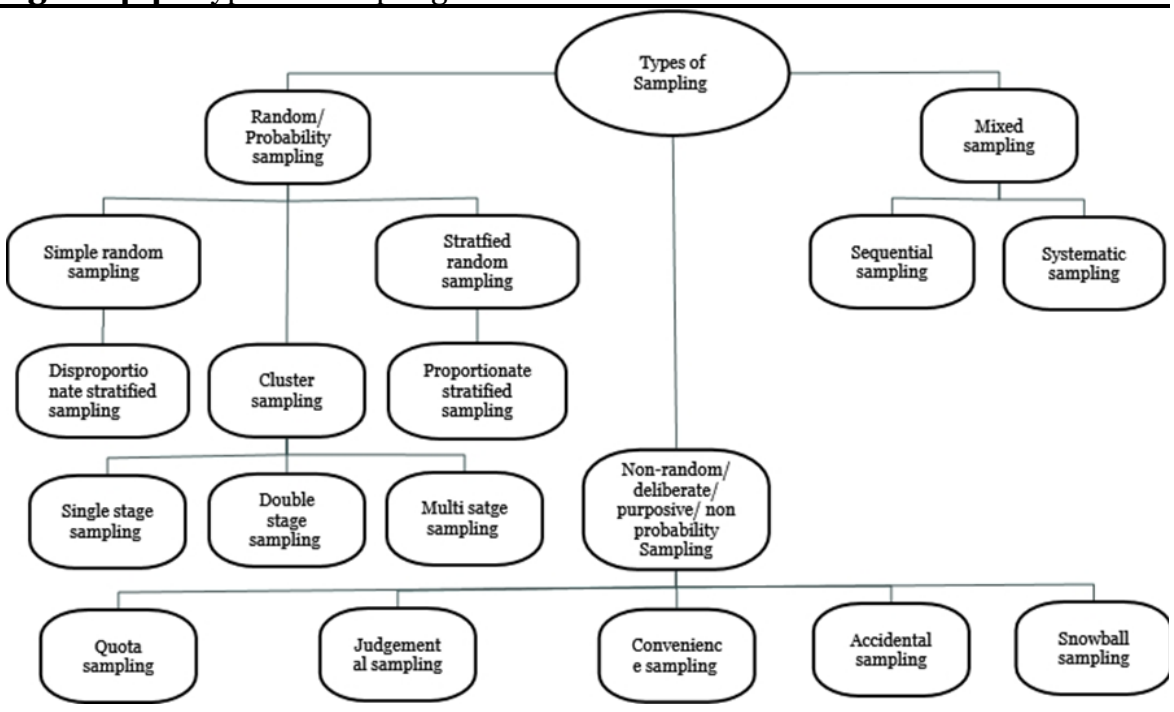
To collect data, the first step is to identify the potential respondents. Below, the researcher first discusses the sampling process in detail, then, how potential respondent were identified.

Sampling and Sampling Techniques

Gupta and Gupta (2011) defined sampling as the process of selecting samples from a targeted population. The selected sample is a subset of the population and represents all properties of the population. It is a systematic process, which involves defining target populations, identifying sample frames, specifying sampling units and methods, determining sample sizes, stating sampling plans and selecting the final samples (Manjunath et al., 2012).

According to Saunders et al. (2012), the choice of sampling technique depends upon the feasibility of addressing the objective of the study. There are three main categories of sampling: random sampling, non-random sampling and mixed sampling (Gupta & Gupta, 2011). Figure 4.4 shows the types of sampling approaches.

Figure 4.4: Types of sampling

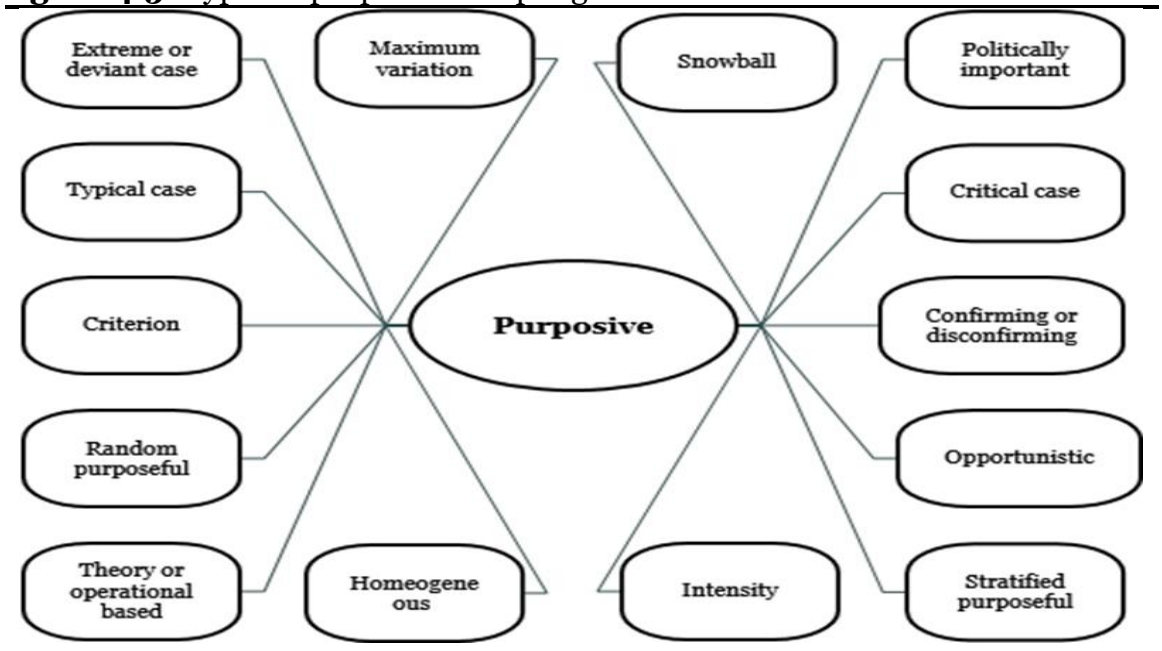


Source: Gupta & Gupta (2011)

The first category of sampling technique is based on the theory of probability and divided into three groups: simple random sampling, stratified sampling and cluster sampling (Manjunath et al., 2012). The second category is called non-random sampling or purposive sampling. It represents a purposive selection of particular groups of the population (Gupta & Gupta, 2011). Purposive sampling is suitable for a case study investigation to explore and gain theoretical insights (Saunders et al., 2009). The purposive sampling technique provides a space to look for issues of interest and suggests that the sample can be 'hand-picked'. It allows the researcher to identify in advance certain people and purposely select those most likely to produce some valuable data (Denscombe, 2014).

The main advantage of purposive sampling is the potential to ensure a balance of group sizes and focus on the specific group. However, the main disadvantage of this technique that it is not easily defensible, because of its subjective nature (Hair et al., 2010). The purposive sampling technique is further categorised into accidental sampling (based on convenience sampling), convenience sampling (selection of samples based on ease of access), snowball sampling (choosing samples based on referrals) and quota sampling based on criteria such as age and gender (Manjunath et al., 2012). Figure 4.5 provides a detailed classification of purposive sampling.

Figure 4.5: Types of purposive sampling



Source: Siegle (2012)

The last category is mixed methods of sampling, which has both characteristics (random and non-random). Mixed method sampling is divided into two groups, sequential and systematic sampling (Gupta & Gupta, 2011). In sequential sampling, the researcher keeps collecting samples until the desired number is reached, and systematic sampling takes a random point from the targeted population and then every nth unit is selected (Gupta & Gupta, 2011). Purposive sampling was used due to the following reasons:

- To select only those sample members who meet the study requirements such as LSPs, manufacturing firms, exporters and importers.
- To obtain quality information only from the targeted sample that the research was seeking to answer the research questions.
- To obtain a suitable sample size to explore SC risks, SCRM strategies and the WoT impact on logistics industry in that region.

For this study, the researcher set as criteria for selecting the firms for interview that first they should be registered with the Security & Exchange Commission Pakistan (SECP). Second, they have their own company website, from which to obtain phone numbers and addresses. Third, they have some trade with Afghanistan or have a branch in the north of Pakistan. The SECP database was used to select the targeted firms for interviews. From the selected firms (i.e. manufacturing, logistics service providers, automobiles, oil & gas exploration, engineering and other small industries), a total of 451 firms were selected.

However, it is difficult to identify the main respondent, especially in developing countries. The following Table 4.4 describes some potential respondents and the reasons for selecting them.

Table 4.4: Respondents and reasons for their selection

Respondents	The rationale for selecting them (Purposive Sampling)
Manager	Due to their role and relevance to the research topic.
Transport Manager	Due to their front role to see how are they identify and manage risk.
SC Manager	Due to their wide role in dealing with different SC issues and their expertise and knowledge in developing and dealing with SCRM.
Finance Manager	To explore how they view the key risks and risk strategies
Owners	According to Akhtar (2012), company owners are solely responsible for decision-making in Pakistan.

Source: Author

However, the researcher was open and flexible is selecting respondents during data collection, if some other managers were identified by the above respondents as more knowledgeable and relevant to answer the research questions. The interview duration was more than two hours to obtain in-depth views on SCRM practices. All respondents were asked almost the same questions, with a minor amount of variation.

Interview Protocol Development and Coding

A large number of authors provide guidelines for semi-structured interviews (Bryman & Bell, 2015; Yin, 2014; Saunders et al., 2012). For this purpose, an interview protocol was developed and tested with pilot interviews to check the efficiency and validity of the initial interview protocol. Results from the pilot interviews were used to polish the initial protocol and develop the final protocol (Bryman & Bell, 2015). Conducting the pilot interviews proved extremely beneficial to improve the interview questions, increase quality, and choose the analysis method, in addition, to learning about the logistics/supply chain industry, SC risks and current SCRM strategies in that region.

The interviews were recorded and notes taken (if respondents refused to allow recording of interview). The recordings were transcribed and then some interviews were translated into English, due to having been conducted in other languages (Urdu and Pushto). A major issue in qualitative research is the validity of interpretations due to the use of different words and terminologies for the same entity in different languages (Cassell & Symon, 1994). Therefore, three Pakistani scholars and two University of Hull scholars, who understand these languages and hold PhD degrees in business, confirmed the linguistic accuracy of the translated interviews.

Regarding the appropriate number of interviews, a general consensus in the literature is to reach theoretical saturation level (no more new information can be obtained from additional participants and already identified themes start repeating) (Bryman & Bell, 2015). Therefore, the theoretical saturation level strategy was adopted for this study; after 35 interviews the researcher reached saturation level and stopped further interviews.

4.3.3-Qualitative Content Analysis

A variety of analytic methods are available to analyse qualitative data, such as discourse analysis, grounded theory, narrative analysing, thematic analysis and qualitative content analysis (Bryman & Bell 2007). In this study, qualitative content analysis was used to study implicit assumptions (latent content) along with explicit statements (manifest content) in interviews (Krippendorff, 2013).

Other analytic techniques were not suitable for study. For example, discourse analysis involves analysing patterns or shifts in language, which was not the purpose of this research. Narrative analysis involves investigating organisational routines, history, processes and structures. This could have been a potential approach but would have needed more interactions with the social actors/interviewees, for example, in a case study research method. That is why this approach also seemed not suitable.

Krippendorff (2013:18) defines qualitative content analysis as *"a research technique for making a replicable and valid inference from texts (or other meaningful matter) to the contexts of their use"*. In other words, it is a technique for systemically describing the meaning of qualitative material (Schreier, 2012). The key benefits of qualitative content analysis are as follows: First, it can be more beneficial in situations where there is a huge volume of data and analysis time is limited (Werner, 1989). Second, it is inconspicuous and non-reactive (Marshall & Rossman, 2010). Third, it provides a sound methodological method to conduct a rigorous, systematic and reproducible research (Seuring & Gold, 2012). Fourth, it has a quantitative sense of data that allow categorization of data to interpret into nominal, ordinal or interval scales. It can provide various graphical representations of data and/or analysis (e.g. tree diagrams, chronological cycle and network analysis) (Lee & Fielding, 2011).

Lee and Fielding (2011:10) said that qualitative content analysis involves "*data expanding rather than data reducing techniques*". In contrast, Schreier (2012) argued that it is a systematic, flexible and data reducing technique, and suitable for wide range of qualitative materials (e.g. interview transcripts, textbooks, transcripts of a the focus group, company reports, contracts, websites, diaries, entries on social sites, newspapers articles, TV programme and magazine

advertisements). However, the selection of qualitative materials depends on their accessibility, availability and relevance (Cullinane & Toy, 2000).

Qualitative content analysis and thematic analysis are frequently used interchangeably; the borders between them have not been clearly stated (Vaismoradi et al., 2013). Some authors (e.g., Braun & Clarke 2006; Elo & Kyngas 2008) are concerned about the strength of both in terms of providing high-quality data in exploratory qualitative research. Despite several similarities between the two, such as cutting across data, and searching for patterns and themes, the important difference between the two is that content analysis includes a quantification of data by measuring the frequency of different themes, which may with caution, be viewed as a indictor of their relative significance (Vaismoradi et al., 2013).

NVivo 11 was used to analyse qualitative data. It is appropriate software for managing data and coding, shaping, providing security to qualitative data, can accommodate single or team users, allows researchers to use multiple languages and enables graphical display of codes (Creswell, 2013; Edhlund & McDougall, 2017).

The qualitative data was loaded into NVivo to be coded, and partially analysed and interpreted in the form of themes (Braun & Clarke 2006). Nvivo provided the initial categories, which explored different relationships, perspectives and perceptions about SC risk, SCRM strategies and its effect on FP. These themes were interpreted according to pre-defined interpretation rules and scores given to the recurrent patterns, themes or sub-themes, concepts and ideas in the themes. Further, NVivo also identified the most frequent risks and strategies in that region.

4.3.4-Qualitative Data Reliability and Validity

In the context of this study, respondents defined the SC risk in different ways and similarly managed it with different approaches, but the researcher ensured that responses are comparable for reliability (Saunders et al., 2009). This was done in two ways: first, by making sure respondents understood what was being asked and second, by asking the same questions, in their own languages, from all the respondents.

Regarding interviewees' bias, a few participants talked about implementation of government security policies, national and international safety regulations, labour laws and corrupt free practices, to safeguard their position. However, in reality, they might not care about any of the above rules. These issues also take in the concept of social desirability bias described by Brace (2008). To handle this aspect, the researcher ensured confidentiality and secrecy and made sure that in reporting the results individuals' answers were not disclosed. These measures increased the confidence of interviewees and they were encouraged to speak openly, which eventually limited biasness.

In the context of qualitative data, it important to ensure internal validity and significance to the involved interviewees. Therefore, all the questions in the interview protocol were linked to the research topic: SCRM and FP. Because of the

The first phase of the study was exploratory in nature due to the lack of existing knowledge on SC risks and SCRM strategies in that region. This phase employed qualitative inductive approach, to build a theory or propositions. Most importantly, it provided an opportunity to deeply insight the SC risk and SCRM practices and their impact on FP in a TAR (see Chapter 5). However, there was a need for a confirmatory study to statistically validate the impact of SCRM strategies on FP.

4.4-Phase Two: Confirmatory Study

This is the first study that attempts to identify the impact of six SCRM strategies (information sharing, SC coordination, risk sharing, SC finance, SC security and facilitation payment) on FP in a confirmatory and quantitative study. To answer RQ 4 and validate the research model, a questionnaire survey was conducted with logistics/supply chain practitioners of a TAR (see Section 6.2).

4.4.1-Questionnaire

The questionnaire can be defined as "*a pre-formulated written set of questions to which respondents record their answers, usually within rather closely defined alternatives*' (Sekaran & Bougie 2011:197). It is the most efficient data collection technique when the researcher knows exactly what is required and how to measure causal variables of interest (Sekaran & Bougie 2011). Cooper and Schindler (2006) said that the choice of the questionnaire technique is influenced by several factors such as geographical dispersion of the survey, cost and time, sensitivity of

requested information and complexity and length of the questionnaire. Saunders et al. (2009) suggested that the choice of a questionnaire depends on the research question(s) and objectives, and the resources available to the researcher.

The choice of a questionnaire as a research approach has both advantages and disadvantages. The main advantages of the questionnaire method are that questionnaires are highly standardized, save time and cost, provide answers that are easy to analyse, allow respondents' anonymity, avoid interviewer bias and offer an efficient way of collecting responses from a large sample (Gillham, 2008). In addition, the questionnaire technique requires less sensitivity to administer than the interview technique (Saunders et al., 2009). One major disadvantage of this technique, however, is that the researcher does not necessarily know who responded to the questionnaire and whether the participant maintained the intended question order when giving the responses. Another problem with this approach is that the time duration for filling in the questionnaire remains unknown (Saunders et al., 2009).

The questionnaire was selected for this study because it is a commonly used data collection method in management research and a large volume of studies have also employed it for fsQCA analysis shown in Table 4.5. In addition, it met the requirements of RQ4 (i.e., finding relationships between the constructs or variables).

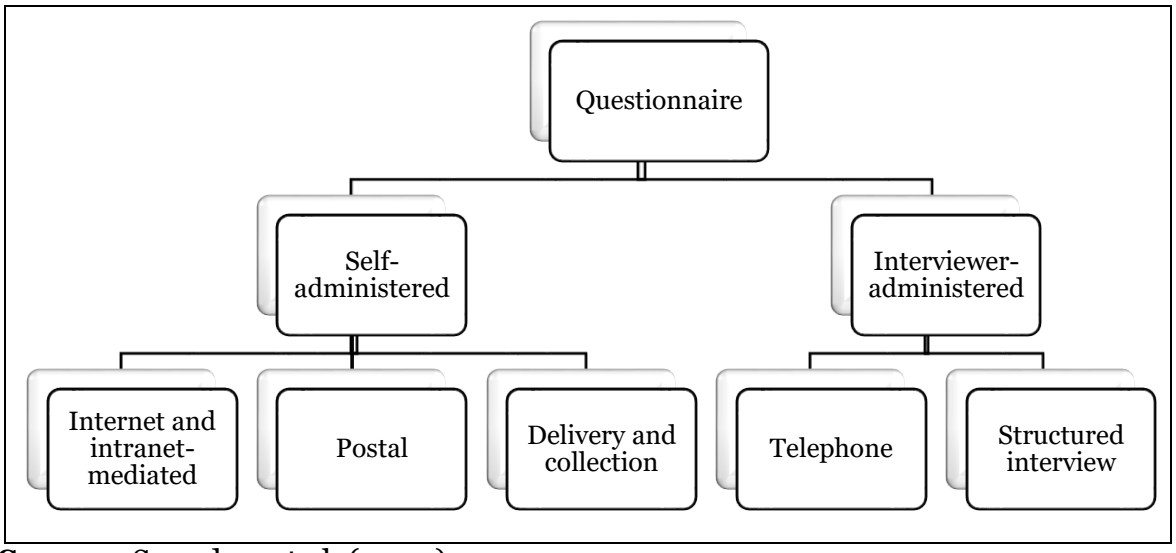
Table 4.5: Questionnaire adopted for calibration of fsQCA in literature

Sources	Data Collection	Calibration Anchors
Jordan et al. (2014)	Delphi panel surveys	Used different score
Leischnig et al. (2014)	Questionnaire	Based on Likert scale
Emmenegger et al. (2014)	Questionnaire	Based on Likert scale
Balodi & Prabhu (2014)	Interviews & Questionnaire	Based on raw values
Huang & Hsieh (2015)	Interviews and Questionnaire	Questionnaire raw average
Primc & Cater (2015)	Interviews & Questionnaire	Thresholds based average
Chari et al. (2016)	Questionnaire	Using 3 thresholds
Balodi (2016)	Questionnaire	Based on scores
Sjödin et al. (2016)	Questionnaire	25th, 50th, and 75th percentiles
Navarro et al. (2016)	Questionnaire	10th, 50th and 90th percentile
Veríssimo & Cristóvão (2016)	Questionnaire	5th, 50th and 95th percentile
Delmas & Pekovic (2017)	Secondary data & Questionnaire	10th, 50th and 90th percentile
Reimann et al. (2017)	Interview & Questionnaire	Based on Interviews
Kapsali et al.(2018).	Interview & Secondary data	Based on Interviews
Galeazzo & Furlan (2018)	Secondary data & Questionnaire	Based on Likert scale

Source: Author

Table 4.5 justifies the use of the questionnaire for fsQCA analysis in this study. A questionnaire also provides a rigorous scheme for fsQCA calibration and reduces researcher bias, as compared to qualitative data (Duşa, 2017).

Figure 4.6: Types of questionnaire



Source: Saunders et al. (2009)

Types of questionnaire can be classified into self-administered and interview administered techniques, as displayed in Figure 4.6. However, each technique has

its merits and demerits in terms of sample size, response rate, population characteristics, types of question, length of questionnaire and resources (Saunders et al., 2009).

The postal survey was used due to the University of Hull health and safety regulation, which prevented the researcher travelling to Pakistan, as a TAR. Additionally, this method of administration has several benefits, such as respondents have more time to think about the questions, it can cover a wide geographic area, is cheaper and faster than other methods in terms of cost and time and it is supposed to be more anonymous (Cooper & Schindler, 2006; Saunders et al., 2012). The pilot survey also showed that the targeted sample respondents were very busy people and so a better choice for data collection was a postal questionnaire.

Questionnaire Development

Response rates, validity and reliability are key issues in the questionnaire technique. However, Saunders et al. (2009) suggested that response rates, validity and reliability can be maximised by the clear and attractive layout of the questionnaire; careful design of individual questions, articulate explanation of the purpose of the questionnaire, pilot testing and carefully planned and executed administration. Figure 4.7 shows the questionnaire development stages.

Figure 4.7: Questionnaire development process

Stage 1	Specify what information will be sought
Stage 2	Determine the types of questionnaire and methods for administration
Stage 3	Content of individual items
Stage 4	Determine form of response
Stage 5	Determine wording of each questions
Stage 6	Determine sequence of questions
Stage 7	Determine layout and physical characteristics of the questionnaire
Stage 8	Re-examine steps 1-7 and revision, if necessary
Stage 9	Pre-test and pilot test questionnaire
Stage 10	Administer the questionnaire

Source: Maylor and Blackmon (2005)

The development of scale items is critical to safeguarding content validity, which requires the items to cover the major content of a construct (Churchill, 1979). Thus,

researchers need to develop multiple measurement items in order to approximate the constructs in their research (Field, 2013). It is important to assess the scientific rigor of the research and the quality of data, which provide understanding of the study's constructs and measurements. The emphasis is on not only identifying and defining each construct in the research but also clarity in discussing how each construct is actually measured, including the different reliability and validity assessments as well as overall construct validity (Ortinau, 2011).

The process of scale development consists of four major stages: First, developing the construct, checking content, and face validity. Second, testing the dimensionality. Third, checking the internal consistency. Last, ensuring convergent, discriminant, and nomological validity of the measures (Anderson & Gerbing, 1988). Table 4.6 highlights the process of scale development and validation. According to Ortinau (2011), the following questions must be answered in the scale development process:

- Who is the original author of the scale?
- What are the scale's reported reliability and validity assessments?
- Are there any weaknesses to the existing scale?
- Why is a particular existing scale the right one to use in the current investigation?

Table 4.6: Scale development process

Stages		Dunn el at (1994) for Logistics	Churchill (1979) for Marketing	Spector (1992) for Scales	Malhotra el at (2012) for Marketing
Stage 1	1	Define constructs	Specify domain of construct (literature search)	Define constructs	Develop theory
	2	Develop potential items, check content validity, confirm substantive validity	Generate sample of items (Literature search, experience survey, insight stimulating examples, critical incidents, focus groups)	Design	Generate initial pool of items: theory, secondary data and qualitative research
Stage 2	3	Pilot survey	Collect data	Pilot test	Select a reduced set of items based on qualitative judgement, collect data
	4	Exploratory factor analysis, Item to total correlation	Purify measure (coefficient alpha, factor analysis)	Administration and item analysis	Statistical analysis and develop purified scale
Stage 3	5	Test theory, confirmatory factor analysis, reliability, convergent validity, discriminant validity (predictive and concurrent), normological validity	Collect data, assess reliability (coefficient alpha, split-half reliability), assess validity	Validate and norm	Evaluate scale reliability, validity and generalisability

Source: Churchill (1979), Spector (1992), Dunn et al. (1994) and Malhotra et al. (2017)

A questionnaire is an efficient and effective way to collect research data. However, developing a questionnaire is both a scientific and artistic endeavour and it is hard to produce a good questionnaire that can draw the best scientific answers to the research questions (Malhotra, 2009). Bourque and Clark (1992) and Schrauf and Navarro (2005) suggested three principles for questionnaire development: First, adopt questions used in other questionnaires. Second, adapt questions used in other questionnaires. Last, develop your own questions.

Questionnaire Development for Study

A closed-ended questionnaire (i.e. the questions limit respondent's answer choices) was developed by using a three-stage process as suggested by researchers (Churchill, 1979; Spector, 1992, Dunn et al., 1994; Malhotra et al., 2017). The first stage consisted of an extensive review of the literature, the second stage was based on the semi-structured interviews finding and the last stage was pre-tests. The questionnaire was developed in the English language because respondents in Pakistan fully understand the English language.

The questionnaire was divided into two parts. The first part comprised general information about the respondents and firms. The second part included seven constructs, was based on the extensive literature review and the interviews (see Section 6.3). The constructs measured were SCRM strategies (information sharing, SC coordination, risk sharing, SC finance, SC security, facilitation payment) and FP. Each construct consisted of five or more measures (items).

Most of the selected measures/items were adopted from SCM literature. However, these studies were conducted in different contexts and their research perspectives may be different from that of this study. Hence, the necessary amendments were made in certain items, in order to fit the research question. Some items were also developed based on the interview findings (see Appendix D).

Based on the literature and the interview findings, a draft of the questionnaire was prepared for a pre-test. Before the pre-test, the questionnaire was proofread and, reviewed many times to check its clarity and orientation. Generally, the SCRM literature used the five-point Likert scale (strongly disagree: 1 and strongly agree: 5). However, a seven-point Likert scale, from 1=strongly disagree to 7=strongly agree was employed to get more reliable results (Preston & Colman, 2000). Table

4.7 shows the precedent for such as choice, which supports the decision to use 7-point Likert scales for this study.

Table 4.7: Seven-Likert scales adopted in SCRM literature

Authors	Likert Scale	Themes
Lai et al. (2007)	7-point scale	Information technology strategy impact on financial performance of 3PL
Fantazy et al. (2009)	7-point scale	Relationships among strategy, flexibility, and performance in the supply chain context
Braunscheidel & Suresh (2009)	7-point scale	For risk mitigation and response
Kern et al. 2012)	7-point scale	SCRM effects on performance
Chen et al. (2013)	7-point scale	Supply chain collaboration as a risk mitigation strategy
Yu et al. (2017)	7-point scale	Effect of data-driven supply chain capabilities on financial performance

Source: Author

For, the construct of facilitation payment, where it was necessary to find out the frequency of facilitation payment among public and private employees, a different scale was used (1 =Never, 2 = Rarely, 3 = Occasionally, 4 = Sometimes, 5= Frequently, 6 =Usually, 7=Every time).

The questionnaire was tested on six Pakistani firms. After testing, minor clarity issues (design, wording and orders) were identified and rectified. The rectified questionnaire (final version) then was again tested with 11 firms. Finally, no error were found in the questionnaire. The pilot test also indicated that the questionnaire was an appropriate tool to obtain the desired data. A copy of the covering letters and the final form of the questionnaire is provided in Appendixs B & D.

4.4.2-Quantitative Data Collection

For collecting quantitative data, purposive sampling was used and 451 selected firms for postal survey (see Section 4.3.2). A pre-paid postage envelope, ethical approval letter and covering letter enclosed with the questionnaire were sent to the selected firms in Pakistan. In the covering letter, the researcher introduced and explained the purpose of the research and the significance of the respondents' contribution to the research. The covering letter also specified that participation in the research was completely voluntary and the respondents could refuse to

participate at any time. It also mentioned that only aggregated data would be used; no individuals/companies were identified, for reasons of confidentiality.

Techniques Used to Increase Response Rate

Denscombe (2014) and Bryman (2008) suggested a number of techniques that can be used to increase the response rate and their advice was followed.

- The letterhead of the University of Hull was used for the covering letter and questionnaire. It clarified the study objective and gave a guarantee of the confidentiality of the respondents.
- Delivery and collection of questionnaires were made through a third party, which had a very positive impact on response rate.
- The wording of the questionnaires was carefully written. Short and concise statements were used to obtain the required information, which fulfilled the study questions.
- Enough time was given to respondents to fill in the questionnaire and, the researcher deliberately avoided the busy periods of the year.
- An offer of a summary of the findings, as an incentive, was given to respondents.
- Two reminders (telephone and post) were issued to encourage respondents to contribute in the survey.
- Additionally, the letter of ethical approval from the University of Hull showed the legitimacy of study, which also enhanced the response rate. A copy of the ethical approval letter is shown in Appendix A.

The response rate for the questionnaire was 17.7 %, which is a satisfactory sample size for fsQCA (Balodi, 2016). The response rates for fsQCA studies in different countries (e.g., Balodi (2016) with 17.5% in India, Sjödin et al. (2016) with 13.5% in Sweden), also support the acceptability of this study's response rate. The response rate of this study is similar to that of recent SCM research in Pakistan with a 17 % response rate (Tipu & Fantazy, 2014). There were no missing data or unusable questionnaires among these 80 responses.

Sample Size for fsQCA

With regard to sample size, the fsQCA technique was originally developed for the analysis of small-or medium-N samples (e.g. 15 to 40 cases) to apply its application to broader contexts (Fiss, 2012; Leischnig et al., 2014; Roig-Tierno et al., 2017). Table 4.8 provides a summary of fsQCA sample size in different disciplines, such as business management, disaster management, financial management and SCM.

Table 4.8: Adopted sample size for QCA

Source	Discipline	Sample Size
Schneider et al. (2010)	Business management	76
Jordan et al. (2014)	Disaster management	202
Leischnig et al. (2014)	Business management	596
Huang and Hsieh (2015)	Supply chain management	147
Talonpoika et al. (2016)	Financial management	445
Carmona et al. (2016)	Financial management	271
Balodi (2016)	Business management	70
Hsiao et al. (2016)	Business management	182
Timmer and Kaufmann (2017)	Supply chain management	50
Reimann et al. (2017)	Supply chain management	60
Paniagua et al. (2018)	Financial management	1207
Peris-Ortiz et al. (2018)	Business management	29
Hughes et al. (2018)	Business management	1,559
Kapsali et al.(2018)	Supply chain management	45
Galeazzo and Furlan (2018)	Supply chain management	19

Source: Author

The SCM literature indicates that the sample sizes used for QCA are between 19 and 147. Thus, the researcher believes that the sample size of 80 respondents was suitable for this study.

Non-response bias test and common method bias (CMB).

The survey method typically faces the challenge of low response rates, especially in the case of the web-based and mail survey, which is commonly used for data collection for a geographically dispersed population. There are different techniques and approaches that assist the researcher to identify the causes of non-response bias (Atif et al., 2012). Table 4.9 provides an overview of non-response bias techniques and approaches.

Table 4.9: Summary of non-response bias methods/techniques

Techniques	Overview
Archival Analysis	Compare respondents to non-respondents on variables contained in an archival database
Follow-up Approach	Resurvey non-respondents
Wave Analysis	Compare late respondents to early respondents
Passive Non-response Analysis	Examine the relationship between passive nonresponse characteristics and standing on the key survey topics being assessed
Interest-level Analysis	Assess the relationship between interest in the survey topic in question and standing on the key survey topics being assessed
Active Non-response Analysis	Assess the percentage of purposeful, intentional, and a priori nonresponse using interviews
Worst-case Resistance	Use simulated data to determine the robustness of observed findings and relationships
Benchmark Analysis	Use measures with known measurement properties and normative data so that observed data can be cross- referenced
Demonstrate Generalizability	Replicate findings, use a different set of research methods

Sources: Atif et al. (2012).

Non-response analysis is an essential part of the overall assessment of the quality of data and a significant issue in survey research, as non-response bias can compromise the total validity of the survey (Atif et al., 2012). Generally, Wave Analysis (comparison of those responding to the first mailing with those responding to the second mailing) is subject to t-test and chi-square for non-response bias to identify any significant differences between them (Armstrong & Overton, 1977).

In the context of this study, the data were tested for non-response bias by comparing the last received ten responses with the early responses as suggested by Armstrong and Overton (1977) and the outcome indicated no evidence of non-response bias. The response rates of the two main groups (first 10 and last 10 respondents) are very similar (14.7% and 13.7%). This suggests that the responses were not biased in terms of groups respond.

As a further test for non-response bias, the first usable 40 questionnaires were considered as early responses while the remaining 40 questionnaires were considered as late responses, as suggested by Atif et al. (2012). These groups of early and late responses were subjected to a t-test for testing of non-response bias, to see if there were any significant differences in between them (Armstrong & Overton, 1977). Using the t-test, the researcher compared the two groups (first and

late respondents) for 10 randomly selected variables (items) from the study. This comparison revealed that responses to the same items did not differ significantly ($p > 0.05$) across the two groups. A similar approach was adopted by previous studies (e.g., Youn et al., 2013; Paulraj et al., 2017). This suggests that non-response bias was not a serious concern in this study.

Common method variance (CMV) is variance*"that is attributable to the measurement method rather than to the constructs the measures represent"* (Podsakoff et al., 2003:879). It is also called common method bias. It generates a false internal reliability. For instance, a study wants to evaluate the organizational capabilities of a multi-national company and the company's international performance in the same survey. This can generate false correlations, if the respondents have a tendency to provide consistent answers to survey questions, which are otherwise not related. Such bias can cause systematic measurement errors that either inflate or deflate the observed relationships between constructs (Chang et al., 2010). The researcher conducted Harman's single factor test (Harman, 1960) to test CMV. The outcomes show that the total variance explained by a single latent factor is 35%. Since, it is less than 50%, it can be said the CMV is not a serious threat in this study.

4.4.3- Data Analysis Method

This section is divided into two parts: the first parts discusses the process of fsQCA in literature. The second part describes the process of fsQCA adopted in this study.

4.4.3.1-Qualitative Comparative Analysis (QCA)

QCA is introduced by Ragin (1987), as a configurational research approach which combines the strengths of qualitative (case-oriented) and quantitative (variable-oriented) research methods. It is a social research method and rooted deep in political science and sociology. It employs a systematic comparison to case study research. QCA's key objective to improve and extend knowledge of the elements of outcome by observing the likenesses and differences of cases in terms of the causal variables and outcomes (Cress & Snow, 2000).

Inherently, it is based on Set theory and Boolean algebra. Set theory deals with collections of sets and relationships among these sets. In contrast, Boolean algebra is suitable for variables that have only two possible answers (i.e. true or false). QCA

uses both logics to carry out a holistic comparisons (Ragin, 2000; Kogut et al., 2004).

The QCA technique has some main advantages over traditional regression analysis: the first advantage of QCA is transparency. The researcher can act with transparency in the selection of variables and tools for the analysis. A second advantage of QCA is that it uses a mix of verbal–conceptual and mathematical-logical language, which helps the researcher to combine verbal statements with logical relationships in a rigorous way (Fiss, 2012). Third it allows for causal asymmetry, which means that the presence of certain conditions leads to the outcome, but it does not mean that the absence of those conditions will also lead to the absence of the outcome (Balodi & Prabhu, 2014). Fourth, it is characterized by equifinality, meaning that there are multiple pathways or solutions to the same outcome. For example, a firm can adopt different strategies to achieve the same level of outcome profitability or market share (Balodi & Prabhu, 2014). In other words, QCA allows the assessement of complex causation between different combinations of causal conditions generating the same outcome. Last, the small data size is one of the major advantages of QCA and it is a superior technique to regression techniques in small-N analyses (Katz et al., 2005; Rihoux, 2006; Ragin, 2008).

There are three key alternatives of the QCA method: crisp-set QCA (csQCA), multi-variable QCA (mvQCA) and fuzzy-set QCA (fsQCA) (Jordan et al., 2014). Crisp-set QCA designed by (Ragin, 2000), is based on crisp set theory where *"an element either belongs inside a set or it does not based upon certain rules"*. In crisp set theory, the set elements are dichotomous and categorised as "in or 1" and "out or 0" (Greckhamer & Mossholder, 2011:261). For instance, a specific country belongs to or does not belong to the set of Commonwealth countries. Therefore, membership in the Commonwealth is classified as membership (1) or non-membership (0). The major limitation of the csQCA technique is that it depends on absolute values without any interval degrees of membership and supposes that the degree of membership is universal for all cases (Grofman & Schneider, 2009). In contrast, the mvQCA deals with causal variables that have multiple values of membership in a set (e.g. 0, 1, 2, 3, 4) but the outcome of mvQCA has to be dichotomous (Jordan et al., 2014).

The fsQCA is based on fuzzy logic (Zadeh, 1965). Fundamentally, it is an analysis of set relations. In fuzzy set theory, an element may belong to some extent to a set with membership scores in the range from 0 to 1 (Smithson, 1987). The fundamental theory of fsQCA is that the relationship is complex, which means that "*an outcome may follow from several different combinations of causal conditions*" (Ragin, 2008:23). Therefore, fsQCA explores complex pathways and studies the set relations. For example, it can change variables within a combination of causal sets for best outcome; which other correlational methods are not able to perform (Ganter & Hecker, 2014).

Therefore, fsQCA is different from the standard regression analysis. For example, it is focused on problems and offers solutions, while regression analysis aims to discover the effect of a variable on an outcome. Further, regression gives the degree and direction of effect of a variable and net of effects variables contained in the model, while fsQCA focuses on conditions that lead to outcome.

Selection of Conditions and Outcome

The first step of fsQCA is to identify the causal conditions for the outcome. The independent variable refers to "condition" and the dependent variable refers to "outcome" in fsQCA. Amenta and Poulsen (1994) and Yamasaki and Rihoux (2009) identified six approaches to select conditions for QCA. Figure 4.8 provides an overview of these approaches.

Figure 4.8: Condition selection approaches

Comprehensive	• Where the full array of possible factors are considered in an iterative process
Perspective	• Where a set of conditions representing two or three theories are tested in the same model
Significance	• Where the conditions are selected on the basis of statistical significance criteria
Second look	• Where the researcher adds one or several conditions that are considered as important although dismissed in a previous analysis
Conjunctural	• Where conditions are selected on the basis of "*theories that are conjunctural or combinatorial in construction and that predict multiple causal combinations for one outcome*" (p.29)
Inductive	• Where conditions are mostly selected on the basis of case knowledge and not on existing theories

Source: Yamasaki & Rihoux (2009)

According to Berg-Schlosser et al. (2009) the selection of the causal condition (s) should be related to the outcome and needs the relevant theoretical and substantive

knowledge regarding condition. In addition, the selected conditions must be validated (Roig-Tierno et al., 2017).

Data Calibration

Calibration is an important stage of the QCA process. It is defined as a process whereby "*set membership scores are derived from empirical and conceptual knowledge*" (Schneider & Wagemann, 2012:23). However, the concept of calibration is different from the concept of measurement (Ragin, 2008). For example, measurement measures variables into units such as inches and dollars, whereas the calibration reflects each case's degree of membership (from 0 to 1) in conceptual categories such as hot, tall and religious (Duşa, 2017)

The csQCA calibration method is extensively criticised due to the absolute nature of the membership (Seawright, 2005; Skaaning, 2011). In contrast, fsQCA calibration provides degrees of membership of a condition and allows qualitative concepts to be measured quantitatively (Ragin, 2008). However, it is vital in the calibration stage to remove the (0.5) ambiguity of the midpoint (Duşa, 2017).

According to Vis (2007), fsQCA calibration can vary across concepts, reflecting the conceptual, theoretical, historical and contextual considerations that the researcher prioritises. The Table 4.10 below illustrates some of the main thresholds of crisp sets and fuzzy sets.

Table 4.10: Crisp vs Fuzzy sets

Crisp Set	Three-values Fuzzy Set	Four-values Fuzzy Set	Six-values Fuzzy Set	Continuous Fuzzy Set
1=fully in	1=fully in	1=fully in	1=fully in	1=fully in
0=fully out	0.5=neither fully in nor fully out	0.67=more in than out	0.9=mostly but not fully in	The degree of membership is more "in" than "out" 0.5<Xi<1
	0=fully out	0.33=more out than in	0.6=more or less in	0.5=crossover: neither in nor out
		0=fully out	0.4=more or less out	The degree of membership is more "out" than "in"
			0.2=mostly but not fully out	0<Xi<0.5
			0=fully out	0=fully out

Source: Ragin (2012)

Ideally, the fsQCA calibration should be based wholly on the researcher's substantive and theoretical knowledge (Ragin, 2008). However, there are three fsQCA calibration approaches: theory-guided qualitative, direct and indirect. The theory-guided qualitative approach is grounded on the researcher's knowledge, truths and generally accepted concepts in social sciences in order to identify meaningful anchors (Gansemans et al., 2016). Generally, qualitative data does not have easily measurable or numerical values for analysis. Basurto and Speer (2012:172) suggested that, *"it might be adequate for the researcher to offer the interviewee a predetermined Likert scale of answers that correspond directly to fuzzy-set values*".

The latter two approaches are more semi-automatic: the direct method of calibration is focused on three qualitative anchors (full membership, non-membership, and the crossover point). However, it makes it difficult for fsQCA to produce results (Duşa, 2017). In contrast, the indirect method uses regression techniques to estimate the degree of set membership based on a four or six-value-coding scheme (Ragin, 2012). However, the indirect method is frequently interchangeably used with direct assignment. In direct assignment, subject specialists, according to their expertise, assign the fuzzy scores; however, it is a highly subjective method due to the probability of two experts' disagreement on scores (Duşa, 2017).

In an ideal world, the selection of the calibration technique should not depend on personal preference. This is because it might affect the coverage of the calibrated causal condition on the outcome (Thiem, 2014). However, Duşa (2017) argued that there is no empirical evidence that calibration techniques can strongly change the QCA final results.

Necessary and Sufficient Conditions

In QCA the hypothesized causality changes into sufficiency and necessity conditions (Badie et al., 2011) uses the notion of sets, set membership and set relations to find the necessary and sufficient conditions (Ragin, 2008).

In set theory, a necessary condition is defined as *"X is a necessary condition for Y if Y is a subset of X"* (Goertz, 2006: 90). According to Braumoeller and Goertz (2000:846), it can be defined as "*X is a necessary condition for Y if X is always*

present when Y occurs" or *"X is a necessary condition for Y if Y does not occur in the absence of X"*..

Similarly, *"X is a sufficient condition for Y when every time X is present, Y is also present"* or "*X is a sufficient condition for Y if X does not occur in the absence of Y*". In set theory, *"X is a sufficient condition for Y if X is a subset of Y"* (Duşa. 2017:137).

Truth Table

After calibration, the next stage of QCA is the construction of a truth table, which is a vital tool for the analysis (Verweij et al., 2013). It accounts all the logically possible combinations of conditions and should always be published (Ragin, 2008).

The truth table shows in each row a possible configuration of conditions. The number of configurations can be calculated through the formula 2^k, where k is the number of conditions included in the analysis. The main limitation of truth tables is the number of conditions, for example, 10 causal conditions have 2^{10} = 1024 rows in a truth table and 2^{20} conditions has more than 1 million rows. Consequently, it needs not only a lot of memory, but also aimless computation (Badie et al., 2011; Duşa, 2017). The key purpose of construction of a truth table is to measure consistency and coverage (Badie et al., 2011).

Consistency and coverage for necessity and sufficiency conditions

Consistency and coverage are the main parameters to measure the significance of a condition or specific combination of conditions towards an outcome, in terms of necessity or sufficiency (Goertz, 2006). The terms consistency and inclusion are frequently used interchangeably in QCA literature. For example, if the inclusion of a condition into outcome is high, then it is said that the condition is highly consistent, or the condition has a high consistency value (Duşa, 2017). Ragin (2008:44) defined consistency as the *"degree to which the cases sharing a given combination of [causal] conditions agree in displaying the outcome in question"*. In other words, it signifies the degree to which a causal combination leads to an outcome in fsQCA. The values of consistency are always between zero and one (zero means no consistency and one mean perfect consistency).

The following formulas are used for calculation of the consistency scores for necessity and sufficiency in fsQCA:

$$\text{Consistency for necessity } X \Leftarrow Y = \frac{\sum \min XiYi}{\sum Yi} \qquad \text{Eq. (1)}$$

$$\text{Consistency for sufficiency } X \Rightarrow Y = \frac{\sum \min XiYi}{\sum Xi} \qquad \text{Eq. (2)}$$

where Xi is the membership score in a causal combination, Yi is the membership score in the outcome set and "min" indicates the selection of the lower of the two values. The forward arrow "⇒" sign indicates the sufficiency statement in Eq. (2), while the backward arrow "⇐" sign signifies the necessity statement in Eq. (1).

When the necessity/sufficiency consistency value is higher than the selected threshold, the empirical evidence is logical and the causal condition or combination of conditions is necessary/sufficient for the outcome (Dusa & Thiem, 2013). A lower score than the threshold indicates less empirical evidence and the condition/combination should be treated as less relevant to the result (Roig-Tierno et al., 2017). According to Schneider et al. (2010), a condition, or a combination of conditions, is called "*necessary /sufficient*" or "*almost always necessary or sufficient",* when its consistency score exceeds the threshold of 0.9. It is similar to a Pearson's r coefficient in statistical analysis (Hsu et al., 2013). A super subset function is used in R (a QCA package) for the necessity test; it measures all potential necessity consistency scores for a single condition or combination of conditions, which lead to outcome (Duşa, 2017).

Coverage is defined as "*the number of cases for which a configuration is valid*" (Roig-Tierno et al., 2017:17). In other words, it indicates that the relevance of a condition or combination of conditions applies in a number of cases (Rihoux & Ragin, 2009). When the consistency value is very high and the coverage value is very low, then the result is not conclusive, because it shows a low number of cases. In contrast, when the coverage value is very high and the consistency value is very low, then result also is not decisive, because the solution does not surpass the threshold for relevance to outcome (Duşa, 2017). However, there are differences between necessary coverage and sufficient coverage. Necessary coverage is a measure of how "*trivial*" a condition is for an outcome; for example, air is a trivial necessary condition for fire, while sufficiency coverage calculates how much of the

entire outcome is "*explained*" by a causal condition (Duşa, 2017:146). The coverage values are equivalent to the coefficient of determination R^2 in statistical analysis (Hsu et al., 2013).

There are two common parameters that are used in R for necessary coverage: Coverage Necessary (denoted by "covN" in the R package and Relevance of Necessary (denoted by "RoN"). Coverage necessary shows how significant is a necessary condition for outcome, while the relevance of necessary measures how trivially significant is a necessary condition for outcome. When the value of RoN is low, it means that a condition is more trivial. In contrast, a higher value of RoN indicates the higher relevance of the necessary condition (Duşa, 2017).

Similarly, sufficient coverage is divided into two parameters: Raw and Unique coverage. Raw coverage (denoted by "covS" in the QCA package) measures the degree to which the configuration accounts for the outcome, while Unique coverage (denoted by "covU") measures the proportion of relations in the outcome explained individually by every single configuration (Ragin, 2008).

Limitations of fsQCA

The fsQCA has several advantages as an analytical tool. For example, it directly assists the reseracher to identify the best combination of causal conditions. However, this technique has a number of limitations:

- The fsQCA has some limitations compared to Multiple Regression Analysis (MRA). For example, MRA has an important advantage over fsQCA, that it can estimate the variable's average effect, which is most significant when the researcher wants to estimate the size of the net effect of each independent variable on the dependent variable (Navarro et al., 2016).
- The fsQCA requires prior causal knowledge and data calibration, whereas MRA does not require prior causal knowledge. Therefore, MRA is less affected by the researcher's prior knowledge. MRA has a clear underpinning and does not need the calibration of data (Vis, 2012).
- Another major limitation of fsQCA is that it does not tolerate the analysis of many variables. In the case of finding a unique model, the understanding of that model would be very problematic (Navarro et al., 2016).

- The fsQCA measures the empirical and set-theoretical significance of complex paths to the outcome. However, when it measures the consistency and coverage it does not conclude the unique contribution of each separate simple condition (Vis, 2012).
- The existing literature on fsQCA is concerned with the issue of threshold. For instance, a condition or combination of conditions scoring less than the 0.75 consistency threshold will be non-significant and should be excluded, irrespective of supporting reasoning (Rubinson, 2013; Roig-Tierno et al., 2017).
- There are problems in selecting the input conditions, how they are to be defined and measured (Lee & Fielding, 2011).
- Finally, fsQCA has been criticised for its involvement in synthesising rich qualitative information into numerical scores, which removes some of the detail and nuance from the qualitative data (Baptist & Befani, 2015).

4.4.3.2-The Adoption of fsQCA for This Study

There are some limitations in the other two types of QCA. For example, a major limitation of the csQCA technique is that it focuses on absolute values and assumed that degree of membership is universal for all cases without representing interval degrees of membership. Therefore, csQCA was not suitable for this study, because the causal conditions of FP given by questionnaire respondents varied in degree of membership. There are multiple points existing in between the two absolute values (1, 0). For example, a strategy has influence to some extent; not every SCRM strategy has an absolute influence on FP. Therefore, fsQCA was the appropriate technique for this study, to calibrate the degree to which a strategy affects FP.

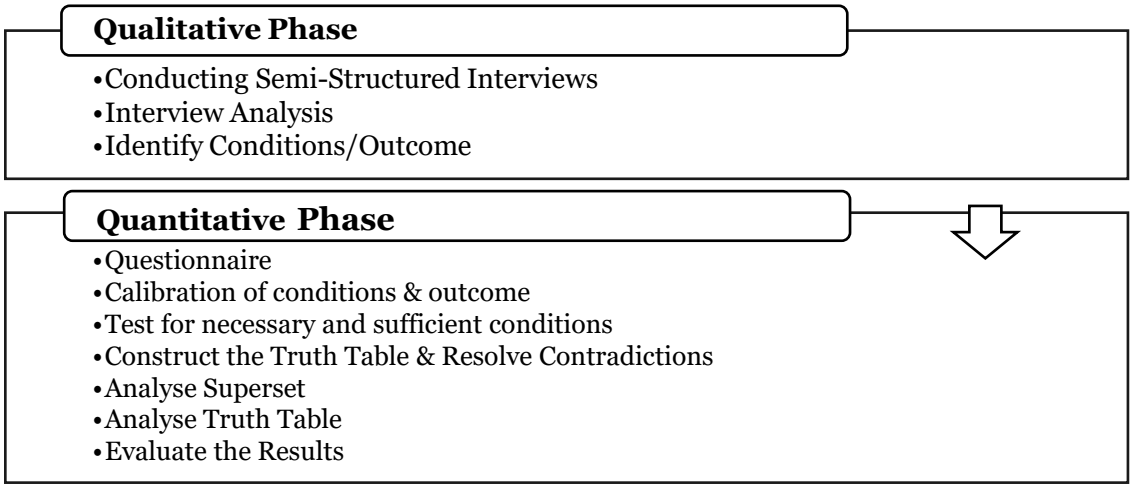
Similarly, mvQCA is suited to research in which conditions may have multiple states. However, mvQCA is not appropriate for conventional truth table analysis (Ragin, 2007) and the number of the logical reminders in mvQCA is more than in csQCA and fsQCA (Grofman & Schneider, 2009; Jordan et al., 2014). Another main limitation of mvQCA is that, it significantly increases the number of logically possible configurations. For example, six conditions can produce (2^6=64) logically possible configurations in csQCA and fsQCA, whereas, in mvQCA, the same six conditions can produce (3^6=729) logically possible configurations (Ragin, 2012).

Therefore, the researcher employed fsQCA (Ragin, 2000) to identify configurations of SCRM strategies related with FP. It is a relatively new analytical technique and

helps to mitigate the differences between qualitative and quantitative analysis. It also increases data analytical efficiency without compromising the main principles of QCA (Ragin, 2007). It has received a growing attention in management sciences and SCM (Vergne & Depeyre, 2016; Karatzas et al., 2016).

There are two main phases of fsQCA in data assessment: qualitative assessment and quantitative assessment. Figure 4.9 presents an overview of the fsQCA process adopted by this study.

Figure 4.9: fsQCA process adopted by researcher



Source: Author

The qualitative phase of fsQCA consisted of three aspects. The first and second of these were semi-structured interviews and analysis (qualitative content analysis), to identify the causal conditions for fsQCA analysis (Balodi & Prabhu, 2014; Huang & Hsieh, 2015; Primc & Cater, 2015; Reimann et al., 2017 ; Rekik & Bergeron, 2017). These aspects were covered by the exploratory phase of this study (see Section 4.3)

The third task was to establish the most critical conditions for the outcome. In fsQCA literature, different methods are employed to select the causal conditions and outcomes for the fsQCA anyalsis. The statistical significance approach was chosen to select conditions and outcome for this study (see Figure 4.8), because it is more endogenous and consistent with the fundamental ontological differences between statistical and configurational approaches. It also reduced the number of logically possible configurations and avoids logical remainders (Yamasaki & Rihoux, 2009). A large number of studies have adopted between 4 to 10 causal conditions for analysis (Badie et al., 2011). Therefore, the researcher selected six SCRM strategies and one outcome (FP) to avoid complexity in results.

In the quantitative phase, first, the questionnaire method was adopted to collect data regarding the selected conditions and outcome. Second, data calibration and anchors were addressed. A key stage of the fsQCA process was to assess the membership scores for conditions and outcome in each case (firm). For causal conditions, the researcher employed four levels of membership in a fuzzy sets calibrating scheme, as shown in Table 4.10 (Ragin, 2012). For example, when the average raw score of a construct is between six and seven, then it is fully in and the fuzzy score is 1. When it is from four to five then it is more in than out and the fuzzy score is 0.67. Similarly, when the average raw score of a construct is from two to three, then it is more out than in and the fuzzy score is 0.33. Lastly, if it is between zero and one, then the membership level is fully out and the fuzzy score is zero (Balodi & Prabhu, 2014; Ordanini et al., 2014; Galeazzo & Furlan, 2018). For outcome, the researcher employed the same calibration technique, as was adopted for conditions' membership (Balodi & Prabhu, 2014).

Third, as a rule of thumb, this study adopted Ragin's (2008) threshold of 0.85 (consistency/coverage) for necessary/sufficient conditions. However, Ragin (2008:47) recommends that "*it is always possible to examine several different thresholds and assess the consequences of lowering and raising the consistency cut-off*.". The selected threshold should be used on the basis of the data quality, nature of the research question and number of cases (Schneider et al., 2010). Table 4.11 shows the precedent for the selection of thresholds ranging from 0.75 to 0.90, which supports the selection of 0.85 as a threshold for this study.

Table 4.11: Thresholds adopted for consistency/coverage in literature

Authors	Discipline	Thresholds
Ragin (2008)	Political Science	0.80
Schneider et al. (2010)	Business Management	0.90
Ordanini et al. (2014)	Service	0.75
Jordan et al. (2014)	Disaster Management	0.85 to 0.95
Vergne and Depeyre (2016)	Business Management	0.90
Rekik and Bergeron (2017)	Business Management	0.80
Reimann et al. (2017)	Supply chain Management	0.80
Kapsali et al.(2018)	Supply chain Management	0.80

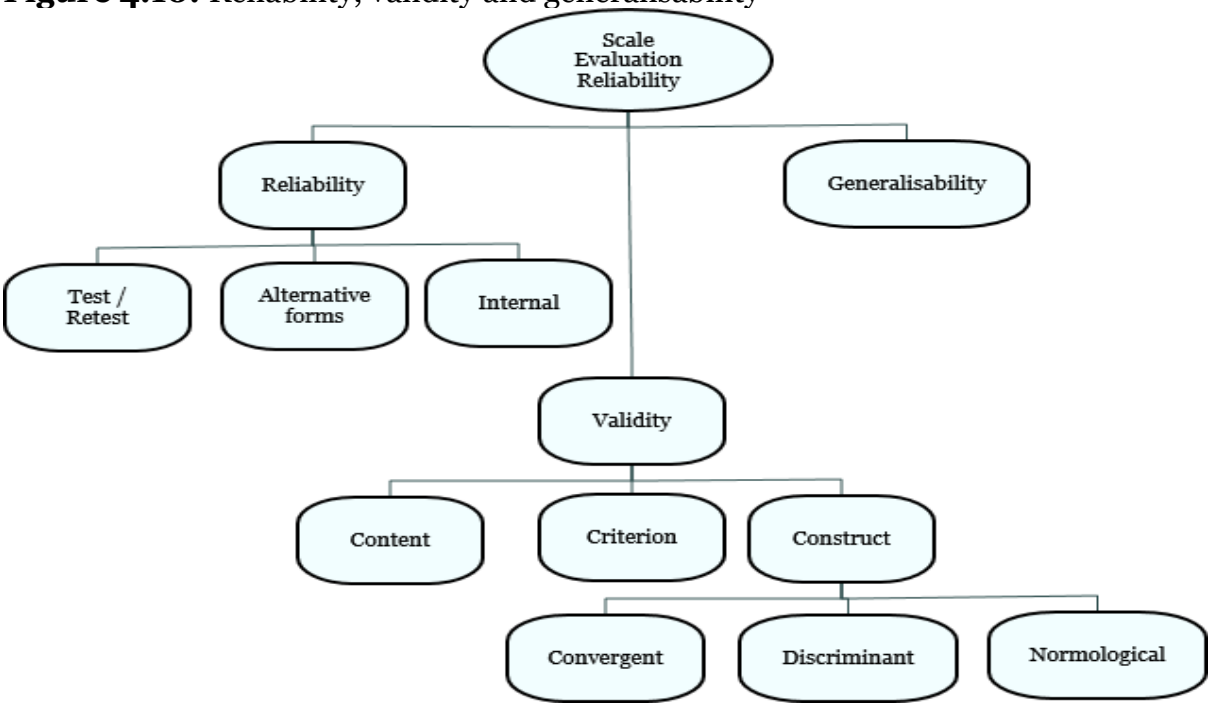
Source: Author

This study also employed the R (a QCA package) for analysis. Necessity and sufficiency tests were conducted to check whether the six SCRM strategies can be considered as necessary/ sufficient to the outcome of interest (FP) and hence to test the hypotheses (see Section 4.4.3.1). Then a truth table was constructed to summarize all the possible logical configurations of strategies, which lead to the outcome (Fiss, 2012).

4.4.4-Quantitative data reliability and validity

Validity can be defined as the degree to which an indicator assesses a concept in the manner for which it was developed, while reliability can be defined as the consistency of a concept's measurement (Saunders et al., 2009). Generalisability is to what degree the results of research can be generalised to another research setting. The generalisability of findings can be increased by selecting large samples (Voss et al., 2002). For instance, the data may come from different target respondents or different places.

Figure 4.10: Reliability, validity and generalisability



Source: Malhotra et al. (2017)

Figure 4.10 shows the different types of reliability, validity and generalisability for the evaluation of management research (Bryman & Bell, 2007). The reliability defined by Cronbach et al. (1963:44) as "*an investigator asks about the precision*

of reliability of a measure because he/she wishes to generalize from the observations in hand to some class of observations to which it belongs".

Malhotra et al. (2017) categorised validity into three types: content validity, criterion validity, and construct validity. Content validity refers to the suitability with which a scale has sampled from the proposed universe or domain of content (Pallant, 2013). It is also called face validity. Criterion validity applies to *"when an instrument is intended to perform a prediction function, and depends entirely on how well the instrument correlates with what it is intended to predict (a criterion)"* (Nunnally, 1978:111). Lastly, construct validity refers to establishing the correct operational measures for the constructs under research or concerns the theoretical association of a variable to other variables (Cronbach & Meehl, 1955).

Reliability is frequently evaluated based on the Cronbach's alpha and composite reliability coefficient. For all the constructs both values exceeded the widely recognized rule of thumb of 0.70 (Nunnally, 1978; Hair et al., 2010). Table 4.12 shows the Cronbach's alpha and Composite reliability of SCRM strategies and FP.

Table 4.12: Reliability test

Strategies	Cronbach's Alpha (α)	Average Variance Extracted (AVE)	Composite Reliability (CR)
Information Sharing	0.71	0.66	0.85
Supply Chain Coordination	0.88	0.64	0.87
Risk Sharing	0.85	0.50	0.73
Supply Chain Finance	0.91	0.50	0.87
Supply Chain Security	0.87	0.45	0.72
Facilitation Payment	0.92	0.72	0.91
Financial Performance	0.93	0.73	0.89

Source: Author

With regard to this study, a primary pool of scale items was generated through an extensive literature review of SCRM strategies to establish the content validity of the survey constructs. For criterion validity, the researcher employed Pearson's correlation coefficient was used to test the relationships between the constructs (SCRM strategies) and the outcome variable (FP). Five of the independent variables (except facilitation payment) have statistically significant positive correlations with FP (see Table 7.6). Based on the findings of the bivariate correlation analysis, the theoretical constructs of this study confirmed acceptable levels of criterion validity

(Nunnally, 1978; Hair et al., 2010). According to Hair et al. (2010), for construct validity, the composite reliability and average variance extracted (AVE) should be higher than 0.70 and 0.50. Table 4.12 indicates that six of the seven factors have AVE values equal to or exceeding the threshold value of 0.5, while one (SC security) just slightly miss the 0.5 threshold value.

There are several techniques to improve the accuracy of statistical prediction. The prediction model involves predictor variables that have different units or degrees of variation. Thus, it is essential to eliminate multi-collinear independent or predictor variables. The data normalization can improve the network training capability which can increase data handling efficiency and astringency speed (Bekhet & Eletter, 2014).

Goldstein (1993) provided two indices to check multi-collinearity: Variance inflation factor (VIF) and Tolerance. The VIF values point out whether a variable has a strong linear regression with the other variables. The variance inflation factor is frequently used for assessing multi-collinearity in regression analysis and tolerance its inverse method.

Tolerance is a gauge that describes how much of the variability of the independent variable is not explained by the other independent variables in the regression model. The tolerance is the inverse of VIF or 1/VIF, not less 0.1. When the tolerance value is less than 0.1, it indicates that the multiple correlations with other independent variables are high. The following Table 4.13 highlights the threshold values for multicollinearity.

Table 4.13: Thresholds for VIF and Tolerance

Authors	Methods	Thresholds
Neter et al. (1983), Kline (1998), Groebner et al. (2005), Saunders et al. (2009) and Hair et al. (2010)	Variance inflation factor	<10
Hair et al. (2010)	Tolerance	>0.2

Source: Author

The researcher employed the VIF and tolerance. Table 4.14 highlights VIF and tolerance scores for SCRM strategies and FP. It shows that the highest VIF value is 4.95, below the threshold of 10. Similarly, the tolerance is greater than or equal to 0.2.

Table 4.14: VIF and tolerance of this study

Strategies	VIF	Tolerance
Information Sharing	2.64	0.38
Supply Chain Coordination	4.95	0.20
Risk Sharing	4.94	0.20
Supply Chain Finance	3.57	0.28
Supply chain Security	3.48	0.29
Facilitation Payment	1.44	0.69

Source: Author

4.5-Research Ethics

Research ethics are highly considered amongst academic institutions. They are concerned with the ethics of human conduct, and play a vital role to safeguard human rights. A large number of researchers have placed emphasis on the need to ensure ethics in data collection, not to infringe on participants' rights and not to harm the participants (e.g., Israel & Hay, 2006; Murphy & Dingwall, 2007; Oliver & Eales, 2008).

This study might be judged to be high risk in the context of terrorism. The researcher was fully aware of all the related ethical codes. Therefore, the researcher followed the guidelines of the University of Hull and the advice mentioned in the literature to ensure that data collection and the overall research fulfilled ethical considerations (Murphy & Dingwall, 2007; Oliver & Eales, 2008).

- Organisational consent was obtained from the interview respondents (i.e., logistics managers, managing directors, owners of the firms).
- The right to withdraw consent at any time was given to respondents in both interview and questionnaire, should they have any doubt regarding the study process or the use of the information. For this purpose, more than one set of contact information (i.e., the researcher's and the research supervisor's) was provided.

- The University of Hull ethics guidelines for the conduct of research were followed and the consent forms were submitted to the university research ethics committee.
- The interview date and time were arranged according to respondents' convenience and availability.
- In the context of terrorism, it was very important to ensure the anonymity and confidentiality of respondents and organisations and not mention their names or information, which had potential to influence their confidentiality.
- The interview guide was emailed before the interview date and before conducting the Skype interviews. Consent for recording was requested, with respondents' right to turn it off any time.
- The interview transcripts were emailed to the respondents for two purposes, 1) to validate that the interviewer had understood correctly and 2), in case they wanted to change anything from a privacy perspective.
- In the process of data collection, analyses and interpretations care was taken to ensure that there was invasion of confidentiality, on deception.

4.6-Time horizons

According to Saunders et al. (2009), the research time horizon can be defined as the time taken to research the phenomena on, and it is independent of which research methodology is chosen or the choice of research technique/method. The two approaches are a cross-sectional and a longitudinal. The cross-sectional approach means that "*collecting data on more than one case at a single point of time*" (Bryman & Bell, 2007:44). It normally involves questionnaire and structured interviews, but could also include other data collection methods such as structured observation, content analysis and secondary data. In contrast, in a longitudinal approach, the researcher conducts several observations of the same topics over a period, sometimes lasting many years. It is considered to improve the external validity of the results.

For this study, the cross-sectional approach was used to explore SC risk and SCRM strategies' impact on FP, due to the practical limitations of longitudinal approach, since the researcher had to conduct the interviews and questionnaire survey in the limited time of a PhD.

4.7-Triangulation

Triangulation strongly increases the validity, reliability and overall quality of the research (Yin, 2009; Bryman & Bell, 2015). It also reduces the bias of data sources, methods and the researcher (Collis & Hussey, 2009). There are four types of triangulation: Triangulation of theories, Data triangulation, Investigator triangulation and Methodological triangulation (Easterby-Smith et al., 2012). Several studies strongly recommend the use of more than one research method for deeper understanding and to explore one phenomenon from many viewpoints (e.g., Mangan et al. 2004; Ellram, 1996; Grant et al., 2010). Näslund (2002) said that the use of triangulation is more significant for developing disciplines, such as SCRM.

This study triangulates in two ways: the use of multi-methods and data triangulation. First, this study employed a mixed methodology to maximize its strengths and minimize the weaknesses of adopting a single methodology (Easterby-Smith et al., 2012). Second, this study used the data triangulation method (Easterby-Smith et al., 2012). Initially, qualitative data was collected to identify key themes in data. Exploratory semi structured interviews were used to produce a detailed perspective of SCRM strategies' impact on FP and allowed the researcher to identify the pertinent conditions (strategies). Furthermore, this study employed quantitative data (a questionnaire) by using the rigorous fsQCA to confirm that these conditions are linked with FP.

4.8-Summary

This methodology chapter has explained the overall research design of this study and explained in detail the methods employed in each research stage. First, it discussed the research design, outlining the positivist research philosophical stance, abductive research approach and mixed method research choice for this study.

Second, it discussed and justified the research method (interviews) and qualitative content analysis used for the exploratory study. Third, it discussed use of questionnaires, and the fsQCA technique for confirmatory study. The following chapters from Chapter 5 and Chapter 7 apply this methodology to empirical settings to explore the SC risks and SCRM strategies in a TAR, Pakistan.

Chapter Five

Qualitative Findings

5.1-Introduction

This chapter introduces the findings from the semi-structured interviews to answer the following research questions: **QR2 (a & b):** (*SC risks and frequent risks in TAR),* **RQ3 (a & b):** (*commonly employed SCRM strategies in that region)* and **RQ5*:*** *(war on terror impact on logistics industry).*

First, this chapter presents a descriptive analysis of respondents' profiles, such as interviewees' experience in the industry, job titles annual revenue of firm and number of employees. Second, this chapter presents the following themes: the first themes, the definition of risk, that is, how interviewees defined the risk in the TAR. The second theme is the identification of SC risks in that region. The third theme is the identification of SCRM strategies adopted by firms in that area. The fourth theme concern whether these SCRM strategies are perceived as critical for the FP of firms or not. The last theme deals with the war on terror, and whether that war had beneficial or damaging impacts for firms in that region.

5.2-Descriptive Analysis of Respondents' Profile

Thirty-five semi-structured interviews were conducted through Skype. Only eleven interview participants allowed the researcher to record their interviews. The main reasons behind the refused to allow recording of interviews were the sensitivity of the topic and their misunderstanding that the researcher might be a secret agent or work for a terrorist group. One of the participants was worried about the privacy of recording. After clarification, they only agreed to take notes of interviews.

The researcher observed several points during the interviews: For example, there were no formal SCRM practices in SME firms and the majority of firms were owned by families. The most interesting finding was that interview participants were all men.

Table 5.1: Characteristics of respondents

Industry	No Resp	The range of Experience (Years)	No Resp	The range of Employees (Number)	No Resp	The range of Revenue Million PKR	No Resp
Manufacturing	16	Less Than 5	1	Less than 50	3	Less than 100	0
		6-10	1	51- 100	3	101 – 200	8
		11-20	14	101-500	2	201-300	3
		More Than 20	0	More Than 500	8	More Than 300	5
LSPs	12	Less Than 5	0	Less than 50	6	Less than 100	7
		6-10	4	51- 100	3	101 – 200	4
		11-20	5	101-500	3	201 - 300	0
		More Than 20	3	More Than 500	0	More Than 300	1
Energy	4	Less Than 5	0	Less than 50	0	Less than 100	0
		6-10	0	51- 100	1	101 – 200	1
		11-20	3	101-500	1	201 - 300	0
		More Than 20	1	More Than 500	3	More Than 300	3
Automotive	3	Less Than 5	0	Less than 50	0	Less than 100	0
		6-10	0	51- 100	1	101 – 200	1
		11-20	0	101-500	0	201-300	0
		More Than 20	3	More Than 500	2	More Than 300	2
Total	35		35		35		35

Source: Author

The above table 5.1 illustrates some of the key characteristics of the interview respondents. First, the majority of the respondents (63%) had 10 to 20 years of experience in the industry. Twenty percent of respondents had more than 20 years of experience and 17% of interviewees had less than 10 years of experience. Table 5.1 also indicates that LSPs and automotive industries had more experienced people as compared to manufacturing and energy industries. Additionally, the majority of respondents belonged to the logistics industry. Average work experience was 16.9 years, which indicates that they had adequate informant knowledge about the topic. Second, in terms of the number of employees, 51% of all firms had fewer than 100 employees, while 37% of the firms had more than 500 employees. Last, 40 % of firms' annual revenue was between 100 and 200 million PKR, 31 % had more than 300 million PKR, while 20 % of firms had less than 100 million PKR.

5.3-Qualitative Content Analysis

The 'word frequency' query was run in Nvivo 11 to determine various themes on interview transcripts and notes. The top 20 words, frequency and weighted percentage in interview transcripts and notes are presented in Table 5.2.

Table 5. 2: Word frequency of semi-structured interviews

Words	Count	Weighted %	Words	Count	Weighted %
Risk	1709	6.87	Cost	204	0.82
Vehicle	548	2.20	Supplying	186	0.75
Security	460	1.85	Bribe	170	0.68
Transport	402	1.62	Damage	160	0.64
Loss	394	1.58	Threat	159	0.64
Financial	387	1.55	Contracts	157	0.63
Manage	250	1.00	Profit	153	0.61
Terrorism	247	0.99	Products	153	0.61
Money	224	0.90	Attacks	149	0.60
Paying	207	0.83	Custom	142	0.57

Source: Author

Word count and weighted percentage indicate the frequency and frequency ratio of a word to the total word count, respectively. The main purpose of word count is to determine the significance of key themes. The text mining produced some interesting results. The word "risk" had a weighting of 6.86 and mainly referred to organizational and network-related turbulences. This was followed by the words "vehicles" and "security" with 2.25 and 1.85 weighted percentages respectively. These words showed its significance in the context of the TAR. Figure 5.1 presents the word cloud of the top 50 words occurring in the interviews.

Figure 5. 1: Word cloud of semi-structured interviews

Source: Author

The size of each word signifies its relative frequency. Word clouds were used to visualize the focus of their content. The Word cloud above shows an example of such cross-checks, mainly focusing on risk, security and finance.

However, six broad themes emerged from the semi-structured interview analysis. These were the definition of risk, sources of risk, SCRM strategies, SC risks' negative impact on FP, SCRM's positive impact on FP and war on terror impacts on LSPs.

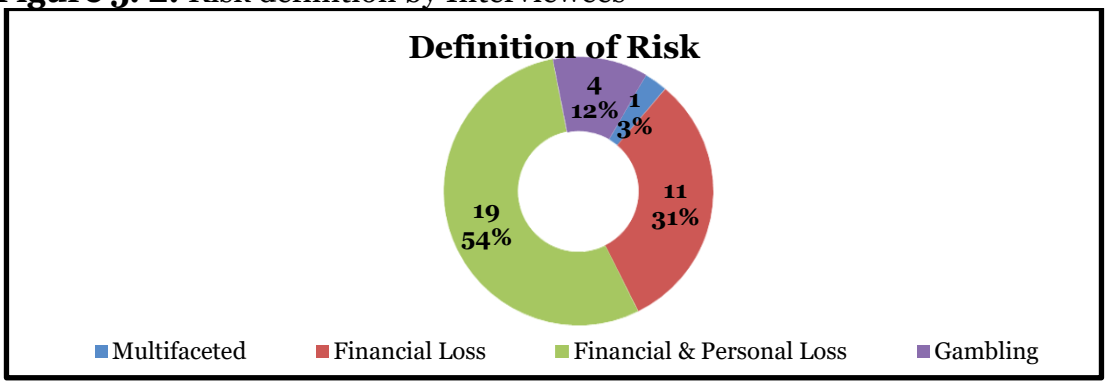
5.4-Theme 1: Definition of SC Risk

The interview participants defined SC risk in four main aspects:

1. The probability of financial and life loss
2. The probability of financial loss
3. Gambling (Chance)
4. Multifaceted

More than half of the participants believed that risk is a combination of financial loss and life loss. For example, interviewee No 3 said, "*in both ways, financially and life risk"*. This finding was also reported by (March & Shapira, 1987; Sheffi, 2005; Craighead et al., 2007; Wagner & Bode, 2008; Heckmann et al., 2014). Another interviewee No 22 defined SC risk and said that "*we think risk is financial and personal losses"*. The main reason behind that definition is that terrorist attacks or other major incidents can generate the financial loss of goods and vehicles, and life loss of employees. However, 31 percent believed that risk is a financial loss. Only one participant defined risk as multifaceted (having different faces). Risks can arise from factors that originate from the outside environment as well as inside organization (external and internal risk factors). This finding is consistent with that of Christopher & Lee (2004). For example, interviewee No 18 said that "*there is a risk to the security of the people, and there is a risk because of the quality of the people*". A few interviwees Nos (2, 9, 15, 24) defined risk as equal opportunity of gain or loss. For example, interviewee No 16 said that "*it's like gambling*". Figure 5.2 highlights the risk definition by interviewees.

Figure 5. 2: Risk definition by Interviewees

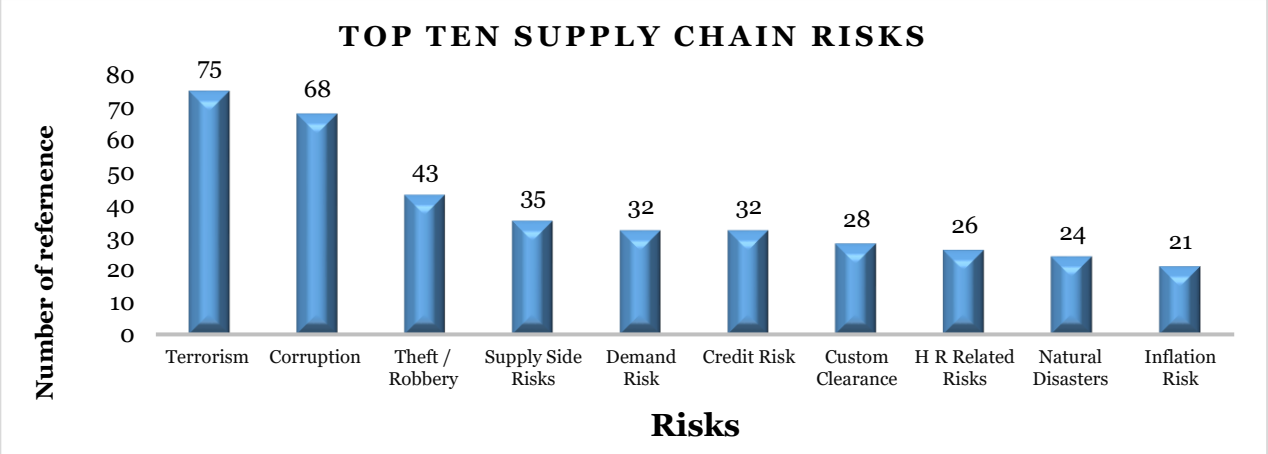


Source: Author

5.5-Theme 2- SC Risk Identification

Several risks were mentioned by interviewees. However, the researcher will only highlight the ten risks most frequent mentioned by interviewees and their negative impact on the SC. Figure 5.3 highlights the frequency of the mentioned risks.

Figure 5. 3: Ten most frequently mentioned risks by Interviewees



Source: Author

5.5.1-Terrorism Risk

Terrorism is the top SC risk in TAR and almost 91% of interviewees acknowledged it. For example, interviewee No 13 said, "*It was the biggest threat to us*". Another interviewee No 33, when asked about terrorism said, "*The biggest physical risk to LSP is got to be the security of people*". In particular, the Taliban and other terrorist groups are key assailants on SC in that region. As interviewee No 15 mentioned, "*The risk of Taliban is a great issue----- a lot of convoys were hit*". It also extremely affected the SC efficiency as confirmed by interviewee No 21, "*Terrorism risk has a tremendous negtive influence on our business*". This finding match those

observed in earlier studies (e.g. Sheffi, 2001; Tang 2006b). However, terrorism consists not only of physical threats to business (e.g. destruction of goods, logistics infrastructures and vehicles) but also threats to employees' life. Talking about this issue, interviewee No 17 said there was "*great risk to drivers' life"*.

Delivery Risk of Foreign Goods

The delivery of foreign goods caused a huge risk to LSPs due to the Taliban, who believe that the foreign manufacturers of these goods support the "foreign occupation" in Afghanistan by paying taxes to their governments. A few interviewees Nos (1, 6, 19) also mentioned the foreign-manufactured products are dangerous to supply in terrorist-controlled area, particularly in the north of Pakistan and Afghanistan. For example, interviewee No 11 said, "*If the Taliban stopped our trucks and noticed that the vehicle was carrying foreign goods, especially Western products, they used to burn it down and beat the driver"*. However, this result has not previously been described.

Regional Risk

The number of attacks on the supply chain varies according to area. For example, the areas (Baluchistan and Khyber Pakhtunkhwa) close to the Afghan border are more risky for the supply chain. Historically, these areas have been rebellious and ungoverable since the time of Alexander the Great. However, the east and south parts (Punjab and Sindh) of Pakistan are relativelly peaceful regions. For example, interviewee No 12 mentioned that *"they target our vehicles and drivers from the Jam road (Peshawar Pakistan) to Torkham (Pak-Afghan border crossing) and from Torkham to Jalalabad and to route to Kabul"*. This is the main northern route (through the famous Khyber Pass) to Afghanistan. Another interviewee similarly mentioned that "*it is a very dangerous route"*. This finding broadly supports by other studies (e.g. Sheffi, 2001; Jüttner et al., 2003; Craighead et al., 2007; Hong & Ng, 2010; Yang, 2011; Ekwall, 2010; Wieland, 2013; Das & Lashkari, 2015).

Border Closure Risk

Another SC risk associated with terrorism is closure of the border between Pakistan and Afghanistan. For example, interview No 31 mentioned that "*If there is any terrorist attack in Pakistan, the blame goes to the Afghan National Directorate of Security (NDS); consequently the border is closed between two countries"*.

Another interviewee No 6 mentioned that "*the government closes the borders without any notice"*. This result reflect those of (e.g. Nurthen, 2003; Chopra & Sodhi, 2004; Cedillo-Campos et al , 2014) who also found that border risk in SCRM literature.

As a result, the entire SC was halted between the two countries and generated financial losses for firms, such as rotting of fresh fruits and vegetables, delay in deliveries and the need to make extra payment to transporters. The impact of these border closures on the SC was very negative. For example, one interviewee mentioned that in 2011, for eight months Pakistan closed its border to Afghanistan because the NATO attacked a Pakistani army checkpost. As a result, the NATO logistics cost was increased by one-third due to use of the Northern Distribution Network (from Baltic and Caspian ports through Russia to Afghanistan).

Low Employee Morale

Terrorism is one a factor that contributes to the low morale of employees in that region, as interviewee No 2 mentioned: *"Sometimes (they are) afraid of being shot dead"*. Another interviewee said that "*drivers have been shot and the goods have been stolen, especially the NATO supplies"*. Talking about low morale, an interviewees Nos (5, 15, 34) mentioned "*physical threat to the life of the people, serious losses were made of drivers' lives-- there were also individual threats"*. Similarly, another interviewee No 29 mentioned that "*For approximately three months we didn't wear the company uniform because through our uniform we are easily recognisable"*. This was significant because the organizations' uniform is a source of pride for employees in Pakistan, especially for security forces. This finding is consistent with that of Reade (2009) who identified the impact of terrorism risk on supply chain empolyees.

Terrorism not only affected the efficiency of workers but also increased absenteeism among workers. As mentioned by an interviewee, a large number of logistics workers have left the industry, in particular, NATO logistics providers were a favourite target for terrorists. Another reason for low morale is the bad condition of roads in that area, which can be exhausting for logistic workers. For example, one interviewee mentioned that from Karachi ports to Torkham, truck takes eight days to travel 1200 Km. In addition, the long waiting and harassment by the authorities at the border could also lower the employee's morale. Similarly,

the police are a major source of the low morale of logistics employees, due to the harassment of drivers for corruption. As interviewee No 12 said, "*They have the power to check all documents such as ID cards, passport and others documents. They harass drivers in both countries (Pakistan and Afghanistan). Even after being shown all the paperwork like slips, ID cards and passports, they still ask for money; every checkpost has its fixed price".* Generally, they are also involved in physical assaults of logistics workers and damage to vehicles, as mentioned by interviewee No 17.

5.5.2-Corruption Risk

The corruption or bribery of police, customs and border security forces is a key risk to firms in that region; 71 percent of interviewees are mentioned the corruption risk. As interviewee No 11 said *"There is a lot of corruption in the SC"*. In particular, the firms need to pay bribes for safe passage of their trucks in high-risk areas. For example, interviewee No 26 said, "*It is impossible to pass the Taliban area without a bribe"*. This study partially supports evidence from previous studies (e.g. Nguyen, 2006; Liu et al., 2010; Arnold et al., 2012; Antero, 2015; Schlegel & Trent., 2014; Silvestre et al., 2018). This is also linked with other related risks, as described in the following paragraphs:

Corruption Culture

Bribery is a cultural norm in Pakistan. It is a necessity for firms to pay the police, customs, and terrorist groups in order to do business in that region. For example, a interviewee No 32 said "*It has become norm now to pay a bribe*". Otherwise, these bodies can hurdles to the business, to force firms to pay them. Reflating this, interviewee No 19 mentioned that, "*all you need to do is pay the bribe*".

There are two main perspectives about corruption in that area. From a business perspective, it is a key to doing business and generally it is accepted among business people. From a control (authority) perspective, officials believe that it is their right to accept bribes because of their low wages. They do not feel any shame or accountability for asking for a bribe. Hence, interviewee No 14 said that "*corruption is a way of life*".

The corruption not only increases the transportation cost, but also increases the lead-time. A logistics manager said that his firm included all bribery costs in the

fare and it account for almost 30% of the total transport fare. Another interviewee No 15 mentioned "*We lost too much money in bribes--- the Taliban were asking for US $500 per vehicle"*. Non-payment or a demand for extra bribes can cause an unnecessary delay to firms. For example, interviewee No 9 mentioned that "*the government officials from both sides never let a vehicle pass by if drivers refuse to bribe them*".

Detention Risk

Detention risk is also linked with corruption. The non-payment of a bribe can lead to detention of vehicles and employees. As interviewee No 13 mentioned, *"Our vehicle was left standing in a customs house for seven months*". This caused a financial loss to LSPs, as a result of non-utilization of the vehicle and employee. Similarly, the customer's firm also suffered from financial losses because of goods lost and damage during detention. However, this finding is partially consistent with that of (Marlow, 2010; Fu et al., 2013; Jens Vestergaard et al., 2013) who identified delention risk in shippling industry.

Authority Blackmailing Risk

Risk of authority blackmail is another risk associated with corruption. Often, the regulatory authorities blackmail the firms for bribes in that region. Most of firms do not keep their official records up-to-date, or have some deficiency in their financial records and legal documents. Therefore, they can easily be blackmailed on account of these deficiencies to be forced to pay a bribe. As one interviewee mentioned, "*It's kind of blackmailing tactics to (make us) pay them*". Another interviewee No 9 said, *"Tax blackmailing is the norm here. Even a firm has complete documentation"*. Officials can use loopholes in law. Another interviewee No 18 mentioned, *"For whatever reason, they can catch our vehicles (for bribery)"*. However, this result has not previously been described.

Employee Corruption

Employee corruption is a common issue in SC, especially in procurement of raw materials and granting logistics contracts. For example, interviewee No 15 mentioned that a few procurement officers are often involved in corruption and accepted the low-quality tobacco leaves from farmers. Similarly, logistics contracts are a source of corruption. As interviewee No 17 mentioned, some firm's logistics

managers are frequently involved in corrupt practices in the award of logistics contracts. This finding was also reported by (Tipu & Fantazy, 2014; Antero (2015).

5.5.3-Goods Security Risks

The goods security risks are cargo theft and robbery. This is a major concern for firms in that region. For example, interviewee No 3 mentioned that "*robbery and attacks were normally a daily routine*".

Cargo Theft

Theft of goods and vehicles are very common risk to firms in that area, especially valuable goods such as fuel, pharmaceuticals and electronic goods. Cargo theft and pilferage typically occurs from vehicles that are temporarily parked along the roadside restaurants, waiting for loading and unloading, and waiting for security checking at checkposts. In particular, the thieves frequently targeted the NATO supplies. For instance, interviewee No 8, "*In Pakistan, people open the container and re-seal it, even the NATO authority can't recognize it (any temper in seal), because of the fake seal*". This finding was also reported by King (2005).

Cargo theft is not only a financial loss to firms, but also a threat to employee and public life. Interviewee No 3 mentioned a recent example of cargo theft in Punjab (Pakistani province), in which at least 150 people were killed, when an overturned oil truck exploded among a crowd of fuel thieves.

Robbery Risk

The WoT has not only increased of number of terrorist attacks in that region, but also increased criminal activities against transportation because of the worse situation of law and order in the country. For example, interviewee no 32 revealed that "*they (thieves) beat the driver or put a gun to your head. There is a chance they'll kill you. The robbers also used a crane to unload the container*". Another interviewee No 25 mentioned that "*we are afraid of risk such as robbery, theft and vehicle kidnapping*".

Similarly, robbery is also associated with the theft of vehicles and kidnapping of employees for ransom. Generally, the firms are forced to pay a ransom to them, due to the non-cooperation of security forces in that area. This study supports evidence from previous observations (e.g. Drewry, 2009; Ekwall, 2010).

Terrorism and Criminality

Currently, terrorism and criminal activities overlap with each other in that region. Criminals took advantage of the situation and disguised themselves as Taliban in the northern part of Pakistan. Usually, the police do not proceed against terrorism related accidents. For example, interviewee No 30 mentioned that *"Thieves also took advantage of the security situation"*. Another interviewee No 11 said that "*They disguised themselves as Taliban. So, the drivers ran for their safety. They (the thieves) looted all vehicles*". However, this result has not previously been described.

5.5.4-Supply Risks

More than 50 % of respondents mentioned supply side risks to their firms. These risks are opportunistic behaviours of suppliers, supplier's inability to meet the order, the delay of delivery from the suppliers' side, the quality of raw materials and bankruptcy of suppliers. For example, interviewee No 16 mentioned that "*the key risk was probably, sourcing and quality, in terms of the fuel and energy that were supplied"*.

Similarly, supply side risks cause a delay in delivery for various reasons mentioned by interviewees Nos (2, 10, 17, 27, 35) such as a lack of SC knowledge, inability to fulfil the customer's orders, lack of inventory management and other local problems facing suppliers (e.g. strikes, weather). These findings were also reported by (e.g., Christopher & Lee, 2004; Blackhurst et al., 2008; Lockamy & McCormack, 2012; Schmitt & Singh, 2012; Tiwari et al., 2013; Nejad et al., 2014; He, 2017).

Opportunistic Behaviour Risk

The supplier's opportunistic behaviour is a common risk in that region. For example, interviewee No 12 said that "*here, the trust factor is not counted, mostly due to the profit margin*". Talking about this issue, interviewee No 18 said that during the WoT, the LSPs have shifted from local customers to international customers (e.g., NATO supply contractors) for the sake of high fares and prepaid insurance. Another form of supplier's opportunistic behaviour is an illegal hoard of raw materials. Hoarding is a common practice in the food SC and energy SC (liquid gas) in that region. This finding supports evidence from previous studies (e.g., Kwon & Suh, 2005; Khan & Burnes, 2007).

Capacity Risk

The supplier's/transport capacity risk means the incapability of the supplier/transporter to meet the order of customers. Most Pakistani firms depend heavily on international suppliers, as well as some local suppliers. However, the local suppliers/transporters do not have the capacity to meet large orders/demand. For example, interviewee No 24 mentioned that the majority of transport firms have small fleets. Therefore, they are not able to meet his firm's demand. Another interviewee No 28 mentioned that *"A 1000-ton target was given for delivery; if you pick up 300 tons, on the remaining 700 tons, they charged you Rs 300 per ton a day"*.

Moreover, Pakistan has been confronting a severe energy crisis for a decade and the gap between production and consumption is widening every year. A common view amongst interviewees was that the state owned energy providers are not capable to produce enough energy for their operations.

Quality Risk

Supply side risk also is related to the quality of raw material or finished goods. As one interviewee mentioned, there is a huge challenge of regarding tobacco raw material quality, such as tobacco leave's colour, wetness and shape. The main reasons are farmers' use of the traditional barns and techniques to dry the tobacco leaves.

There is also huge risk of counterfeit products, such as food items, lifesaving drugs, spare parts and low quality smuggled Iranian oil. For example, interviewee No 32 said that "*the law is too weak to control illegal and low quality medicines in the market."* This finding is in line with those of previous studies (e.g. Christopher et al., 2004; Tummala & Schoenherr, 2011; Das & Lashkari, 2015; Kauppi et al., 2016).

Bankruptcy Risk

The bankruptcy of suppliers is a very common risk on the supply side. In Pakistan, suppliers face many difficulties in access to finance for their businesses. For example, a few interviewees Nos (9, 12, 14, 31) mentioned that the tobacco growing farmers find it difficult to buy raw materials such as fertilizers, seeds and chemicals for their crops. Similarly, bad weather can also cause famers' bankruptcy, which can increase supply risk to tobacco firms. Especially, in the food SC, agricultural

suppliers (farmers) face cash flow problems due to high inflation in the price of fertilizers, energy and other agricultural related products, which can lead the supplier to bankruptcy.

5.5.5-Demand Risks

Demand risk was frequently mentioned by interviewees. All LSPs interviewees agreed that the demand for LSPs is dropping gradually, due to NATO's withdrawal from Afghanistan. As interviewee No 16 said, *"At that time, fares were very great. During the war on terror our companies made good money------Now everyone losses the money, such as transport companies, drivers, even the checkpost people (security forces)".*

Similarly, terrorism can cuase uncertainty in that region, which forced businessmen and inverstors to take their business and inversment to more secure regions. For example, interviewee No 2 said that "*95% of customers of the industry left and moved to other countries---Some of them migrate to the Middle East (Dubai), the USA and UK-- So the industry will be going out of business".* This finding was also reported by (e.g., Miller, 1991; Chopra & Sodhi, 2004; Tummala & Schoenherr, 2011).

Afghan Demand Risk

Afghanistan is a landlocked country and most of its trade goes through Pakistan. A large number of Pakistani firms export goods to Afghanistan. Pakistan is the main source for exporting food items, construction materials, chemicals and pharmaceuticals to Afghanistan. However, now the demand is more volatile in Afghanistan due to uncertainty, particularly after NATO withdrawal. For example, cement is a common export product to Afghanistan. However, interview No 27 mentioned that "*now the cement is coming from Iran. So demand is down*." A logistics manager mentioned that "*the NGOs' (Non-Government Organizations) work is finished to Afghanistan-- The NGOs' contracts are rarer now".* However, this result has not previously been described.

Demand Anticipation Risk

Demand anticipation is a risk of low volume production or manufacturing, which can lead the firm to high demand risk. It can affect a firm's reputation and even lead to bankruptcy. For example, interviewee No 16 said, "*We anticipated an*

increase in demand, so we increased our capacity to more than 25 million tons ---- we mismatched the demand". This finding is consistent with that of (e.g., Giunipero & Eltantawy, 2004; Hendricks & Singhal, 2009) who identified the demand anticipation risk.

Similarly, LSPs invested heavily in terms of vehicles and logistics infrastructure due to the high demand of from NATO. However, after the NATO withdrawal, they suffered huge financial losses due to non-utilization of vehicles and infrastructure, as mentioned by interviewee No 13. The Pakistani economy is very fragile and GDP growth has been very slow for the last few years (see Figure 3.1). It is not capable to generate a demand for these LSPs. Therefore, the demand risk is a very serious issue for Pakistani LSPs.

5.6.6-Credit Risk

Seventy-seven percent of respondents mentioned the credit risk to their firms. They are exposed to credit risk on trade accounts receivable (customers, dealers and advance payment related to long-term supply contracts). Occasionally, they have a risk of non-trade receivables, such as loans to employees and advance wages. The main cause of credit risk is the bad economic conditions in this region. For example, interviewee No 32 said, "*Still, millions of rupees in receivables are stuck in the market*".

The problem increases with new customers or dealers. As interviewee No 11 mentioned, "*Definitely, we have this risk, if the customer is new to our company".* However, a few interviewee mentioned Nos (7, 11, 24, 32) that they had changed their firm's credit policy for new customers, such as regarding an advance security payment, conducting credit assessment and asking for references. For example, interviewee No 19 said, "*We have no problem of credit risk. They pay the fare first, and then take the goods*". This is in accord with recent studies indicating credit risk in SC (e.g., Chopra & Sodhi, 2004; Zhu et al., 2016).

5.5.7-Customs Clearance Risk

Customs clearance is a significant risk for firms in that region. It causes a long lead-time for firms. As interviewee No 9 said, time is a vital metric in customs clearance and depends on the nature of goods. Another interviewee No 23 mentioned that

"*Customs clearance takes 7-14 working days in Karachi, subject to all documentation being in order".*

Another issue in customs clearance is corruption. As interviewee No 15 mentioned that "*The custom authority did not accept our documents--- the customs authority charges us Rs 4000 or 5000 per vehicle*". Occasionally, they instigated a delay tactic to force firms to pay more bribes to them. For example, they can ask for unnecessary documentation or demand needless fumigation of a product for drug checking. Interviewee No 18 mentioned that "*they drill into box or product, and as a results the product is damaged. Suppose you have furniture in that box. If I deliver the damaged furniture to the destination, I will lose that customer".* This finding is consistent with that of (e.g., Sheffi, 2001; Vilko & Hallikas, 2012) who identified the customs clearance risk in global supply chain.

5.5.8-HR-related Risks

Human resource-related risks are employees' dishonesty, departure of skilled employees, the lack of skilled labour and usage of drugs by truck drivers.

Employee's Dishonesty Risk

The risks arising from employees' dishonesty are theft of money and fraud. Employees steal expensive products such as electronic products and fuel. As interviewee No 1 said, a manager mentioned that, "*the driver had opened that container very skilfully"*. In the process of procurement of raw materials and sale of products, the risk of employee fraud is increased. For example, interviewee No 21 mentioned that often salespersons sold products on credit to dummy vendors, and found out that they were bankrupt. Another example, mentioned by interviewee No 16, was the following: *"when I did not increase the wages of the driver, then the driver said to his cleaner (helper). Go to my house and bring my AK47 (gun) and go to that mountain, where I will pass with my vehicle and from there you will target the oil tank, not me".* This shows how the drivers manipulated the security situation to increase their wages in a fraudulent way. This finding was also reported by (e.g., Tipu & Fantazy, 2014; Antero, 2015).

Skilled Employees Leaving Risk

The risk of skilled employees leaving to join other firms or start a similar business is a common issue for SMEs. As interviewee No 24 mentioned, "*He left this job and*

started his own company and also took my company's customers". Such loss is especially problematic as unskilled employees are a risk to the firms due to their low professional literacy. For example, interviewee No 17 said, "*There is a risk of because of the quality of the people*." Ignorance can also cause financial distress to firms. For example, one interviewee revealed that one worker used a 5-ton capacity forklift to try to lift 25 tons, because of the lack of professional knowledge about machinery and as a result, he damaged the cargo.

Driver Specific Risks

Driver specific risks are overloading, dangerous driving and drug addiction. First, the overloading of vehicles can cause damage to vehicle and the road. It can not only put the driver's life at risk, but also pose a risk to other road users. Overloading is common in the LSPs industry, due to lack of implementation of traffic laws in that area. Most of firms seek to maximize their loads in order to reduce their operating costs to maximize their profit. As interviewee No 30 stated, "*It's not up to me, I want to avoid overloading myself, but everybody must do it to sustain a good business. There is competition over overloading; everybody is fighting with tooth and nail to beat his competitor to capture the market*". However, overloading can also cause huge financial losses to LSPs firms. As interviewee No 2 mentioned, *"Four to six vehicle incidents happen on a daily basis due to overloading. It is a huge loss for us"*.

Pakistani truck drivers are notorious for dangerous driving. The main reasons for that are a lack of traffic knowledge, pressure to complete the job on time and the bad condition of roads. These factors force drivers into dangerous driving, as mentioned by interviewees Nos (20, 26, 31, 32).

Generally, truck drivers do not have regulated working hours in Pakistan and there is no equipment fitted in vehicles for checking their hours, such as a tachograph. The truck driver's working depends on job completion. For example, interviewee No 22 mentioned that the estimated transit time from Karachi to Kabul is 15 days and one or two drivers covered this time.

Drug usage among drivers is very common practice in the LSPs industry. Due to the long working hours, truck drivers are attracted toward the drug cannabis, which known locally as "Charas". Usually, truck driver's excuse for using the drug that it

helps them to focus on the road and avoid accidents, as mentioned by interviewee No 11. This finding was also reported by Kersten et al. (2012).

5.5.9-Natural Disaster Risk

Negative impacts on the SCs are understandable, since production plants and transportation are highly vulnerable to natural disasters. The risk of natural disasters such as floods, fog, fire, smog (a combination of fog and smoke), earthquakes and bad weather are catastrophic for Pakistani firms and affected their operations. Such impacts are more critical to their financial viability. These findings are in line with those of previous studies (e.g., Miller, 1991; Chopra & Sodhi, 2004).

Weather Risk

Weather risk is one of the cause of financial losses in that region. For example, interviewee No 6 mentioned that "*bad weather is also a risk. If the goods are damaged by rain, then we have to pay the customers*". Another interviewee No 25 identified how floods can damage logistics infrastructure (roads, bridges, and warehouses), causing severe disruption for firms. Describing such an event the interviewee No 18 said, "*It was heavy rain. We couldn't operate the route -- there was a road washout due to bad weather".*

In particular, the monsoon period (the rainy season from June to September in that region) increase the risk of flooding of rivers and creates huge disruption in the SC. Bad weather not only disrupts transportation operations, but also affects the agricultural SC. For example, interviewee No 11 stated that the rains affected the tobacco crop yield, so the tobacco industry was confronted with a shortage of raw materials, which led to a production stoppage.

Smog Risk

Smog is a serious natural disaster for the SC in central Pakistan. In winter, most farmers burn the stubbles remaining after the rice harvest, causing a thick blanket of smoke mixed with winter fog. As interviewee No 19 said, this causes enormous disruption for transportation because of low visibility on the roads. In particular, smog also causes huge disruption in the form of delay and rescheduling of flights. However, this finding has not previously been described.

Earthquake Risk

There is always the risk of an earthquake, particularly in the northern part of Pakistan. As interviewee No 22 mentioned, the massive earthquake in 2005 caused an extensive disruption in the SC and human losses.

Industrial Fire Risk

Industrial fire accidents are very common in Pakistan, for two reasons: first, firms' non-compliance with the fire safety regulations. Second, the lack of firefighting equipment and engines for industrial fires in Pakistan. An example is the notorious industrial fire in a textile factory in Karachi, which caused the loss of more than 300 workers' lives in 2012, as mentioned by interviewee No 2.

5.5.10-Inflation Risk

Inflation risk has a negative impact on firms' profitability. There are two main causes of the inflation risk in Pakistan. First, the fragile economic condition of the country (see Section 3.2). Second, the threat of terrorism has increased the cost of transportation security and other related costs.

Most of interviewees mentioned that the cost of production has been increased due to terrorism. In particular, it has increased the cost of insurance premiums, transportation and security, generated a rapid increase in wages, and caused spikes in commodities price and escalating fuel prices. For example, interviewee No 9 mentioned that *"because of concern about security the expenditure and everything has increased"*.

A few interviewees Nos (2, 15, 18, 25, 30, 35) said that the main reason for inflation is the WoT, because it suddenly increased the demand for labour, food items and construction materials in Afghanistan, which affected the local market. Similarly, the Government of Pakistan spent a huge amount of resources on encountering terrorism, which has affected the overall economy of the country and a rised inflation. On other the hand, the fragile economic condition of Pakistan led to devaluation of the currency, which caused a huge increase in the balance of payment (see Table 3.1).

Increasing energy costs are a significant risk for firms, which have been confronted with energy shortage for the last ten years. Government-owned energy suppliers are the main source of energy supply. However, the self-generation of energy is

more expensive in that region. For example, interviewee No 19 said that heavy duty diesel-electric generator operation and solar panel installation are more expensive than Government-owned energy suppliers. Talking about this issue interviewee No 13 said, *"The rise in oil prices might force us to reduce the speed of our ships, but increase our operational costs and lead-time"*. This finding was also reported by (e.g., Ritchie & Brindley, 2007; Rao & Goldsby, 2009; Badurdeen et al., 2014).

5.5.11-Other SC Risks

The interviewees also acknowledged a large number of other SC risks. These include political uncertainty, competition risk, smuggling risk, cyber-attacks, port and transport strikes, reputational risk, counterfeit risk, financial risks (foreign exchange rates, liquidity risk, interest rate risk and market risk), regulation changes, lack of coordination among partners, sourcing and quality risk, poor business rules, legal risk and lack of insurance providers, especially in a TAR. These findings are in line with those of previous studies (e.g., Miller, 1991; Craighead et al, 2007; Wagner & Bode, 2008; MacPherson, 2008; Manuj & Mentzer 2008; Zsidisin & Ritchie, 2008; Mandal, 2011; Cruz, 2013; Badurdeen el at, 2014).

The most striking finding was the claim of paedophilia risk. For example, interviewee No 2 alleged, "*There are some checkpost officers who do this thing. Because, he knows that he is not accountable to anyone ---------Especially in Kandahar (Afghanistan) area, even a driver is at risk if he is beautiful to them*". Generally, officials kidnapped the young employee with his vehicle. However, a few interviewees Nos (16, 23, 28, 29, 34) denied that there is a paedophilia risk in their areas.

Another noticeable risk is the use of containers to stop protesters from entering to the main cities. The security forces seize the load or unload containers and block the main entrances to the city. For example, interviewee No 26 mentioned that in the event of any type of protest in the main cities, police seize and hold their containers, depending the length of protest, without any compensation. This can create a risk of delay in delivery to customers and financial losses to firms.

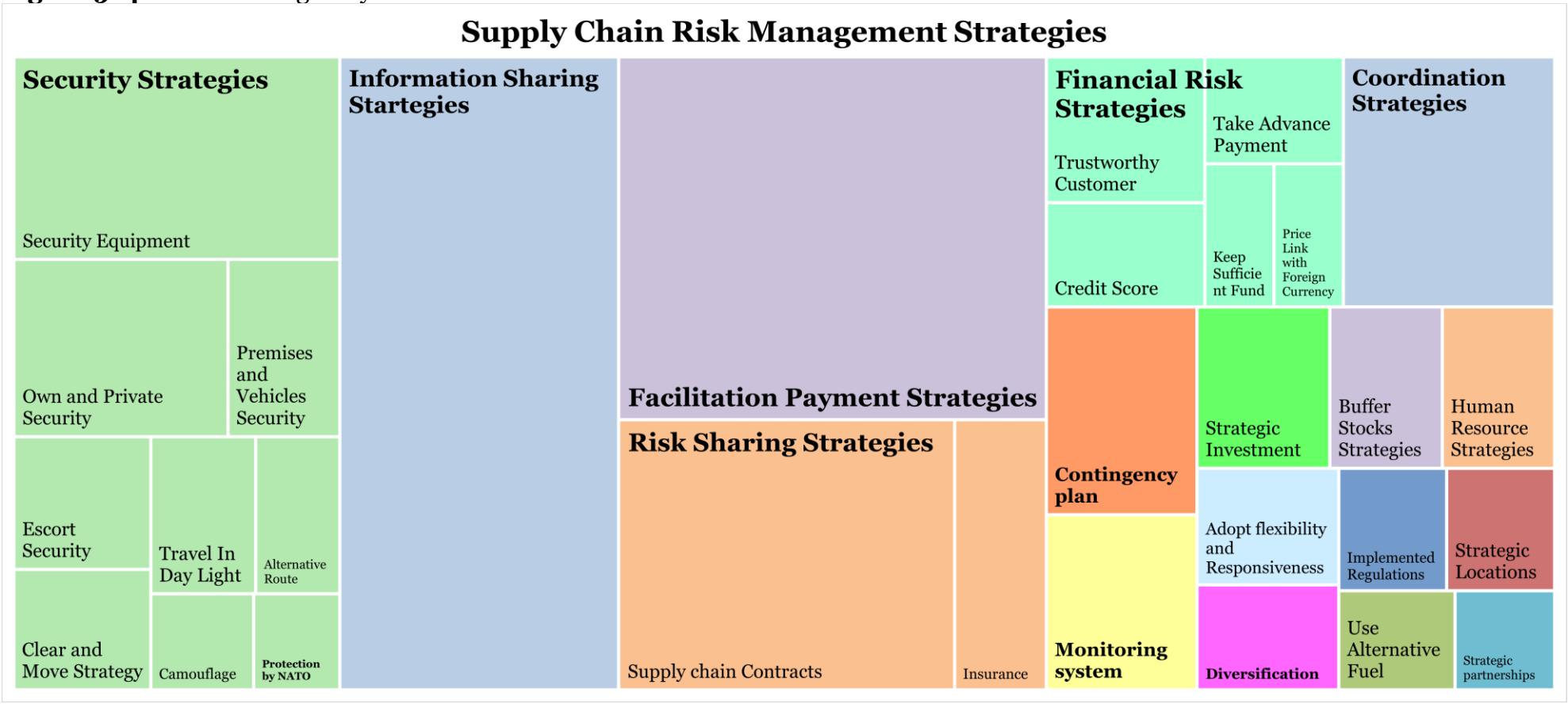
5.6-Theme 3: SCRM Strategies

Several SCRM strategies were mentioned by interviewees, such as security strategies, information sharing strategies, risk sharing strategies, facilitation payment strategy, contingency planning, monitoring systems, investment strategies, buffer stock strategies, human resource investment strategies, adopting flexibility and responsiveness strategic location strategy and diversification. However, the researcher only discusses the six strategies most frequently mentioned by interviewees in this study.

Figure 5.4 highlights the overall risk management strategies adopted by firms in that region. The size of each rectangle indicates its relative frequency. A tree mapping chart is used to visualize the interviewee's data, and display it in a hierarchical form.

The top six strategies can be discussed under six headings, which are SC security strategies, information sharing strategies, facilitation payment strategy, risk sharing strategies, SC financial strategies and coordination strategies.

Figure 5. 4: SCRM strategies by mentioned number references



Source: Author

5.6.1-Security Strategies

The SC security strategies means the adoption of security measures in the SC to secure and mitigate financial losses. The interview analysis revealed that the firms adopted different types of security measures such as hiring private security or hiring their own security guards for their premises and vehicles, installing security equipment, hiring a security escort for their vehicles, adopting clear and move strategy, using the security equipment, recording the exit/entry of each vehicle and employee, taking alternative routes, travelling only in daylight, camouflaging their vehicles and following industry initiated security guidelines. This finding is in line with those of previous studies (e.g., Rice & Caniato, 2003; Banomyong, 2005; Peleg-Gillai et al., 2006; Sheu et al., 2006; Autry & Bobbitt, 2008; Whipple et al., 2009; Yang, 2011; Voss & Williams, 2013; Yang & Wei, 2013; Zailani et al., 2015; Cigolini et al., 2016).

Usually, the firms hired private security guards for their premises to mitigate the risk of terrorism and theft. The firms also hired security escort for their vehicles from private security companies and national security forces. However, this is very expensive especially for SMEs. For example, interviewee No 6 said, "*To hire a security escort very expensive -------- They were charging us $1000 US per vehicle. The cost was too much*". In addition, the firms also installed different types of security equipment. For example, they installed trackers to monitor their vehicle's movements. They installed barbed wire and CCTV cameras around their premises. They also installed walk-throughgates and recorded the exit/entry to the main entrance to the factory or office, to reduce the threat of suicide attacks. A common view amongst interviewees was that the installation of scanners, jammers, trackers, CCTV, barbed wire and sentries could mitigate security risks.

The firms adopted a military reconnaissance (scouting) strategy to explore outside an area by gaining information about Taliban or robbers' presence. For example, interviewee No 35 explained that strategy: "*One vehicle goes before the other vehicle and it ensures that the route is clear. The other vehicle follows the first vehicle*". Similarly, another interviewee No 24 mentioned that "*We move like forces step by step that was a drill that we used to follow in the British time"*. They also adopted the strategy of quickly running vehicles along route after a terrorist attack, because they believed that there was very little chance of a second terrorist attack

happening in the heavy presence of security forces. For example, interviewee No 5 mentioned that "*Three or four hours after (terrorist attacks), we rapidly pass our vehicles"*.

Generally, the firms adopted the strategy of daylight travelling for vehicles, especially in the northern part of the country, as the government did not provide any night-time security for vehicles. For example, interviewee No 15 said, "*The drivers drive in daylight and park at night near a checkpost or by a petrol pump for safety reasons."* Similarly, some interviewees mentioned that "*our strategy is to travel at day time on the route", "we completely avoid driving at night*". Talking about this issue, interviewee No 30 said that there is a huge chance that criminals or security forces in the name of the Taliban might rob vehicles at night. However, this result has not previously been described.

Camouflaging vehicles is a frequently adopted security strategy in that region. In particular, NATO logistics contractors camouflage their company vehicles as private vehicles, as there is less chance of a terrorist attack on private vehicles. Similarly, some firms adopted the strategy of displaying a huge banner of featuring a verse from the holy Quran on their main premises and vehicles in order to appear as faithful Muslims. Some firms also kept the detail of expensive deliveries secret, to mitigate the risk of theft.

The most interesting strategy for security was the use of a monkey as a guard in the back of the vehicle. The trained monkey has the ability to attack any thief who tries to ride on the back of the vehicle, and to alert the driver, revealed by interviewee No 11. Another security strategy was for drivers to carry a licensed gun in their vehicles, for use in the case of emergency, mentioned by interviewee No 2. However, these findings are have not previously been described.

5.6.2-Information Sharing Strategies

A standard information sharing strategy can guarantee that each partner of SC informed about issues related to operations. For example, interviewee No 15 said, "*The more information you gather, the more you realize"*. It enables SC partners to react quickly to any problems experienced in the SC. A common view amongst interviewees was that it can help to identify the SC risks in their firms and for partners, such as information regarding their deliveries, order cancellation, delay

in processing, raw materials quality and the financial health of suppliers. Talking about the information sharing strategy, interviewee No 1 said that "*information sharing with supplier and warehouses can help to reduce risk*". Similarly, another interviewee supported this argument by saying that "*information sharing with partners and local police is an important strategy against terrorism, supply side and demand risks*".

Information sharing helps also to reorganize personnel and physical resources. For example, interviewee No 13 revealed that vehicle tracker information not only enabled his firm to improve the visibility of SC, but facilitated real-time planning, rescheduling of deliveries and tracking of drivers' activities and vehicle movements, as well as alerting the firm to fuel consumption and drivers' theft. For example, interviewee No 30 mentioned, "*I can ask the driver what is the condition of the border and he tell me that today it is open or closed*". Another interviewee No 23 mentioned that it was important "*to make contacts constantly in case of an attack or an ambush by Taliban or robbers*". Information sharing also enhances the coordination between firms and security agencies. For example, as interviewee No 17 mentioned, "*We receive constant information regarding the danger area*". However, government information sharing about terrorism threats varied according to the size of firms; the larger firms have more information than SMEs. Interviewee No 9 revealed that the C-TPAT certification could reduce lead-times at customs entry points at borders. However, the researcher observed that a few firms were very cautious about sharing any information with their partners. This finding seem to be consistent with other studies (e.g., Kleindorfer & Saad, 2005; Li et al., 2006; Ural, 2009; Yu et al., 2010; Pandey et al., 2010; Wakolbinger & Cruz, 2011; Ye & Wang, 2013; Rached et al., 2015; Kumar et al., 2017) which found the significance of information sharing strategy in SCRM.

Communication

The benefit of information sharing strategy are obtained through parties' effective communication with each other. A common view amongst interviewees was that communication is the key to efficient SC operations. Consistent information sharing through effective communication channels can help firms in speedy recovery from potentially disastrous events. As interviewee No 14 said, "*So you got to have a good back-up security plan. If you have done all of that, then the key to*

running efficient SC is communication". Another interviewee No 7 mentioned that good communication across the SC could help to accommodate changes in product, which increase the customers' satisfaction.

Most firms are used basic communication systems, such as telephone, fax, and e-mail to communicate with their suppliers and partners. However, the large firms have personal satellite communication channels, which is the most secure channel for communication in that region. For example, interviewee No 3 said, "*Our driver uses the satellite mobile phone to communicate"*. It is normally used for external communication, while for internal communication, firms used the local area network (LAN) system, which is a quick and stable communication system.

Communication is key a challenges to firms in the implementation of SCRM, as mentioned by interviewees. Another interviewee No 29 said that *"the key challenges, really 'communication', nothing more*". Common challenge to communication in that region are jammed mobile signals, lack of mobile signals and insufficient bandwidth. Jammed mobile signals occur because the government often jams the mobile signals to block communication among the terrorists. There is also a huge problem of bandwidth in that region, as interviewee No 26 mentioned that "*to get enough bandwidth for the SC, is a constant battle*".

Local Knowledge

The local firms have vast knowledge about high risk area for terrorism and robbery. Usually they have a sense of the timing of a terrorist attack. As interviewee No 20 mentioned, "*There are specific timings of terrorist attacks and we know that timing*". Some other interviewees also supported this claim. For example, interviewee No 11 explained, *"We decide where to stay and where to stop because of the timing when the Taliban is come out. When the timing of the Taliban ends and they go to their houses, then we move"*. In Pakistan, most people know that Friday is a favourite day for terrorist attacks, becuases terrorists believe that death on this day means a straight path to paradise.

The firms also have knowledge about highly attack-prone areas. As interviewee No 8 mentioned, "*Terrorist attacks happen in some particular places; we are experts and know the dangerous areas"*. Another interviewee, when asked about terrorism-prone areas said that "*the road from Khyber agency (Khyber Pass) to Kabul is very dangerous"*.

5.6.3-Facilitation Payment Strategy

The risk management strategy most frequently mentioned by interviewees is facilitation payment (bribery). However, the larger companies' interviewees did not directly admit being engaged in this strategy. A common view amongst interviewees was that it is a more effective strategy against the SC risk. For example, interviewee No 3 mentioned that "*money is the key to every lock"*. Another interviewee No 35 said that "*it has become trend now to bribe wherever we face the authorities"*. However, this result has not previously been described.

There was also consensus amongst interviewees that it is best strategy to mitigate financial losses, for example, to avoid the delay of legal documentation processing in government offices (e.g. Inland Revenue, environmental agencies and transport department) due to red tape. Similarly, to avoid delay risk at security checkposts on unnecessary detention of vehicles, achieve release of goods and drivers from police and customs detention and prevent unnecessary delay at customs clearness points and when crossing the border.

It maybe very hard to do business without facilitation payment in Pakistan. For example, interviewee No 27 said that "*it's a kind of part of a business here"*. A few interviewees disclosed (off the record) that they bribed union leaders to mitigate the risk of strike. Similarly, a few firms used bribery to get SC contracts. For example, interviewee No 12 mentioned that "*many transport companies bribe the manager for contracts*".

The facilitation payment strategy is an effective strategy in securing the firm's premises and vehicles from terrorist attacks. For example, interviewee No 21 said that "*only money is the tool to avoid any risk of attack*". A common view amongst interviewees was that it can help to mitigate terrorism risk. For example, some interviewees Nos (8, 14, 25, 30) mentioned regarding facilitation payment that, "*now people pay bribes to the Taliban------- When you pay, the Taliban, then they avoid attacking your trucks---- This a kind of forced tax from the Taliban--- but certain areas -----are under control of Taliban"*. Similarly, a few other interviewees Nos (4, 7, 13, 14, 20) are also disclosed that they were paying the bribe in the form of charity to escape from terrorist attacks. For example, interviewee No 23 stated that "*it is impossible to pass through the Taliban area without a bribe. It's all*

about the bribe".

However, this strategy also created a battle between security forces and terrorist group for safe passage through their controlled areas. For example, interview No 4 revealed that *"when some companies shifting to security escort companies. The Taliban attacked those vehicles that were paying for a security escort and the security escort was targeting those vehicles protected by the Taliban. It was a kind of road rage war zone and only transport companies were on targeted by both sides, so we had to pay both parties to secure our vehicles"*.

Several multi-national firms believed that bribery is a corrupt practice, but they also argued that it is the way of doing business in that region. For example, interviewee No 12 said, "*It is going to happen and in some part of the world there are practices which are called corrupt in the US. Corrupt in Europe"*. A common view amongst interviewees was that without facilitation payment they could not doing business in that region. As interviewee No 27 said, "*We have no option but to pay a good sum to complete our job*". It is essential for the LSPs industry in that area. For example, interviewee No 9 said, "*We manage police risk by bribing them"*.

5.6.4-Risk Sharing Strategies

The risk sharing strategies are mostly divided into two groups of strategies: SC risk-sharing contracts and buying insurance. First, firms established strong mutually-beneficial long-term contracts with SC partners. This has improved their performance across the SC, generating greater cost efficiency and allowing the business to grow. For example, interviewee No 10 said that "*NATO paid good money to transporter companies for deliveries during the war on terror; we also engaged with them in a long-term contract"*. Similarly, shipping firms adopted long-term contracts with fuel firms to reduce price risk. For example, interviewee No 8 mentioned that "*long term contracts can save money if the price goes high"*. Similarly, another interviewee No 12 who supported long–term contracts said that his firm "*keeps long term contracts with LSPs"*.

The firms are also adopted the dormant contract with SC partners in that region. A dormant contract means that the contractor de-activates the contract for a period of time, if they feel any risk. For example, interviewee No 4 explained that "*you*

may want to have a dormant contract-------you may not be able to guarantee the 'quality' that you have in the original contract. You have to go the customer. And you say to the customer---- 'I can't stay'. All I could then do is to activate this dormant contract with that company down there".

In addition, the firms adopted the strategy of a risk-sharing contract, which divided loss between the SC partners. For example, interviewee No 25 mentioned that "*the losses were divided into three; according to the market terms and conditions, the driver (in case transport company had to a hire private vehicle), the customer, and the transport company pay the losses".* Another interviewee No 17 said that *"the bribe money needs to be paid by all partners".* Talking about this issue interviewee No 27 said that "*the vehicle owner needs to pay for the damage to his truck and transport companies are responsible to pay for the goods".* Occasionally, the risk sharing contact also causes risk due to vagueness of the terms of contract with SC partners. For example, interviewee No 33 commented, "*There is also that risk, which can be exacerbated by whether or not the people you are working for have got what I called a tight contract or woolly contract".*

A common view amongst interviewees was that purchasing insurance is a most effective risk sharing strategy. For example, interviewee No 7 mentioned that although insurance does not eliminate SC risk, but it is a tool of risk mitigation. Another interviewee No 32 asserted that *"we buy insurance for employees and goods".* In this risky business environment, insurance against terrorism has more significance for firms, to protect their interests. Terrorist groups are becoming more sophisticated and planning terrorist attacks on firms' premises and vehicles, which may result in human casualties, business disruption, property damage, relocation costs, and long-term damage to reputation. Therefore, insurance provides a sufficient shield against terrorism risk and is a crucial part of any contingency plan. For example, interviewee No 23 mentioned about LSPs that *"they have insurance; they got new vehicles in case of terrorist attacks*".

The SC insurance also covered other risks, such as non-physical damage events (strikes, regulatory action, political risk) and physical damage (fire and natural catastrophes, road accidents). As interviewee No 16 mentioned, "*If the driver is involved an accident or damages the material, then it is insured".* However, interviewee No 33 mentioned that many insurance companies did not provide

insurance cover for terrorism risk in the North and West of Pakistan. This finding match those observed in earlier studies (e.g., Martha et al., 1997; Jüttner, 2005; Faisal et al., 2006; Wakolbinger & Cruz, 2011).

5.6.5-Financial SC Strategies

In the context of a TAR, there are several SC financial strategies adopted by firms, such as conducting business with trustworthy suppliers and customers, checking the credit score of customer and suppliers, taking an advance security deposit, keeping sufficient fund in the bank and linking prices with a foreign currency. A common view amongst interviewees was that SC financial risk could be effectively reduced through these SC financial strategies. This finding is in line with those of previous studies (e.g., Pfohl & Gomm, 2009; Hofmann, 2011, 2013;; Wuttke el al., 2013a, 2013b; Iacono et al., 2015; Caniato et al., 2016; Wuttke et al., 2016; Song et al., 2018; Moretto et al., 2018).

Trust

Trust is a very significant enabler between trading partners in that region, which can drive physical, informational and financial flows between SC partners. As interviewee No 13 said, *"It's all about the trust in this market"*. Another interviewee mentioned that *"our business depends entirely on trust"*.

Most firms asked for trade references to verify the creditworthiness of the client. For example, interviewee No 22 mentioned that "*someone take your guarantee, and then I provide a vehicle to you"*. Similarly, it is an important factor in awarding logistics contacts. As interviewee No 35 said, *"Trust is the main tool in the market, where dealers and suppliers prefer the transport companies*". However, a newcomer in the market suffered from a lack of trust. As interviewee No 2 mentioned, *"New transporters, the people don't trust them"*. Similarly, another interviewee No 26 said that "*We select strictly customers carefully and try to restrict our dealings to parties who are trustworthy and financially sound"*.

Credit Score

The credit score is an important tool for firms to know about a client's financial position. In Pakistan, the Electronic Credit Information Bureau (eCIB) of the State Bank can provide information regarding credit scoring. It collects and organises credit data on borrowers from its member financial institutions. However, this

information is only available for member financial institutions such as banks, development financial institutions (DFIs), non- bank financial companies (NBFCs), and micro finance banks.

However, there are four privately owned credit agencies operating in Pakistan. The large firms relied on these private credit agencies. For example, interviewee No 4 said that "*we always assess the dealer's credit score",* but the reliability of the data provided by these credit agencies questionable, according to another interviewee No 34. In contrast, credit score assessment is not common practice in the SMEs.

SC Finance

Currently, the mainstream banks in Pakistan provide SC finance to their customers, as mentioned by an interviewee. Usually the banks are involved in providing a controlled financial solution to SMEs, based on the support of a corporate entity.

This can benefit the SME suppliers in different ways, such as lower pricing, fast processing of loan applications and hassle-free guarantee requirements, as mentioned by an interviewee. Similarly, agricultural SME suppliers (i.e. farmers) need financial help at all levels such as agricultural input, processing, trade, wholesaling, and marketing. Large enterprises (e.g. tobacco manufacturers) also provide SC finance to their suppliers. For example, interviewee No 9 said that "*we can buy or finance the seeds and agricultural inputs (i.e. chemicals, fertilizers, crop protection agents) for tobacco growing famers to ensure the smooth supply of raw material.*"

Other SC Financial Strategies

There are other SC financial strategies adopted in that region. First, firms keep sufficient funds in banks against financial risks. For example, interviewee No 13 said that his firm "*manage through keeping sufficient funds in the bank*". Another interviewee reported that *"keeping enough cash and balances in banks, and arranging loaning through banking facilities and managing the timing of payments".*

Second, the working capital is the backbone of any business. Therefore, the working capital management strategy is vital to firm success. The firms in that region have different arrangements with financial institutions, regarding working capital shortage with financial. As interviewee No 25 referred to *"mitigating the risk of*

shortage of working capital by availing ourselves of sufficient lines (of credit) from the diversified financial institutions in order to meet the shortfall".

Third, currency exchange rates may fluctuated, which can create a huge financial SC risk. It leads to differences between domestic and foreign prices, especially, as the foreign currency exchange rate is volatile in Pakistan. Therefore, firms need a financial strategy to link the price of their product/service with the foreign currency exchange rate to mitigate the exchange rate risk. For example, interviewee No 5 said that because of "*the fluctuation in exchange rate--- we link the prices of our products and crude oil with foreign currency to mitigate risk".*

Last, most firms asked for advance security payment. For instance, interviewee No 33 said that "*they (clients) pay the fare first, then take the goods"*. Talking about credit risk, interviewee No 16 said that his firm required clients "*to deposit a good share of the value of the goods before we seal the deal".*

5.6.6-Coordination Strategies

Coordination strategies can reduce uncertainty in SCs. For example, interviewee No 3 believed that it was possible to "*manage the safe and well-organized inbound freight and outbound freight through local coordination*". The researcher observed that a few firms have constantly coordinating with local authorities and even terrorist groups. For example, interviewee No 27 mentioned, *"We are in constant coordination with the relevant government agencies in this regard".* However, a few firms had very poor internal and external coordination mechanism. This finding is in line with those of previous studies (e.g., Martha et al., 1997; Sinkovics & Roath, 2004; Fugate et al., 2006; Choi et al., 2016).

5.6.7-Other SCRM Strategies

Although of these six were the main risk management strategies, the others risk management strategies adopted in that area were:

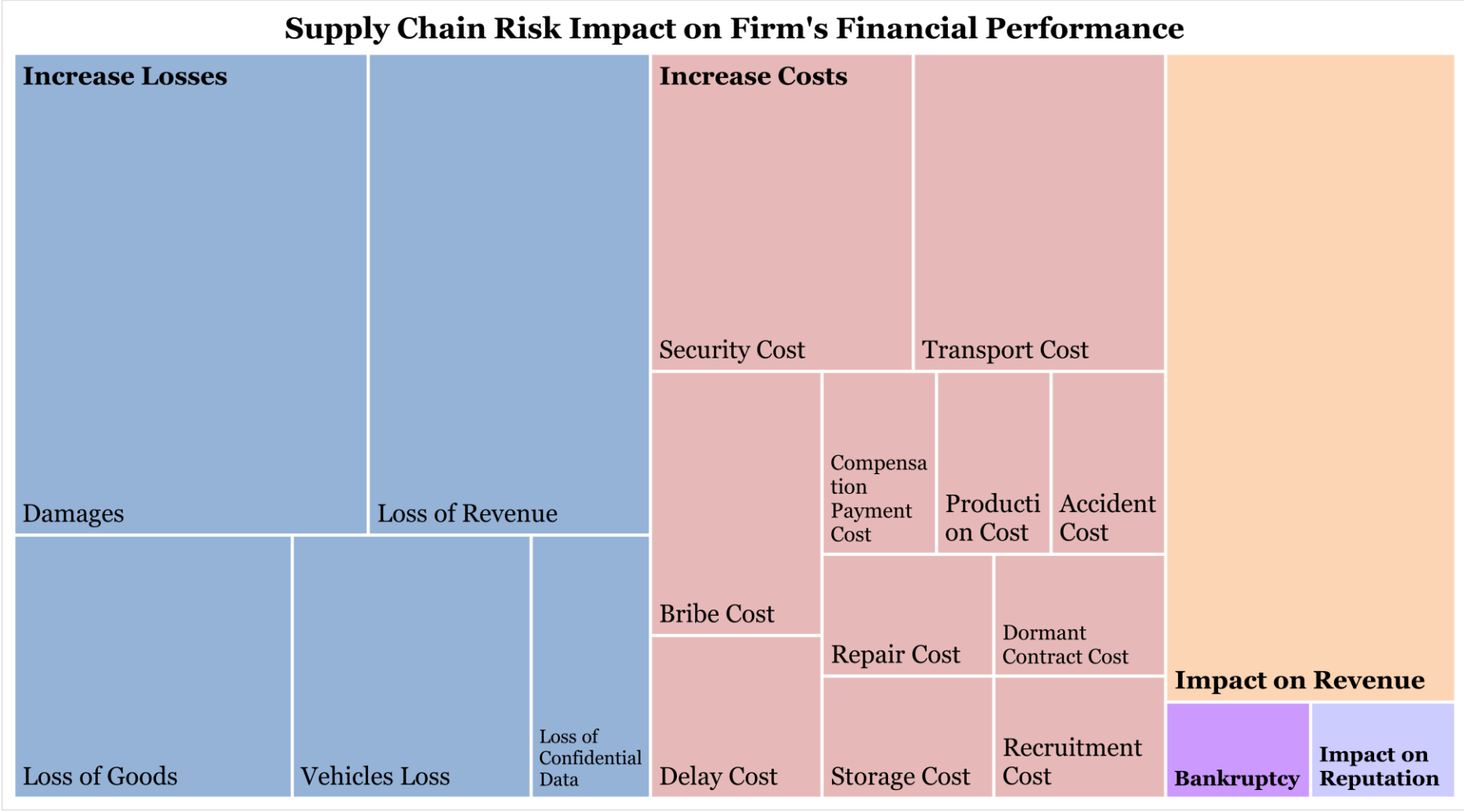
- Contingency planning
- Monitoring systems
- Strategic investments
- Buffer stocks
- Human resource related strategies (risk related employee training, hiring from the local population, checking employees' background checking and providing accommodation and other facilities to employees)

- Adopting SC resilience and responsiveness (flexibility, reliability, using small vehicles in the city and their own fleets)
- Implementation of health and safety regulation
- Building plants and warehouses in strategic locations
- Using alternative fuel
- Getting legal status (foreign firms need to satisfy local legal requirements, working under umbrella of the NATO force)
- Strategic partnership
- Diversification (e.g. in investment, suppliers)
- Improving the firm's reputation.

5.7-Theme 4: SC Risk Impact on Financial Performance

SC risks have an enormously negative impact on performance and financial viability. They not only affected the operation performance of the firm, but also affect FP. A minor SC disruption can have a significant impact on a firm's performance and viability. Many firms in that region have experienced heavy financial losses, especially form terrorism risk. There was a common view among interviewees was that this had a negative impact on FP. The key negative impacts on FP are identified in Figure 5.5. The size of box relative signifies the number of references to the issue in questions.

Figure 5. 5: SC risk impact financial performance mentioned by interviewees



Source: Author

5.7.1-Increased Losses

Terrorism risk is a major source of financial losses for firms in that region. For example, interviewee No 2 said that, "*you lost a vehicle of PKR 12 or 13 million. It is a huge financial loss for a person who has only one vehicle*". Another interviewee No 12 mentioned that, *"The Taliban set fire to more than 100 vehicles standing in a petrol pump"*. Similarly, interviewee No 27 mentioned that *"we were attacked by terrorist; they shot two rocket launchers at the oil tanker vehicles outside the warehouse"*. Similarly, theft, robbery and accidents can increase financial losses. For example, interviewee No 18 said that "*it was a big loss. In case of accident, you can't recover the loss in a year"*. Another interviewee mentioned that *"we lost PKR 450,000 in that accident"*.

Many other risks can also trigger financial losses. For example, the weather risk can increase financial losses in the form of compensation payment to customers. As interviewee No 3 said, "*If the goods are damaged by rain, then we have to pay the customers"*. Talking about this issue interviewee No 9 said that, "*fire is the main risk because LPG is very highly inflammable. It can hit you very badly financially"*. Similarly, corruption risk initiated a financial loss. For example, interviewee No 19 mentioned that "*PKR 450 to 500 bribe per vehicles has to be paid at every checkpost. So, this caused a big loss to us"*. Another interviewee No 33 mentioned having paid PKR 3.1 million facilitation payment and other expenses to release his vehicle from customs' detention.

The risk of delay at security checkposts and border crossing can cause losses, especially for perishable food LSPs. For example, interviewee No 14 said that "*when loading and unloading fresh produce it gets damaged quickly and goes rotten while waiting for a long time*". Another interviewee No 16 mentioned experience "*damage/rotting as a result of by delay due to 3 to 5 days waiting time"*.

The counterfeit product risk can causes an in sales and affect overall firm profitability. Particularity, the pharmaceutical, fuel and vehicle spare parts industries are suffered from huge losses. For example, a large number of counterfeit medicines and low-quality Iranian petrol damaged profit, according to interviewees. Low-quality crude oil can also cause damage to the plants. For example, interviewee No 23 said that "*a supply-side risk is change in the quality*

of crude oil, it has impacted the throughput of the refinery, product account and may also cause damage to the equipment resulting in financial loss".

Customer's default and fraud can reduce revenue and ultimately affect the FP. For example, interviewee No 15 mentioned that "*if you delivered the goods to a dealer in Afghanistan and he has changed his address and taken your fare as well, you can't do anything with him".* Another interviewee No 7 reported cases where "*they ran away with the money/goods. We lost goods of two trucks, which cost us one million rupees".* Similarly, cyber risk can also cause potential loss of confidential data and financial losses to firms, because, as interviewee No 2 said, "*If the competitors get that data, it will be a huge financial loss for the firm".* These results seem to be partially consistent with other studies (e.g., Banomyong, 2005; Europol, 2007; Autry & Bobbitt, 2008; Stecke & Kumar, 2009; Blomberg & Rose, 2009; Modarress et al., 2012) which found that terrorism risk could increase the firms financial lossess.

5.7.2-Increased Costs

SC risk can increase production and distribution costs. For example, one interviewee mentioned that transportation costs were significantly increased (more than 300%) in the local area during the WOT, due to opportunistic behaviour of LSPs. As interviewee No 2 mentioned, "*NATO supply from Karachi to Kabul, they made US $18000 per vehicle. Before they were charging US$6000 to US$7000 per vehicle for same jobs".* Terrorism risk can also increase the security costs in Pakistan, in the form of hiring private security guards, investment in security equipment and hiring security escort. As interviewee No 13 explained, "*If you keep a security guard for 24 hours, it costs you PKR 30000 a month".* Another interviewee revealed the cost of hiring a security escort and said that "*to hire a security escort is very expensive and they charge us $1000 per vehicle".* Talking about security cost interviewee No 3 said that "*if the risk high and the places remote, the cost of security is high".*

Similarly, the corruption risk can create the extra costs for firms. For example, interviewee No 33 admitted having to pay bribes to the customs authority between PKR 4000 to 5000 per vehicle. Similarly, they paid the Taliban US$500 per vehicle for passage. Another interviewee No 24 mentioned that the level of facilitation payment (bribes) depends on the mood of officials and security condition in the

area. In a low-security risk area, the checkpost officials charged less as compared to a high-risk area. For example, interviewee No 17 said that, "*the security force charged the vehicle 40 thousand for security"* in a high-risk area. Generally, the bribe is included in the LSPs fare, but the amounts of the bribe varied and they would often need to pay extra cost from their own pockets, as mentioned by an interviewee.

Strikes and natural disasters also caused increased expenses. For example, a strike by the oil tankers union can increase the demand risk and reduce sales, especially for oil companies. As interviewee No 6 mentioned, "*strikes also hit deliveries timing and the chance of losing the customer, especially the foreign customer*". Talking about smog interviewee No 10 said that the natural disaster (e.g. smog) increases the costs of airlines operations, due to delay or rescheduling of fights and increases the parking charges of civil aviation.

The risk of kidnapping (of employees or vehicles) also caused the more cost, in the form of payment of ransom or compensation for an employees' death. Due to the lack of employee insurance in that area, generally, the firms have to pay the compensation. For example, interviewee No 30 said that "*if the driver dies, then we become their family financial sponsor*". Similarly, the firms also supported those employees, who were displaced due to military operations against terrorist groups. As interview No 15 said that *"For about 4 month; the company supported them. The company gave support like providing shelter, utensils and blankets."*

The researcher also identified some other expenses, which happened due to SC risks, such as the rise in energy price. For example, interviewee No 23 mentioned that "*the energy cost part is a large part of the overall cost of production in our company. It is above 50% on average. Any change/rise in coal prices or rise in electricity price would hurt the financial performance of the company"*. This finding is consistent with that of Sheffi (2001) who said that terrorism risk could increase the cost of supply chain.

5.7.3-Reduced Revenue

There is a consensus in the literature that SC risks can reduce the firm's annual revenue. Similarly, most of the interviewee mentioned that their businesses were declining because of terrorism risk. For example, interviewee No 3 mentioned that

many businesses had left the region because of terrorism risk, which increased uncertainty in market. Further, he said that, "*Only 5% of customers are now remaining"*. Another interviewee No 20 mentioned that terrorism risk significantly increased security and transportation costs, which affected overall firm profitability.

Similarly, the risk of energy shortage in that region can reduce the revenue of firms because of long hours' stoppage of production and other business activities. The risk of energy shortage has a trickledown effect on different industries. For example, interviewee No 4 mentioned that "*insufficient supply of electricity and gas, also affects the export and import of the customer's company. They roll-back their businesses, which causes loss to our company"*. Especially, manufacturing firms' revenue significantly suffered from energy shortage risk. Interviewee No 7 mentioned experiencing power shortage lasting more than 12-hours, which could halve our productivity. In contrast, the larger firms had invested heavily in diesel and other fuel power generators for their manufacturing plants. For example, interviewee No 15 reported that, "*due to energy shortage, we were allowed to build a 18-20 Mega Watt power plant to meet the energy demand"*. However, the cost of diesel is higher than that of the energy provider's companies.

The counterfeit risk can also directly hurt revenue. Interviewee No 9 mentioned that the market is full of counterfeit products; some a products ever have three or four types of counterfeit quality. In particular, the tobacco industry is badly affected by counterfeit product. As interviewee No 20 mentioned, "*we take up this issue in every forum with the government*". However, the Government of Pakistan has not taken any action against these counterfeit products because of the leak of copyright law implementation and the prevalence of corruption.

5.7.4-Bankruptcy of Firms

SC risks may lead to the firm's bankruptcy. For example, interviewee No 11 mentioned that "*there were some people who had a few vehicles. The vehicles were burned, in an incident and destroyed. It was a total loss for them*". In particular, a large-scale terrorist attack has a devastating impact on firms in that region, such as destruction of an entire convoy of vehicles and goods. For example, 160 vehicles were burned near Peshawar in one night, as mentioned by interviewee No 4. Another interviewee No 12 recalled that *"these risks are so high impact that a*

couple of transport companies got bankrupted recently". This finding seem to be partly consistent with other studies (e.g., Chopra & Sodhi, 2004: Lai et al., 2008) which found that SC risk can lead to firm bankruptcy.

5.7.5-Impact on Firm's Reputation

A larger body of SCM literature is agreed that SC risks can cause a severe reputational damage to firms. For example, a cargo loss may influence FP, at the same time; it may also cause reputation damage to firms.

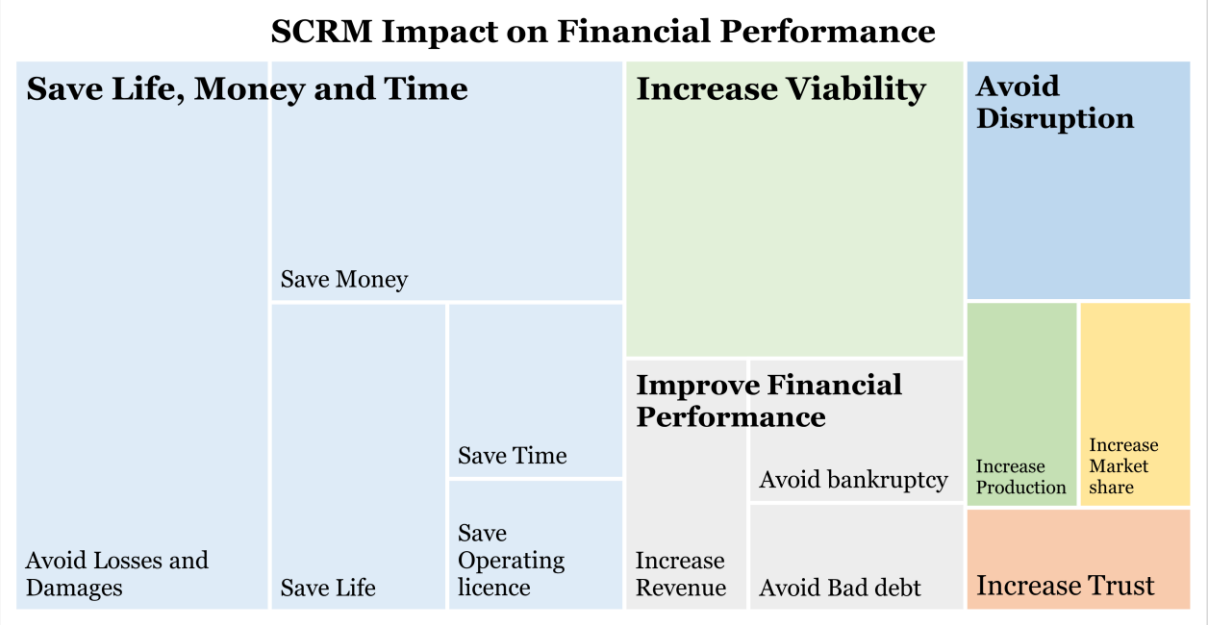
In the context of Pakistan, the firm's reputation is principally based on trust. For example, one interviewee mentioned that his firm was giving more attention to security strategies by spending more money, time, and resources to ensure their security reputation, because any unexpected terrorist attacks could cause tangible and intangible damage in terms of the firm's reputation. Terrorism risk can also adversely affect a firm's reputation in terms of investment, because, in the mind of investors, the main concerns are about the security of a firm. A firm's bad security reputation and capability may make it harder to raise cheap capital for investment. Similarly, SC risks such as human rights and child labour cause reputational risk to firms in Pakistan. Interviewee No 30 mentioned that trying to keep a good reputation in term child labour in the eyes of international SC partners.

However, the firms adopted different strategies to mitigate the sustainability risk, such as improving working conditions in warehouses and factories, reducing packaging, using more efficient transportation and social programmes to reduce costs, as mentioned by an interviewee. The researcher observed that many firms in Pakistan engaged in corporate social reasonability (CSR) activities as a way of improving their firm's reputation. This finding is in line with those of previous studies (e.g., Sarah 2003; Lemke & Petersen 2013; Roehrich et al., 2014).

5.8-Theme 5: SCRM Impact on Financial Performance

Most interviewees believed that SCRM practices have a positive impact on FP. For example, interviewee No 2 said that "*when you pay the Taliban then they avoid attacking your trucks. So we can save our goods and trucks"*. Figure 5.6 highlights the significance of SCRM on FP.

Figure 5. 6: SCRM practices impact FP by references.



Source: Author

There was a common view among the interviewees regarding SCRM practices, that they can save life, money and time. For example, interviewee No 22 said that "*these measures are very necessary to keep the surroundings and vehicles safe*". SCRM allows firms to save their employees' lives. As interviewee No 7 stated, "*The contingency plan for withdrawal of my people is the first thing I use*". The SCRM strategies are designed to save employees' life, avoid financial loss and ensure timely delivery to customers in that region. For example, interviewee No 13 said that through an information strategy, "*we got three trucks through before the border closure. Therefore, we saved the customer from losses. It was done due to good communication among drivers*". Another interviewee No 19, talking about the SCRM camouflage strategy, said that, "*the NATO and Afghan Trade transport vehicles are unrecognisable for terrorists to figure out which vehicles carry NATO or Afghan Trade Goods. That way, the risk is zero now*".

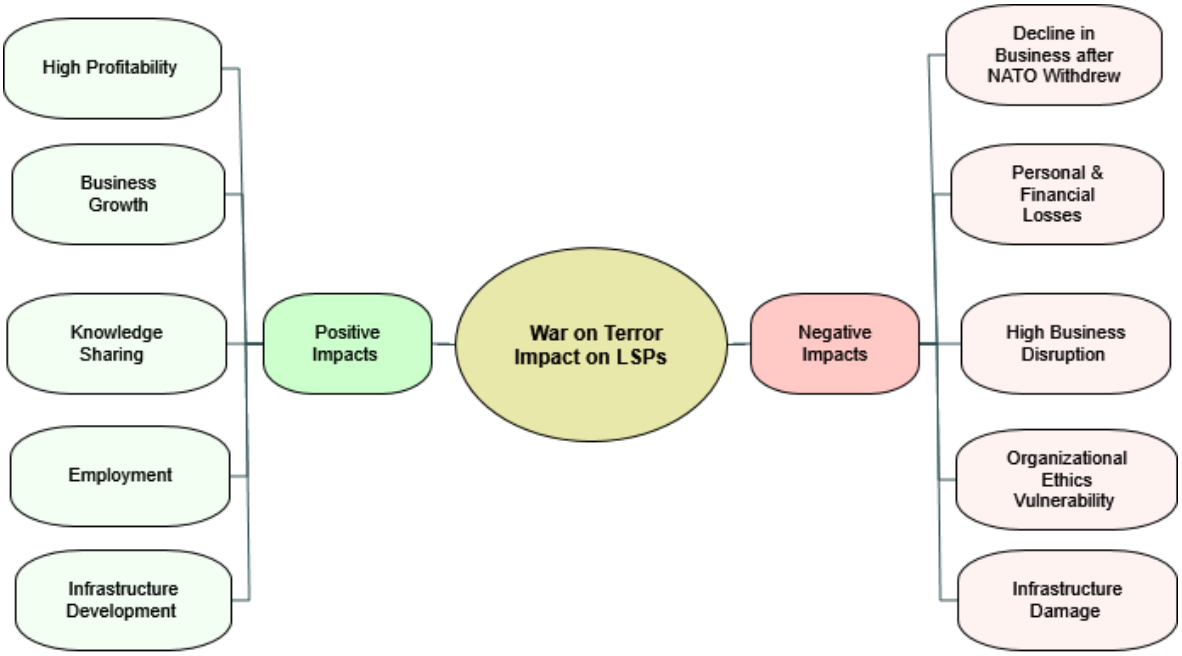
Similarly, SCRM practices can increase a firm's profitability. For example, interviewee No 25 reported that *"I get back all the money invested in going there. I make some profit; my contingency plan allows me to be able to walk away"*. Another interviewee No 6 mentioned that SCRM enhanced the firm's financial viability by reducing disruption risk and increasing revenue. It also helped to increase production, market share and trust between SC partners, as mentioned by

interviewees Nos (9, 11, 19, 22). This finding partially match those observed in earlier studies (e.g., Hendricks & Singhal, 2003, 2005; Kleindorfer & Saad, 2005; Hendricks et al., 2009; Chen et al., 2013).

5.9-Theme 6: Impact of WoT on LSPs

All interviewees believed that the WoT was profitable for LSPs' business in that region, due to reduced losses of life and assets. However, the WoT had both positive and negative impact on local logistics industry. Figure 5.7 highlights the overall impact on the logistics industry.

Figure 5. 7: Impact of war on terror on LSPs



Source: Author

5.9.1-Positive Impacts

The NATO supplies have positive impact on the logistics industry, for example, high profitability, business growth, SC knowledge sharing, employment and infrastructure development.

High Profitability

There was a common agreement among the interviewees that the local logistics industry was enjoying high profitability during the WoT. For example, interviewee No 2 mentioned that "*during the war they received $4000 to $5000 profit*", in one trip from Karachi to Kabul. Talking about profitability of interviewee No 12 said, "*Double profit in NATO business*". Another interviewee No 15 stated, "*Now they*

(contractors) playing in billion". Similarly, another interviewee No 22 supported this argument by saying that *"NATO were giving fixed and high fares to transporters……a giant contractor could do great business by transporting NATO supplies"*. However, this result has not previously been described.

Business Growth

Afghanistan is a landlocked country and heavily dependent upon transit through the neighbouring countries for its foreign trade. Before the 9/11 terrorist attack, the trade between Afghanistan and Pakistan was very limited. Consequently, the WoT provided an opportunity for LSP business in the region. As interviewee NO 17 mentioned, "*It brings a boost in my business because of the NATO shipments"*. Another interviewees No 9 mentioned that *"it was an excellent period for hauliers"*. Similarly, another interviewee N0 35 supported this argument by saying that "c*hanged many people's lives and that was a best time for business"*. This finding was also reported by Clemente and Evans (2014).

SC Knowledge Sharing

Before the WoT, the local logistics industry was not aware of the new knowledge and technologies in SCM. The WoT brought new logistics technology and knowledge to the region. The local logistics industry has gained knowledge and experience by working with multi-national companies. For example, interviewee No 6 mentioned that, *"the only experience was gain. For example, how to will survive in a war zone, in difficult circumstances and how to complete your task, whether it's financially, socially and strategically"*.

Another interviewee No 21 reported that the WoT brought computerized SCM, which changed his firm's business and allowed them to improve visibility and tracking, and to monitor real-time shipping and invoicing. Others technology products (e.g., GPS devices, smartphones and tablets) can increase security and production and averted disruptions in SC. However, this result has not previously been described.

Employment

The WoT also generated employment for local residents. A large number of the population, were already connected with logistics. Consequently, they took advantage of the NATO supplies. Other local residents were also employed in logistics-related businesses, such as security and escort companies, warehouses and highway motels. A common view amongst interviewees was that employment opportunities increased during the WOT. For example, interviewee No 7 mentioned that "*certainly, the NATO contracts create more jobs"*. This finding was also reported by Clemente and Evans (2014).

Infrastructure Development

Before the WoT, the region had an inadequate logistics infrastructure. Therefore, the allied forces in Afghanistan invested heavily in roads and other logistics infrastructure. Most interviewees believed that the logistics infrastructure is improved in form of cold cargo and perishables storage, truck maintenance, customs facilitation, air freight and cargo services and warehousing. This outcome is contrary to that of (e.g., Ekwall, 2010; Raymond, 2006) who found that terrorism risk have negative effect logistics infrastructure. However, a few interviewees Nos (4, 6, 12, 21, 33) believed that NATO is destroyed the road infrastructure, due to their heavy equipment.

5.9.2-Negative Impacts

NATO supplies also had negative impact on logistics industry, such as the sudden decline in business after NATO withdrew, personal and financial losses, high business disruption, organizational ethics vulnerability and road infrastructure destruction.

Sudden Demand Decline

NATO withdrawal caused a huge decline in demand for logistics services providers. For example, interviewee No 9 mentioned that "*there are about 80,000 vehicles especially in Afghanistan and 3,000 vehicles are unable to find work. Afghanistan's entire business depends on transport business and it's going bad*". Another interviewee No 17 mentioned that, "*our business is down, we are going down day by day"*. Similarly, the LSP firms had invested heavily in vehicles and other logistics infrastructure during the war on terror. Subsequently, they suffered

from huge financial losses due to non-utilization of this logistics infrastructure. This finding was also reported by Clemente and Evans (2014).

Personal & Financial Losses

During the WoT, the logistics industry suffered terribly from financial and personal losses. Many firms lost their employees and trucks. For example, a few interviewees Nos (6, 11, 19, 29) mentioned that "*the drivers were shot and the goods were been stolen"…. "The terrorists used to fire rocket launchers and spray AK47 burst, so many drivers lost their lives during the shift to just transfer goods"*. Talking about the WoT interviewee No 22 said that, "*we in loss instead getting profit"*. This finding is partially in line with those of previous studies (e.g., King, 2005; Banomyong, 2005; Europol, 2007; Autry & Bobbitt, 2008; Stecke & Kumar, 2009; Modarress et al., 2012).

High Disruption

The NATO supplies were a favourite target for terrorist groups and because of these attacks, the security level was also increased in that region. This could generate huge disruption for the local logistics industry. For example, interviewee No 30 mentioned the high number of security checkposts on the route to Afghanistan, reporting the appearance of *"several security- checkposts, which can generate delay for us"*.

Similarly, protests against NATO supplies by religious and political parties also caused disruption for LSPs due to the blocking of the main routes to Afghanistan. For example, interviewee No 15 mentioned that "*there were always problems of strikes"*. However, this result has not previously been described.

Organizational Ethical Vulnerability

Similarly, the WoT affected the business ethics in that region. First, at the top level, as one interviewee put it, there was huge corruption in awarding NATO logistics contracts. Most logistics contracts were granted to Afghan warlords, who in turn awarded them to their own people. Second, at a lower level, the level of pilfering increased among employees. NATO even allowed for 10% pilferage in their supply, as mentioned by interviewee No 2. Similarily, the black-marketers were also took advantage of NATO suppliers. The black-market in NATO stolen goods was flourishing in that region. This finding was also reported by Clemente and Evans (2014).

Transportation Shortage in Local Market

The WoT was also a main cause of shortage of transportation in the local market. As interviewee No 7 mentioned explained this happened, "*because NATO paid good fares to them"*. Therefore, most LSPs were diverted to NATO and generated a demand for transportation in local market. For example, a few interviewees Nos (12, 16, 22, 25, 29, 34) mentioned that *"from Pakistan to Afghanistan goods supply is risky but it crates more profit, so transporters go for profit despite any big risk, if there is any"..... "It caused a shortage of vehicles in the local market and the fares of local transporters went up as well"*. This also partly accords with previous studies, which showed the opportunistic behaviours of suppliers (e.g., Speckman et al., 1998; Smeltzer, 1998; Moura et al., 2003; Spekman & Davis, 2004).

Infrastructure Damage

Some interviewees argued that the NATO supply destroyed their road infrastructure. For example, interviewee No 31 recalled that *"the road you could see ahead was in total disaster, the main road"*. Frequently, the Taliban instilled improvised explosive devices (IED) as roadside bombs targeting the NATO force. Talking about this issue, interviewee No 25 described that, "*the road was very bad ---- it had been damaged by a bomb blast*". Similarly, interviewee No 8 mentioned the indirect effect on the condition of roads in that region and said that "*the vehicles were running too slow to complete the trip, which also damaged the vehicles due to the very bad condition of the road.* The Khyber Pass, which was the main route for NATO supply to Afghanistan, was badly damaged by NATO supply trucks. For example, interviewee No 16 said that "*the road from Peshawar to Torkham is in a bad condition"*. This finding is partially in line with those of previous studies.(e.g., Rice & Caniato, 2003; Stecke & Kumar, 2009; Männistö et al., 2014; Zeneli et al., 2018).

5.10-Summary

This chapter reported the findings from semi-structured interviews, through a descriptive and thematic analysis. In the descriptive analysis, it was shown that most of the interview interviewee had more than 10 years' experience and 100 employees. In terms of annual revenue and job titles, 50% of firms have more than PKR 100 million annual revenue and more than 47% of interviewee are involved in

the manufacturing.

In terms of themes, first, the majority of interviewee defined SC risk as the probability of life and financial loss. Second, 105 SC risks were identified and terrorism and corruption were seen as the most disruptive SC risks in that region. Third, 105 employed SCRM strategies are recognised. However, the top six most frequently mentioned strategies were discussed in detail. Fourth, SC risks were shown to have a significant negative impact on FP in TAR. Fifth, almost all interviewee agreed that SCRM has a positive impact on revenue, FP/ viability, employees' lifesaving, time and avoiding SC disruption. Last, the WoT was said to have both positive (boost in business, profitability, infrastructural development and logistics knowledge and employment) and negative (decline in business after withdrawal, organizational ethical vulnerability, personal and financial losses and disruptions) impact on LSPs and the local logistics industry.

Chapter Six

Framework and Hypothesis Development

6.1-Introduction

This chapter introduces a management framework and hypothesis development and answers **RQ4** (*the impact of the SCRM strategies on FP*). It is organized into five sections. Following the introduction, the theoretical framework based on the COSO framework and contingency theory is discussed in the second section. In the third section, literature regarding the effects of SCRM strategies (information sharing, SC coordination, risk sharing, SC finance, SC security and facilitation payment strategy) impact on FP is addressed. Fourth section discussed the moderation and mediation effects of SCRM strategies on FP. A summary of the chapter is presented in the last section.

6.2-Theoretical Framework

The theoretical framework is an essential part of any quantitative research. A large and growing body of literature has adopted the COSO Enterprise Risk Management (ERM) framework (e.g., Gordon et al., 2009; Akotey & Abor, 2013; Bezzina et al., 2014; Gupta, 2014; Florio & Leoni, 2017). However, far too little attention has been paid to the COSO framework in the context of SCRM literature (e.g., Grötsch et al., 2013; Kumar et al., 2014).

There is a large volume of published studies on adoption of contingency theory (e.g. Czinkota et al., 2005; Baier et al., 2008; Gordon et al., 2009; Trkman & Mccormack, 2009; Walker & Jones, 2012; Ojha et al., 2013; Hofmann & Lampe, 2013; Grötsch et al., 2013; Mikalef et al., 2015; Park et al., 2016; Yim et al., 2017).

6.2.1-COSO SCRM framework

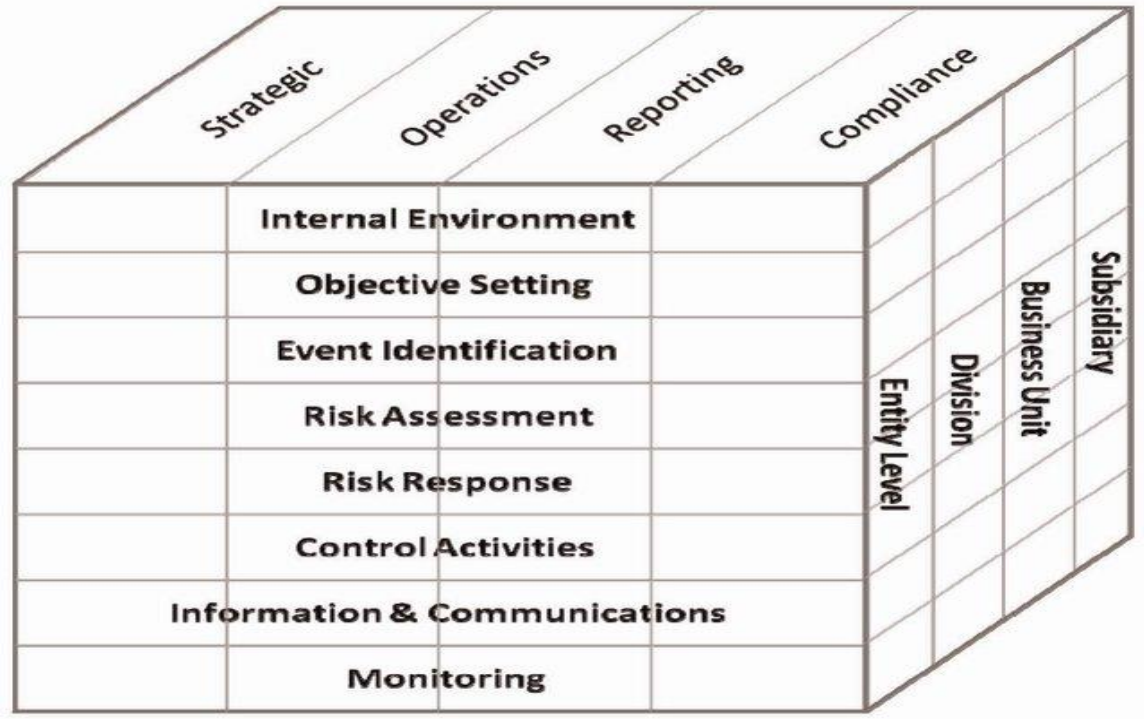
The COSO presented the "Enterprise Risk Management (ERM) Framework" in August 2004. However, it had published reports about the evaluation of internal control systems since 1992. The framework has gained importance both in academia and among practitioners (Gottfredson et al., 2005; Walker & Shenkir, 2008). COSO is a recognised voluntary private-sector based organisation. It

provides guidance on critical aspects of ERM, business ethics, fraud, organisational governance, internal control and financial reporting. The framework helps organisations to efficiently identify, assess and manage risk and applied to all organizations (large and small, public and private).

ERM is overcoming the traditional RM approach (Florio & Leoni, 2017). It is defined as "*a process, effected by an entity's board of directors, management and other personnel, applied in a strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives"* (COSO, 2004:16). Additionally, Brehm et al. (2007) mentioned that it a process of systematically and broadly identifying potential risks, quantifying their impacts and employing strategies to maximise organization value. It focuses widely on all risks, not just financial risks. It also studies the variance between an organization's strategies' outcomes and objectives. However, the COSO's ERM framework has some serious limitations. For example, it fails to provide a workable standard for identifying ERM effectiveness, its risk definition diverts attention from opportunities, it takes a command and control approach and it ignores shared management of uncertainties with external parties and social implications (Dickinson, 2001; Chapman, 2006).

The COSO framework consists of three dimensions: The first dimension is four categories of objectives: strategic, operations, reporting and compliance. The second dimension examines eight components of each of the four categories of objectives: internal environment, objective setting, event identification, risk assessment, risk response, control activities, information and communication, and monitoring. The third dimension contains all organizational entities of the firm: entity, divisions, business units and subsidies, as shown in Figure 6.1.

Figure 6.1: COSO framework



Source: (COSO, 2004)

Inherently, SCM is linked with several cross-divisional functions and organizational parts. Similarly, the ERM framework also considers many organizational entities. Therefore, SCM has adopted the holistic ERM tool in the form of SCRM. It is a systematic framework that may suggested a logical approach to SCRM, because the process model of SCRM already includes particular central ERM objectives and mechanisms. It has been argued that organizations should develop and implement a comprehensive SCRM that can be united with ERM (Zsidisin & Ritchie, 2008). A survey conducted by Sodhi and Tang (2009) revealed that nearly 75% of the respondents believed SCRM to be a subset of ERM or an extension of it. This view is supported by Diehl and Spinler (2013) who stated that ERM and SCRM are linked to each other; first, SCRM is a part of ERM because it focuses on processes within the firm. Second, SCRM increases standard ERM by including the upstream and downstream partners in a SC. They can overlap each other when financial flows, SC strategy decisions, and SC support processes are included.

6.2.2-Contingency theory

To study how SCRM strategies affect the FP, the researcher adopted contingency theory as presented in the strategic literature. In general, contingency theory assumes that there is no universal approach to manage processes of decision-making, organising and leadership, since different environments provide different antecedents (Fiedler, 1964). It also helps to explore the relationships of the SC network within a specific environment, reflecting the strategy-structure-performance paradigm (Chandler, 1962). Otley (1980:413) adopted a contingency approach to management accounting "*based on the premise that there is no universally appropriate accounting system which applies equally to all organizations in all circumstances. Rather, it is suggested that particular features of an appropriate accounting system will depend upon the specific circumstances in which an organization finds itself*".

Previous studies on contingency theory have indicated various environmental contingency variables that helped to create clusters (Sousa & Voss, 2008). These variables are firm size, age, environment and technology. These studies also acknowledged three different types of variables:

1. *Contextual variables*; which signify situational characteristics exogenous to the pivotal company.

2. *Response variables*; which are the firm or managerial actions taken in response to existing or predicted contingency variables.

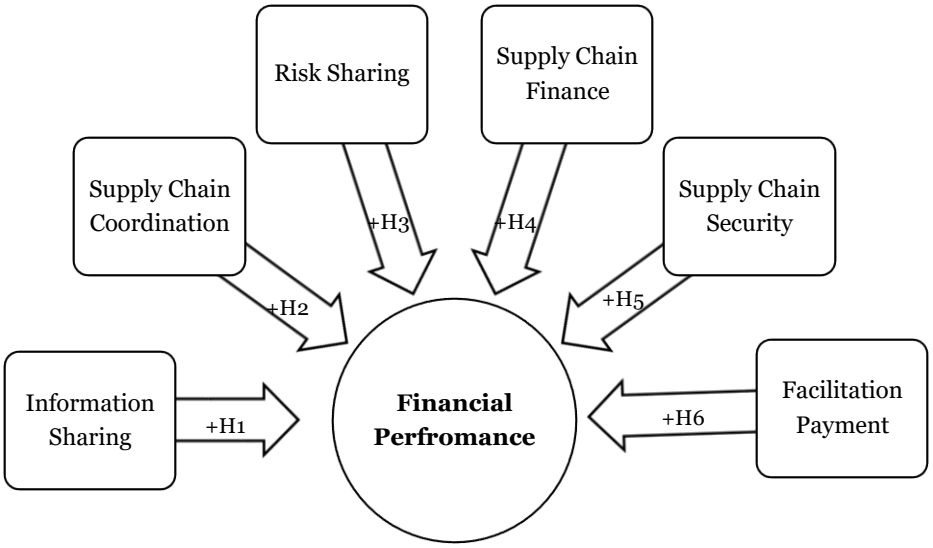
3. *Performance variables*; which are dependent measures and represent specific features of effectiveness that are suitable in assessing the fit between the above two variables (Sousa & Voss, 2008).

The contingency theory has been employed in SCRM literature to examine SCRM practices impact on firm performance (e.g., Glas et al., 2013; Park et al., 2016). In addition, Wagner and Bode (2009) used contingency theory to develop a conceptual framework which examines the connection between SC risk and firm performance. Similarly, Trkman and Mccormack (2009) adopted contingency theory to examine how contingent variables impact on supplier risk and supply chain disruption. From a theoretical point of view, they supposed that SCRM strategies should be company specific and based on supplier contextual factors and

found that the fit between the companies cluster and SCRM strategies provides SC performance.

Largely, the theoretical structural model in this study comprises the hypothetical relationships of six components, which are information sharing, SC coordination, risk sharing, SC finance, SC security and facilitation payment strategies with FP. Therefore, in this chapter, the researcher introduces the associated hypotheses to explore the positive relationships between SCRM strategies and FP, as shown Figure 6.2.

Figure 6.2: Overview of the theoretical framework



Source: Author

6.3-The conceptualisation of SCRM Strategies

A large and growing body of literature has investigated SCM in the Pakistani context. For example, Bhutta et al. (2007) studied 650 SMEs to investigate the impact of SCM practices on enterprise health. They found that SCM practices have significant impact on enterprise health and the healthiest enterprises have more products and more customers on average. In addition, growing enterprises sold more directly to end users, while enterprises with higher sales per employee sold the least to the end user. Hussain et al. (2009) studied the Pakistani textile SC. They found that the industry is more focused on reduction of lead times and costs, and driven by big brands and retailers. Ahmad et al. (2009) developed a scale for the measurement of service quality in pharmaceutical supply chains, and found it to be consistent with other service quality studies. Awan et al. (2009) identified the

critical success factors of TQM in Pakistani pharmaceutical wholesale distribution firms. They found that process design is a critical TQM success factor. Rashid and Aslam (2012) conducted a case study to evaluate the quality management practices in Pakistani supply chains. They found that the majority of firms had adopted ISO 9000 standards. However, Pakistani firms are far from achieving total supply chain quality management at the supply chain level. Akhtar et al. (2012) identified chain coordinators in Pakistani food SC. They found that chief executive officers and proprietors are strategic coordinators in medium-sized companies and small businesses. Furthermore, they said that the chain coordination effectiveness and relationship depended on distinctive or acquired abilities and available tangible resources. Noor et al. (2013) studied SCM effectiveness in the Pakistani textile industry. They found that the four dimensions, planning, sourcing, quality and time delivery are crucial to increase SCM effectiveness. In particular, planning and on-time delivery factors are closely associated with SCM. Akhtar (2014) explored the factors and determinants that compel or hamper firms' to implementation of ethical SCM initiatives in the Pakistani fertilizer industry. They found that legal and environmental obligations had more effect and have positive significant impact on ethical SCM than customer orientation in the business arena. In addition, Pakistani fertilizers companies place less emphasis on purchasing social responsibility and customer centred business activities.

With regard to SC sustainability, Khan and Qianli (2017) studied the effect of five green supply chain practices (green manufacturing, green purchasing, green information systems, cooperation with customers, and eco-design) on organizational performance in the context of Pakistani manufacturing firms. They found that green supply chain practices, except green purchasing, have a significant effect on organizational performance. However, the eco-design of green practices followed by green information systems revealed the greatest impact on organizational performance. Nadeem and Siddiqui (2017) studied the effect of green SC practices on SC performance in the context of Pakistani manufacturing industry. They found that Pakistani firms are less oriented towards the environment and SC. However, due to the pressure from institutions, firms were persuaded to adopt GSCM practices in their operations, which eventually boosted their performance. Khan et al. (2018) examined the effect of three factors (green transportation, green distribution and green purchasing) of green supply chain

practices on organizational performance in the perspective of Pakistani firms. They found that green transportation and green distribution have a significant effect on organizational performance. However, in the Pakistani context, green purchasing practice has a negative impact on organizational performance. Mumtaz et al. (2018) identified the critical factors of green SCM in Pakistan. They found that organizational involvement is the most important dimension useful to implement GSCM practices. In addition, the most significant factors of green practices are commitment from top management, ISO 14000 certification of suppliers and recycling of waste heat.

With regard to SCM strategies, Abass et al. (2011) conducted a study to highlight the role of organizational culture in determining knowledge management strategies. They found a significant relationship between knowledge management strategies and organizational culture. Knowledge management strategies are highly correlated with organizational performance. Mubarik et al. (2012) studied the impact of transportation outsourcing on supply chain performance in the Pakistani pharmaceuticals industry. They found that transportation outsourcing not only increased SCM performance but also had a significant influence on supply chain effectiveness and efficiency. Tipu and Fantazy (2013) adopted a quantitative approach to compare between Canadian and Pakistani SMEs with regard to the relationships among strategy, flexibility, and performance in the context of supply chain. They found that Pakistani SMEs adopted a follower strategy in order to achieve financial and non-financial performance, while the Canadian SMEs adopted innovative and customer-oriented strategies in order to improve their performance. Qureshi et al. (2013) conducted a study on supply chain Just-in-Time strategies on Pakistani cement industry. They found that the SC strategies of implementation of quality, product design, inventory management and production plans enhanced cement industry competitiveness in order to increase inventory performance, reduce operations & inventory costs and reduce unnecessary production. Khan et al. (2014) conducted research on SMEs to study the effect of adoption of E-Commerce and Electronic SCM on business performance. They found that E-Commerce and E-SCM adoption has a significant positive influence on business performance and SMEs that have significantly higher average sales growth rate, on-time order management and delivery process achieve high performance. Dost et al. (2018) studied the impact of devolution strategy on supply

chain performance. They found that devolution plays a significant mediator role between knowledge management practices and SC performance. They also revealed that knowledge management practices have a direct relationship with SC performance. Aslam et al. (2018) conducted a study on supply chain strategies agility, adaptability and ambidexterity. They found that a market-sensing capability is an antecedent of agility and adaptability. Moreover, agility plays a mediator role between adaptability and ambidexterity. Basheer et al. (2019) studied Pakistani textile firms to explore the impact of TQM and SC practices on firms' SC performance in terms of IT capabilities and SC technology adoption. They found that there is significant relationship between TQM and SCM practices and IT capabilities has a relationship with SC technology adoption and firm performance. In addition, IT capabilities and SC technology adoption play a mediating role among TQM practices, SCM practices and firm performance. However, far too little attention has been paid to SCRM strategies impact on FP in the context TAR (Pakistan).

After a deep understanding of qualitative data of the SC risks profile in a TAR, the findings enhance our understanding of risk identification in that region. The previous chapter also indicates different SCRM strategies. However, the researcher selected the top six SCRM strategies emerging from the qualitative data, to analyse their influence on FP.

SCRM strategies can manage SC complexity and avoid risk, which can lead to better SC performance. SC disruption has direct or indirect negative impacts on a firm's performances, there is a need for intervention with appropriate strategies and responses to tackle such risk (Bode et al., 2011). SCRM strategies are "*strategic moves organisations deliberately undertake to mitigate the uncertainties identified from the various risk sources*" (Jüttner et al., 2003:200). SCRM strategies for holistic risk mitigation are flexibility, agility and preparedness (Ponomarov & Holcomb, 2009). After more comprehensive review of SCRM strategies Colicchia et al. (2010) suggested three broader categories of strategies: buffering (through inventory or capacity), mitigation (actions that reduce the probability of risk event) and the use of contingency plans which are triggered when a risk occurs.

Traditionally, firms adopt various strategies that provide defence against risks. Tang (2006b) emphasised that the benefits of implementing SCRM strategies are reducing cost, improving customer satisfaction, and sustaining the normal operation level during/after a major disruption. Similarly, Altekar (2004) also asserted that SCRM strategies (e.g., trust, integration and investment) can improve SC performance in developing countries. However, these strategies may limit a firm's operational performance and can negatively impact competitive advantage (Giunipero & Eltantawy, 2004).

Previous research has indicated that various SCRM indicators have a positive impact on long-term operations and FP (e.g., Hendricks & Singhal, 2003, 2005; Kleindorfer & Saad, 2005; Hendricks et al., 2009; Chen et al., 2013). The following sections unveil the top six SCRM strategies emerging from the qualitative data and their impacts on FP in a TAR.

6.3.1-Information sharing strategies and financial performance

The benefits of information sharing in SCs are a growing area of interest among researchers and practitioners (Arshinder et al., 2011). Several researchers have identified benefits of information sharing benefits in different dimensions. For example, information sharing strategies can significantly reduce the bullwhip effect (Lee et al., 1997), increase material flow (Lee et al., 2000), reduces the level of behavioural uncertainty and enhance the level of trust (Kwon & Suh, 2004) and can improve channel coordination (Sahin & Robinson, 2005). Similarly, they can provide a better base for conflict resolution and decision making (Li & Lin, 2006), they can improve order fulfilment rate, which can impact on customer satisfaction level (Lin et al., 2002; Li & Lin, 2006; Premus & Sanders, 2008), they enable faster delivery and reliability (Zhou & Benton, 2007; Premus & Sanders, 2008) and can help in achieving competitive advantage (Chandra et al., 2007). In addition, they can increase visibility and traceability (Hendricks et al., 2007), reduce inventory costs (Soosay et al., 2008), decrease SC costs (Lin et al., 2002; Ding et al., 2011), enhance responsiveness and planning (Yu et al., 2010), and improve partner relationships and operational effectiveness (Barratt & Barratt, 2011).

In the SCRM context, Kleindorfer and Saad (2005) concluded that information sharing is a best practice among SC partners, to identify their vulnerabilities and

help them in SCRM implementation. It can avoid disruptions (upstream and downstream) or it can mitigate their negative consequences (Li et al., 2006). In addition, Faisal et al. (2006) identified that information sharing is an enabler of SC risk mitigation and vital for a firm to achieve effective SCRM (Li et al., 2015). The current terrorism risk to global SCs has increased the importance of information sharing between trade and governments. There are a number of security and information sharing incentive-based programmes such as Free and Secure Trade (FAST), and Customs-Trade Partnership against Terrorism (C-TPAT).

A growing body of literature has highlighted the significance of information sharing in improving the performance of supply chains and responding to disruptions (e.g., Narasimhan & Jayaram, 1998; Lee et al., 2000; Zhao et al., 2002; Fiala, 2005; Fawcett et al., 2007; Flynn et al., 2010; Khurana et al., 2011; Lotfi et al., 2013; Chang et al., 2013). According to Lee and Whang (2005:126), "*The capability for all supply chain partners to have access to shared information on a timely basis is therefore key to improving supply chain performance".* Information-enriched SCs perform significantly better than those that do not have access to information beyond their company limits (Mason-Jones & Towill, 1998). Gupta and Nehra (2002) found that SCM performance could be affected by 80 percent due to a lack of information sharing among SC partners. It helps firms increase profits by reducing the cost of inventories and enhancing capital and cash flow utilization, thus improving business performance (Rai et al., 2006).

In addition, Flynn et al. (2010) asserted that the significance of information sharing between manufacturers and SC partners (both downstream and upstream) for improving operational performance. Similarly, Manyika et al. (2011) found that information sharing could help manufacturers to cut product development time by 20–50% and eliminate product defects prior to production through simulation and testing of SC big data. Sanders (2014) agreed with this view and said that the data-driven SC can affect the production and operations processes. It allows a higher degree of efficiency in product design and development, quality improvement, and a better balance between demand and capacity through information sharing with SC partners. Similarly, Zhou et al. (2014) found that firms should align the level of effective SC practice with the level of information quality in order to achieve superior performance. They found that no firm had low information quality but a

high level of effective SC practice, while firms with high information quality but no effective SC practice can experience poor performance.

Several studies have empirically established the link between information sharing and SC operational performance. For example, Li and Lin (2006) found that both information sharing and information quality are influenced positively by trust in SC partners and shared vision between partners and contribute to overall cost and service level performance. Wu et al. (2014) examined four key social exchange issues, trust, commitment, reciprocity, and power as antecedents of information sharing and collaboration. They found that both information sharing and collaboration have a partial mediation effect on SC performance. Panahifar et al. (2018) empirically tested three collaboration enablers (trust, information readiness and secure information sharing) which improve SC collaboration. They found that secure information sharing is the most important factor in fostering information sharing-centred collaboration and positively and significantly influences a firm's performance.

Similarly, Carr and Kaynak (2007) found that traditional communication methods of information sharing (internal and external information sharing) are significant factors for improving a buyer's performance, and also affect firm performance. Sezen (2008) surveyed the impact of information sharing and supply chain integration on SC performance in Turkish manufacturing firms. They found that information sharing and integration significantly influenced supply chain performance. However, Liu et al. (2013) argued that information sharing affects only supply chain performance; it has no impact on overall business performance.

Furthermore, Marinagi et al. (2015), based on a survey of 61 manufacturing firms in Greece validated the role of information sharing. They found that information sharing among SC partners facilitates higher overall performance. Dominguez et al. (2018) analysed partial information sharing involving retailers with four operational configurations (demand variance, lead-time average, forecasting period and inventory policy). They found performance enhancement based on information sharing. However, partial information sharing structures need to be carefully designed in order to achieve significant performance.

In addition, Chang et al. (2013) found that e-procurement contributes to SC performance through effective information sharing. Bruque-cámara et al. (2016)

also analysed the impact of specific cloud technology (community cloud computing) on an integration of informational flow. They found that technological innovations (such as cloud computing) enable SC integration to increase operational performance.

In the SCRM context, Hall et al. (2011) said that effective implementation of an information security strategy is positively associated with firms performance. Yang and Wei (2013) empirically identified the significant of SC security. They found that information sharing management and partner relationship management are positively and significantly associated with security performance. Sindhuja (2014) found that information security initiatives are positively linked with supply chain operations, to produce positive effects on SC performance. Similarly, Kauppi et al. (2016) found that firms in riskier countries use combined arcs of external information sharing and risk management practices. Such a combined approach is linked to higher operational performance.

A number of studies have shown that information sharing and SC integration lead to improved FP and profitability. For example, Ural (2009) demonstrated that there is the positive impact of information sharing on financial export performance and satisfaction with an export venture. Oh and Kim (2011) found that both of the e-marketplace types (many-to-one and many-to-many), buyer-supplier relationship (information sharing, collaboration, trust, integration and communication) and operational performance have a significant correlation. Schloetzer (2012) finds that the greater the degree of information sharing, the better for the partner's FP and other non-FP.

Similarly, Huo et al. (2014) found that strong internal information sharing within the business processes can generate sufficient requirements for the firms to improve their FP. Zhao et al. (2015) conducted a survey of 195 firms in China and found that information sharing is a key factor of FP. The management used the advantage of the strategic relationships of information sharing to increase FP. Chang et al. (2016) conducted a meta-analysis of 170 previous studies to examine information sharing impact on FP. They point out that an element of information sharing can certainly improve FP. However, Huo et al. (2017) claimed that there is no significant link between information sharing and FP.

In addition, Lai et al. (2015) examined environmental management information (EMI) sharing with upstream suppliers and downstream customers and its effect on FP. They found that EMI sharing with suppliers could bring cost and environmental performance, but not profit. Alternatively, when firms reveal EMI with their customers, it has a positive effect on profit and cost performance. Similarly, Gu et al. (2017) surveyed 220 demand-driven manufacturers to explore the joint effects of information sharing on their FP. They found that a strong relationship with suppliers not only improves suppliers' operational performance but also positively influences manufacturers' operational performance directly and FP indirectly. Yu et al. (2018) explored the effect of big data-driven SC capabilities (information exchange, coordination, intrafirm activity integration, and supply chain responsiveness) on FP. They found that there is no significant relationship between information sharing and FP.

Several studies have empirically established the link between information sharing and supply chain FP. Despite this, a few studies such as Oztekin et al. (2015), Huo et al. (2017) and Yu et al. (2018) failed to find a link between information sharing strategies and FP. In this study, the reseracher extend his analysis by examining the positive impact of information sharing strategies on FP. This study offers the following hypothesis:

H_1: *Information sharing strategies are positively related to FP.*

6.3.2-Supply Chain Coordination and Financial Performance

SC coordination has been recommended in the literature for better business performance (Flynn et al., 2010; Li et al., 2010). It also increases intra and inter-organizational performance and flexibility (Martha et al., 1997; Andraski, 1998; Sinkovics & Roath 2004). However, Costantino et al. (2015) argued that the lack of coordination reduces the performances of the whole SC. Specifically, SC operational coordination facilitates companies to streamline and automate their operational activities across the SC (Lee & Whang 2005; Liu et al., 2010). Coordination has positive effects on SC operational performance; SC operational coordination improves overall business performance (Lee & Whang, 2005; Liu et al., 2013).

Numerous studies have provided empirical evidence that SC coordination can improve FP. For example, Yu et al. (2013) identified that internal coordination significantly influences both dimensions of external coordination, customer and supplier coordination; and that supplier coordination and customer coordination strategies are significantly and positively related to FP. Zhang and Huo (2013) also empirically showed that the SC coordination can increase SC financial performance. Similarly, Lobo et al. (2013) revealed that farmers' coordination with buyers can increase farmers' loyalty and FP. Foerstl et al. (2013) stated that a positive impact of cross-functional integration and functional coordination on purchasing performance and purchasing performance has significant effect on overall firm performance.

In addition, Xu et al. (2010) developed a multi-agent simulation model to examine the effects of coordination strategies and vendor-managed inventory (VMI) on firms' bankruptcy. They found that the coordination strategies are effectively reduced the risk of bankruptcy. Zhao et al. (2015) studied the U-shaped relationship between coordination and FP. They suggested that firms should focus on the significant role of top management support in improving FP through coordination more effectively.

A study conducted by O'Neill et al. (2016) in Australian small manufacturing firms found that there is a positive relationship between quality commitment and FP. Akhtar et al. (2017) found that participative leadership is more strongly linked with the effectiveness of SC coordination than directive leadership, and operational and social performances are the key factors of FP. Huo et al. (2017) also validated the direct link between process coordination and FP. Similarly, Yu et al. (2018) found through exanimation of big data that SC coordination is positively and significantly linked to FP. In this study, the reseracher extend his analysis by examining the effect of SC coordination strategies on FP. This study offers the following hypothesis:

H_2: *SC coordination strategies are positively related to FP*

6.3.3-Risk Sharing Strategies and Financial Performance

Risk sharing strategies can increase firms' operational performance in three ways. First, they can help resolve conflicting objectives, align incentives, facilitate joint efforts in activities to respond to risks, aid SC planning, collaborative planning forecasting and replenishment, protect new product development and enable better time-based performance in terms of delivery and improved design efficiency (Narayanan & Raman, 2004; Zhou & Benton, 2007; Yan & Dooley, 2013). Second, risk sharing strategies can assist the SC partners in better anticipation and coordination in their supply and demand (Gérard P. Cachon, 2002). Third, they can help SC partners correctly allocate costs and benefits linked to risk events, and distributed supply chain work in an integrated way to get better SC performance (G. Li, Feng, Cheng, Zheng, & Ji, 2014). This view is supported by Knoblich et al. (2015) who said that the SC contract is a risk-sharing strategy to integrate SC partners and improve SC operational performance.

A number of empirical studies have found that risk-sharing contracts affect performance. However, far too little attention has been paid to SC risk sharing strategies' impact on FP. For instance, Dana and Spier (2001) revealed that revenue-sharing contracts contributed to improved availability and higher profits for all SC partners. Wakolbinger and Cruz (2011) developed a model that allows decision-makers to evaluate the impact of risk-sharing contracts on their key objectives, profit and risk. Their results highlight also the significance of considering risk-sharing contracts as a tool to mitigate SC disruption risk. In the same vein, Fan et al. (2017) found that operational and financial performances are positively influenced by risk-sharing strategies.

In addition, Li et al. (2015) examined collaborative relationships (relationship length, supplier trust, and shared SCRM understanding). They found that both risk sharing strategies and risk information sharing significantly improve FP. These findings confirmed that risk-sharing strategies could have a significant influence on the firm's FP. Thus, this study postulates the following hypothesis:

H_3: *Risk sharing strategies are positively related to FP*

6.3.4-Supply Chain Finance and Financial Performance

Financial strategy mainly focus on the financial parts of strategic decisions. According to Bender (2014), the financial strategy has two components: raising the funds needed by an organization in the most appropriate manner and managing the employment of those funds within the organization. Traditionally, financial institutions adopted a strategy of credit rating to evaluate the credit risk of a firm. Similarly, buyers also frequently evaluate the credit score of suppliers in SCs to avoid future disruption (Moretto et al., 2018). In the SCRM context, there are different SC financial strategies, such as keeping a sufficient amount in the bank, financial hedging strategies, credit rating models, long-term contract, revenue sharing, transfer or sharing of currency risk, currency call and put options, factoring and reserve factoring.

The main goal of SC financial strategies is to diversify the financial sources of firms and improve the entire SC performance (Buzacott & Zhang, 2004). It can depend "*on the terms of payment that may include a penalty for late payments and/or discounts for early payments*" (Gupta & Dutta, 2011:47). It is focused on the coordination of cash flows between firms in their SC to increase performance and efficiency (Wuttke el at., 2013a).

SC operational performance is linked with FP. This view is supported by Birge (2015), who studied the relationship between financial management and operations management and discussed that there are areas where financial activities have a significant impact on operations; conversely, operational considerations provide new perspectives on financial decisions. Previous research has indicated that various SC financial strategies have a positive impact on performance. For example, Protopappa-sieke and Seifert (2010) developed a mathematical model to determine optimal purchasing order quantity under working capital constraints and payment delays. They used a numerical model to examine the sensitivity of the firm's operational and FP on problem parameters. A case study conducted by Blackman et al. (2013), found that first, SC financial strategy is an essential component of Motorola's overall SCM strategy. Second, physical, information and financial flows are closely aligned with each other. Last, SC financial strategies provides a reduction in financial risk, increased efficiency of

the foreign exchange process, reduction in international payments from offsetting, shortening of the lead-time for the payment cycle within the banking system and the reduction of variability of customer-supplier settlement dates. Similarly, Silvestro and Lustrato (2014) conducted an exploratory study of the role of banks in improving supply chain integration. They found the role of financial institutions in synchronising the flow of physical, financial and information flows, and in contributing to the SC integration enablers (e.g., coordination, collaboration, information sharing and information visibility) to improve SC performance. Lekkakos and Serrano (2016) studied SC financial strategy (reverse factoring) implications on the operational decisions and performance in a cash-constrained SME. They found that the application of reverse factoring significantly increases the SME's operational performance and FP (such as robustness in cash fluctuations and unlock more than 10 % working capital).

Some researchers have attempted to draw a link between SC financial strategies and its effect on a firm's bankruptcy. For instance, Xu et al. (2010) found that SC finance strategies (vendor-management-inventory) can significantly reduce the probability of bankruptcy of members in the supply chain. In the same vein, Zhao et al. (2015) developed a big data set model to predict the probability of business bankruptcy of SC finance clients. They found that information on SC activities (taxable sales revenue, the frequency of making value-added tax (VAT) payment, number of VAT invoice issuance, the frequency of VAT invoice issuance and firm age) is negatively correlated with business bankruptcy. Kutsuna et al. (2016) studied Initial Public Offering (IPO) firms and their SC partners. They found that supply chain partners experience significantly higher rates of growth in revenue, cash balances, and PP&E (property, plant and equipment) than other private firms do and financial effects of positive liquidity shocks on SC partners.

In the SCRM context, several studies have been conducted to explain SC financial strategies effects on SCRM, and in turn on FP. For example, Mello et al. (1995) developed a model for multinational firms to examine flexibility in sourcing and ability to use financial markets to hedge exchange rate risk. They found that operational flexibility and SC financial strategies have supportive features and can be interconnected by substituting each other in a firm's performance. Chowdhry and Howe (1999) used a mean-variance (MV) model to examine SC financial

strategy (financial hedging) and operational flexibility with fixed total capacity. They found that firms frequently use financial tools to hedge short-term risk while depending on operational flexibility to hedge long-term risk. In the same vein, Hommel (2003) extended that model and differentiated between geographical discrepancy and operational flexibility, where hedging strategies are motivated by a minimum cash flow constraint. Ding et al. (2007) examined the financial strategies (currency call and put options) production (postponement) portfolios to mitigate exchange-rate risk. Chen et al. (2014) used a single-period MV model to study financial strategies and operational strategies with production postponement. They found that financial strategies are a partial substitute for operational strategies.

In addition, Steeman (2016) examined that SC financial strategies can improve the overall FP and mitigate the overall risks of the supply chain. Pellegrino et al. (2018) highlighted that SCRM (sourcing strategies) used as commodity price volatility (CPV) mitigation strategies can improve the firm's FP. They showed that effective non-financial strategies (switching suppliers and substituting commodities) could mitigate CPV risk. However, the suitability of these strategies is strongly influenced by some specific conditions such as the purchasing volume, the relative values of the long-term prices of the commodities and the sunk cost needed to build flexibility.

SC financial strategies is an essential part of SCs and yet there is very little research that explicitly addresses the topics of strategy, implementation and FP of global financial SCs (Blackman et al., 2013; Gelsomino et al., 2016). However, a few researchers have been able to draw a relation between SC financial strategies and FP. For instance, Randall and Farris (2009) provided SC financial management techniques to identify and quantify the potential opportunities to improve overall SC profitability and performance. They found that supply chain financial management such as cash-to-cash cycles and sharing WACC (weighted average cost of capital) with trading partners can contribute to increase competitive advantage and performance. Shou et al. (2012) analysed the critical relationship between the SC structure and its key factors through a system dynamics model and showed that prepayments (i.e. payment to a supplier in advance of delivery and the issue of an invoice) may have a positive impact on FP. In the same vein, Wuttke et al. (2016)

found that SC financial strategies can increase FP by providing better access to finance for suppliers and facilitating longer payment terms for buyers. In sum, there is a positive relationship between SC financial strategies and FP (Klapper, 2006; Gelsomino et al., 2016). In this study, the reseracher extend the analysis by examining the impact of SC financial strategies on a firm's FP. This study offers the following hypothesis:

H4: *SC finance strategies are positively related to FP*

6.3.5-Supply Chain Security Strategies and Financial Performance

Security performance is defined as *"the measurement and comparison of actual levels of achievement with regard to security. It is related to the prevention of any malicious threat, damage, and disturbance to an organization"* (Zailani et al., 2015:655). Generally, security performance can be measured by hard (objective) measures and soft (perceptual or responsive) measures. However, actual incident data are difficult to obtain and perceptual measures are valid indicators of security performance (Shang & Lu, 2009).

SC security can improve logistics performance. For example, on the non-financial (operational) side by the reduction in lead times, increased delivery reliability, waste reduction, the firm reduced the need for operations workers to perform security-related tasks. On the financial side, the firm increases the ability to improve revenues and profits through SC security actions that lower the total costs of security, such as the improvement of security technology whereby firms reduce variable costs linked with product monitoring or loss/theft/sabotage (Autry & Bobbitt, 2008). Similarly, the European Commission (2006) reported that enhancing SC security can reduce the number of delayed shipments, reduce theft and losses, increase customer loyalty and employee commitment, improve planning, reduce the number of safety incidents, lower inspection costs of suppliers and increase cooperation with partners, reduce crime and vandalism, and improve security and communication between supply chain partners. Furthermore, SC security enables international trade by reducing transit time (Banomyong, 2005), increasing port operational efficiency (Y. Yang, 2011), and improving customs clearance efficiency (Sheu et al., 2006).

A large and growing body of literature has investigated SC security strategies' impact on operational performance. For example, Peleg-Gillai et al. (2006) claimed that in Malaysia, firms have a 48 % decrease in inspection time, 50 % improvement in asset visibility, 31 % shorter problem resolution time, and 38 % reduction in theft, loss and pilferage, through investment and improvement in their SC security. Closs et al. (2008) recommended that internal and external security initiatives would improve the general performance of the supply chain. Autry and Bobbitt (2008) employed a content analysis technique to evaluate qualitative research data and identified potential SC security performances impacts at the firm, operational, and market-level as well as enhanced customer satisfaction and greater SC continuity. Whipple et al. (2009) explored the link between security initiatives and food manufacturers' security performance of global and domestic SCs. Their results indicate that global-oriented SCs have significantly higher security performance than domestic SCs and that global supply chains give more managerial importance to SC security and ensure the security procedures of SC partners (suppliers, customers and service providers). In addition, Voss and Williams' (2013) study revealed that firms which are compliant with security initiatives have a positive influence on their supply chain resilience and performance as compared to non-compliant firms. Yang and Wei (2013) empirically investigated that the effect of SC security on security performance in the South East Asian region. They identified four vital SC security management dimensions; facility and cargo management, accident prevention and processing, information management and partner relationship management, and found that information management and partner relationship management has significant positive effects on safety performance while partner relationship management had a significant positive effect on customs clearance performance. Similarly, Zailani et al. (2015) revealed that four crucial practices (cargo management, facility management, human resource management, and information management) of SC security have a significant influence on firm security operational performance. They also found that security culture positively controls the relationship between facility management and the security operational performance of the firm. Cigolini et al. (2016) suggested that organizational and cultural tools positively influence SC security performance, by reducing the impact of both operative and planning mistakes, especially the cause of delays in the delivery of goods to the final customers. To summarize, a secure supply chain can

lead to higher visibility and an increase in supply chain performance and customer satisfaction, reduction in lead-time and overall cost reduction.
Despite this, very few studies have investigated the impact of SC security strategies on FP. For example, Bearing Point (2003) conducted a research impact SC security strategies on financial in Thailand and USA. They reported that security initiatives have a significant impact on FP. Such impacts as avoidance of cost on US customs' trade security measures, better visibility on cargo arrival timeline and cargo monitoring, reduction in the size of inventory, increase in sales, and reduction in theft and pilferage can improve the FP.

As discussed above, much of the prior research on SC security tended to focus on operational performance and security initiatives' influence on performance. However, research on SC security strategies impact on FP has been rare up to this point. Based on these earlier research findings, this study hypothesize that a higher level of SC security strategies has a positive impact on FP.
H_5: *SC security strategies are positively related to FP*

6.3.6-Facilitation payment strategies and performance

A number of studies have found an insignificant positive or negative impact of bribery on firms performance. For example, a stream of research studies found that corruption has a negative impact on both macro-level economic growth and firm-level investment growth (e.g. Gaviria, 2002; McArthur & Teal, 2002; Fisman & Svensson, 2007; De-Rosa et al., 2010) . However, some empirical studies found a positive link between the use of bribery practices and firms' performance (e.g. Huntington, 1968; Lui, 1983; Vial & Hanoteau, 2010; Hanousek & Kochanova, 2016).

With regard to the negative business performance impact of facilitation payment, De-Rosa et al. (2010) studied bribery impact in non-EU countries with weaker institutions. They found that the bribery negatively affects a firm's performance. In the same vein, Yang (2014) found that bribery has a significant negative impact on firm growth in firms in the Latin America and Caribbean region.

Regarding positive business performance impacts of facilitation payment. Funga (2015) combined information on bribery practices with the firm's accounting data

to examine how bribery effects bank debt ratios. They found that bribery is positively linked to firms' total bank debt ratios. Hanousek and Kochanova (2016) empirically examined the relationship between bureaucratic corruption and firm performance in Central and Eastern European (CEE) countries. They found a positive relationship between local bribery environments and firm performance in CEE countries.

There is a large volume of published studies describing the effect of anti-corruption activities on firm performance. For example, Kong et al. (2017) investigated the causal effects of anti-corruption on firm performance in China. They found that the anti-corruption operation significantly increases state-owned enterprises' performance, while non-state-owned enterprises' performance is significantly reduced. In the same vein, Chen et al. (2018) studied the impact of a crackdown on political corruption on the stock market in China. They found that firms whose officials were being prosecuted by the authorities experienced a significant risk of a decrease in share prices.

Generally, SCs are prone to corruption risk, which can lead to disruption (Christopher & Lee, 2004). Corruption also is the main risk for SC sustainability (Speier et al., 2011). The likelihood of corruption in the SC increases due to high levels of SC complexity. SCs are comprised of large numbers of stakeholders, with a variety of cultural backgrounds and different ethical standards (Arnold et al., 2012). In particular, SCs in developing economies face a major risk from both petty and grand corruption and these criminal activities are very hard to disrupt (Silvestre et al., 2018).

A large number of studies have investigated the impact of bribery on a business performance. Nevertheless, the long history of bribery practices in businesses, our understanding of SC bribery practice's impact FP is very limited (Arnold et al., 2012; Apergis & Apergis, 2017; Silvestre et al., 2018). However, Silvestre et al. (2018) studied the consequences of addressing corruption in the Brazilian beef SC. They suggested good practice for corruption in SCM and provided insights for policymakers and watchdogs/law enforcers on how to identify and disrupt supply chain corruption cons. However, the qualitative findings of this study revealed that facilitation is an effective strategy for SCRM (see Section 5.6.3).

Based on previous research and qualitative findings, this study hypothesize that facilitation payment strategies may have a positive or negative impact on a firm's FP.

H_6: *Facilitation payment strategy is positively related to FP.*

6.4-Moderating and Mediating Strategies

There are two vital classifications of variables. The first divides variables into dependent variables and independent variables. The second classification is grounded on the 'positions' of these variables, with antecedents, dependent variables, moderators and mediators. Such classification is essential in research design, particularly for solving complex and unsettled problems in theory development. According to Baron and Kenny (1986), identification and quantification of the effects of moderation and mediation variables effects is a valuable contribution to literature and essential for more complex situations (Muller et al., 2005).

6.4.1-Moderating effect of Information Sharing between SC Security and Financial Performance

Security information sharing focuses on the extent to which partners share accurate and timely information to address security-related events. It provide a first defence line against terrorist attacks, theft, product contamination and missing shipments (James & Dell, 2011). Blackhurst et al. (2005) stated that the flow of information can increase visibility across networks and help the SC partners to discover and recover from security-related incidents. Zhou and Benton (2007:1363) indicated that "*information sharing is a means to capture supply chain dynamics and thus reduce uncertainty in external and internal environments*". Firms frequently collect information about the external environment to reduce uncertainty and deal with risk in dynamic business climates. An effective use of information sharing can reduce terrorism risk to the SC (Noda, 2004). Similarly, it can also assist the firm to track criminal activity (e.g., Prentice, 2008; Ekwall, 2012).

The core of SC security is information sharing rather than physical activities (Lee & Whang, 2005). Security information sharing between SC partners (e.g. suppliers, customers, service providers and government agencies) is more likely to reduce SC risks and improve security operations (e.g., Giunipero & Eltantawy, 2004; Rice &

Spayd, 2005; Manuj & Mentzer, 2008; Voss & Williams 2013). It can also increase capability to design effective SC security strategies (e.g Sarathy, 2006; Gould & Macharis, 2010). This view is supported by Langley (2016) who writes that security information sharing allows firms to adjust their security strategies based on risk.

Information sharing with external partners is considered significant for successful SC security (e.g. Russell & Saldanha, 2003; Autry & Bobbitt, 2008; Speier et al., 2011). In particularly, the partnerships of voluntary security initiatives (e.g. C-TPAT, ACI) require extensive information sharing (Huh, 2008). For example, C-TPAT certification requires the sharing of more information with authorities, which can improve SC security in ports.

A number of studies have found that security information sharing can improve SC performance. For example, Furia et al. (2011) found that C-TPAT certification can increase the ability to meet customers' security expectations. Lee et al. (2011) investigated how information sharing through technology such as RFID can improve the efficiency and performance of SC security. Sheu et al., (2006) anticipated that IT-based SC security solutions would be essential to facilitate the flow of security information between SC partners in order to improve the logistics security performance. Lee et al. (2011) and Sternberg et al. (2012) found that higher information sharing between SC partners can increase security and logistics performance. However, Panahifar et al. (2018) argued that firms need a balance between information sharing and security information sharing for high SC performance.

A majority of interview interviewees in this study indicated that information sharing plays a significant role in SC security (see Section 5.6.2). In particularly, they considered security information sharing vital for them to develop their security strategies and mitigate financial damage due to security risk. For example, one interviewee said, "*We receive constant information about the area (form Government), specifically in regards to a possible risk to transport vehicles attacks"*. Another interviewee mentioned the existence of "*a very good communication system through mobile cell phones. All the drives used to make contacts constantly in case of an attack or an ambush by Taliban or robbers. ---- - to coordinate with each other and make sure the route is safe to drive------ information give us more benefit"*. Therefore, the information sharing can

influence the relationship between SC security and FP. The moderation hypothesis suggests that the relationship between SC security and FP is strengthened by information sharing.

H_7: *A combination of information sharing and SC security strategies is positively correlated to FP.*

6.4.2-Mediating effect of SC coordination between Information sharing and Financial Performance

The SCM literature has studied the impact of coordination and information sharing strategies in detail for quite a long period of time and suggested that businesses require a higher level of coordination to share information, knowledge, decisions rights and resources (Lee et al., 2000). There are two interrelated practices of coordination strategies. First, the coordination between partners regarding the upstream and downstream product flows (e.g., Cooper et al., 1997; Perry et al., 1999). Second, coordination of information sharing among SC partners (e.g. Christopher, 1998; Handfield et al., 1999). This view is supported by Akhtar et al. (2012) who write that coordination have important antecedents such as information sharing, trust, and commitment. SC coordination among SC partners appears to be critical and helpful in improving information sharing between SC partners (e.g., Peleg-Gillai et al., 2006; Autry & Bobbitt, 2008). Conversely, the coordination among SC partners critically hinges on the quality of information sharing (e.g., Alger & Renault, 2006; Balcik et al., 2010; Akhtar et al., 2012; Altay & Pal, 2014; Kabra & Ramesh, 2015). Firms often collect information about external environment and established trust and coordination with trustworthy SC partners to facilitate information sharing (e.g., Daft & Lengel, 1986; Das & Joshi, 2007; Kocabasoglu et al., 2007; Loh & Thai, 2015). The coordination between SC partners can overcome major barriers to SC integration, such as incompatibility of information sharing and lack of mutual trust in information sharing (Uusipaavalniemi, 2008). The mutual trust among partners can only be established through good-quality information flow. Information sharing between partners is a basic enabler, which can enable higher levels of coordination (Lee & Whang, 2005). Similarly, Zhang and Chen (2013) argued that the SC partners should sign a coordinative contract to guarantee the complete sharing of mutual information.

SCRM needs better coordination among SC partners to improve the entire SCRM performance. However, it is difficult to achieve SCRM performance, if one firm has risk information and others do not (Narayanan & Raman, 2004). Datta and Christopher (2011) found that a centralised information structure without extensive coordination is not effective in SCRM, even with increase in information flow. Similarly, the coordination of material flows without extensive information sharing does not improve SCRM. Both coordination and information sharing across SC partners were found to be vital for effective SCRM. However, coordination can be attained more easily in a centralized and widespread information sharing environment than in a decentralized and partial information sharing environment (Jeong, 2012).

It is widely acknowledged in SCRM literature that information sharing and coordination can lead to improved SC performance (e.g., Chen, 1998; Cachon and Fisher, 2000; Yu et al., 2010). Cachon and Fisher (2000) found that coordination and information sharing provided a maximum of 12.1 percent savings, with an average 3.4 percent system cost reduction. Sahin and Robinson (2005) found that SC performance could be enhanced through coordination and information sharing and positive correlation between coordination and information sharing. Xu et al. (2010) found that coordination is a mechanism to improve operational performance through information sharing, vendor-managed inventory (VMI), and various cooperation incentive schemas. Gligor and Holcomb (2013) found that coordination and information sharing are positively associated with SC agility and increase operational and relational performance. Pezeshki et al. (2013) found that establishment of effective coordination and quality information sharing can increase the total profit and reduce the market price. Quality information collection, sharing, and processing can lead to effective coordination and operational performance (Altay & Pal, 2014).

Numerous studies have attempted to explain how coordination among SC partners can effectively improve SC performance: FP, such as cost and revenue, and non-FP such as customer service and commercializing to market (e.g., Mentzer et al., 2001; Frohlich & Westbrook, 2001). However, poor coordination and information sharing have a negative effect on collective decision-making and performance (e.g., Dawes et al., 2004; Helsloot, 2005; Junglas & Ives, 2007).

A common view amongst interviewees was that the coordination with security forces and between SC partners could facilitate information sharing, which can improve FP. For example, one interviewee said, "*We have a good coordinating relationship with security force, so they send us a useful information about any threats*". Another interviewee mentioned that "*we passed three trucks before the border closure. Therefore, we were safe from loss. It was due to good coordination and information sharing between drivers and managers*". Consistent with this literature and qualitative finding, two hypotheses are thus proposed, suggesting that SC coordination plays a mediating role between information sharing and FP.

H_8: *Information sharing is positively related to SC coordination.*

H_9: *SC coordination mediates the relationship between information sharing and FP.*

6.4.3-Mediating effect of SC Coordination between SC Security and Financial Performance

SC security requires coordination between the public and the private sectors. SC coordination is vital for effective SC security strategies (e.g., Sheffi, 2001; Rice & Caniato, 2003; Rinehart et al., 2004; Kleindorfer & Saad, 2005; Sheffi, 2005; Elkins et al., 2005; Bohle et al., 2014). Similarly, SC security initiatives could improve coordination between SC partners and firms' profitability (Peleg-Gillai et al., 2006).

Williams et al. (2008) argued that supply chains are changed from internal coordination to external coordination in the context of SC security. Sheffi (2001) said that the lack of coordination between the SC partners can potentially annul internal SC security initiatives. Cedillo-Campos et al. (2014) stated that non-coordinated SC security initiatives have an impact on international trade and competitiveness performance of cross-border supply chains.

SC coordination between governments and the logistics industry is being increasingly recognised as an obligation across the global SC (Urciuoli et al., 2014). Sheffi (2001) suggested that the public and private sectors would need to work closely against terrorist threats. Russell and Saldanha (2003) extended this coordination and suggested that host governments should share responsibility for

SC security. Prokop (2004) illustrated the importance of coordination between government and industry in terms of customs clearance to maintain cargo integrity and avoid shipment damage or contamination. Thibault et al. (2006) found that SC security initiatives have benefited most from the coordination between public and private sectors. Sheu et al. (2006) identified that C-TPAT certification can encourage the coordination of global SCs in term of secure customs inspections, lower costs, and customer satisfaction. C-TPAT can voluntarily and proactively bring together the public and private sectors, which can coordinate with each other to mitigate security risk (Faisal et al., 2006). Yang and Wei (2013) found that container-shipping firms in Taiwan enhance their SC security performance (safety and customs clearance performance) through public and private sector coordination.

Strong evidence was found in this study, in the qualitative analysis that SC coordination between firms and authority can improve SC security in the context of TAR; ultimately, it can affect FP. For example, one interviewee said, "*We are regularly coordinating with security forces regarding transport security, to save employee life and money"*. Consistent with these arguments, two hypotheses are thus proposed, regarding coordination's mediating role between supply chain security and FP.

H_{10}: *SC security is positively related to SC coordination*.

H_{11}: *SC coordination mediates the relationship between SC security and FP*.

6.5-Summary

This chapter has discussed a set of SCRM strategies and their effect on firms performance based on a rigorous literature review. From the findings in previous Chapter 5, it was anticipated that SCRM strategies in a highly terrorism affected region would effectively mitigate SC risks and have an impact on FP.

After qualitative data analysis (through Nvivo 11), the researcher identified that the six most frequently used SCRM strategies in that region, although the previous chapter could not exactly answer to what extent these SCRM strategies affect FP due to the limited sample size. Rather, a large-scale survey will help to validate the extent of the impact of these SCRM strategies. In addition, this chapter also proposed a theoretical model with hypotheses about the relationships among

information sharing, SC coordination, risk sharing, SC finance, SC security, facilitation payment strategies and FP. Information sharing was expected to play a moderating role between SC security and FP. Similarly, SC coordination was thought to play a significant role between information sharing and FP. These hypotheses regarding mediation and moderation effects should also be tested by statistical analysis of survey data in the next chapter.

Chapter Seven

Quantitative Findings

7.1-Introduction

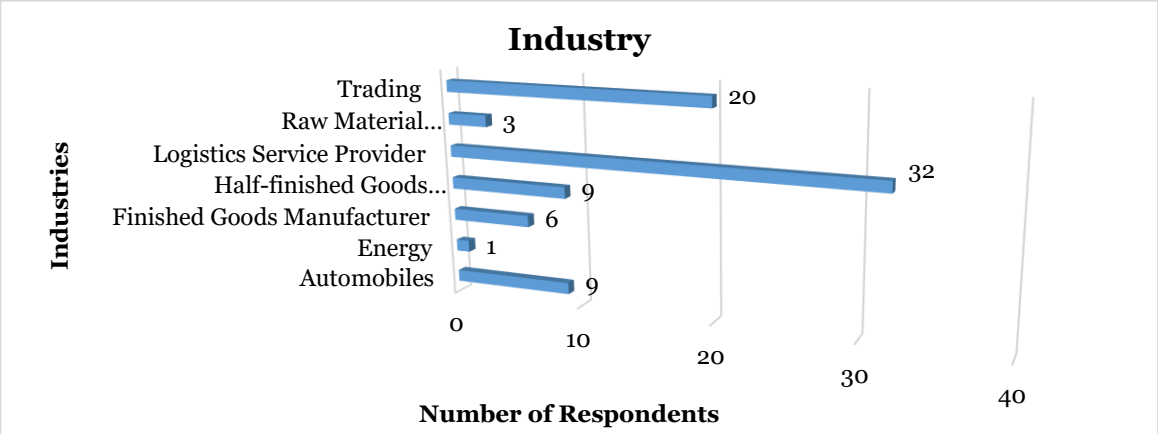
The aim of this chapter is to present the outcomes of the survey data, and to provide a comprehensive descriptive analysis of the quantitative data collected from the questionnaire. The profile of respondents is discussed in section 7.2. Section 7.3 evaluates the items and analyses respondent firms' context including ANOVA analysis. Reliability checks are presented in the section 7.4. Section 7.5 presents fsQCA analysis results. The sixth section investigates the mediation of SCRM strategies. The chapter is concluded by section 7.7, which contains a summary.

7.2-The Profile of Survey Respondents

A number of variables were used to collect general information about manufacturing and service firms. These include industry, annual sales, number of employees, number of containers per month, job title and experience of respondents.

Industry

Figure 7.1: Respondents' firm industries



Source: Author

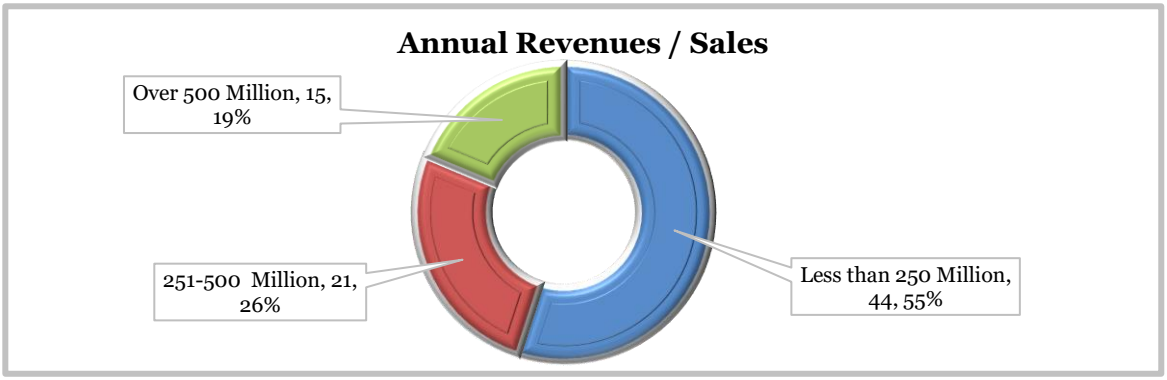
Figure 7.1 shows the industry profile of the respondents who completed the questionnaire survey. The largest concentration of respondents (40%) labelled their business as logistics service providers followed by trading firms and agents (25%). Finished and non-finished goods manufacturers accounted for 19% of

respondents, while, the others defined their business as automobiles, raw materials exporter/importer and energy firms.

Annual Sales and Number of Employee

The annual sales and the number of employee were used evaluated the size of the respondent firms.

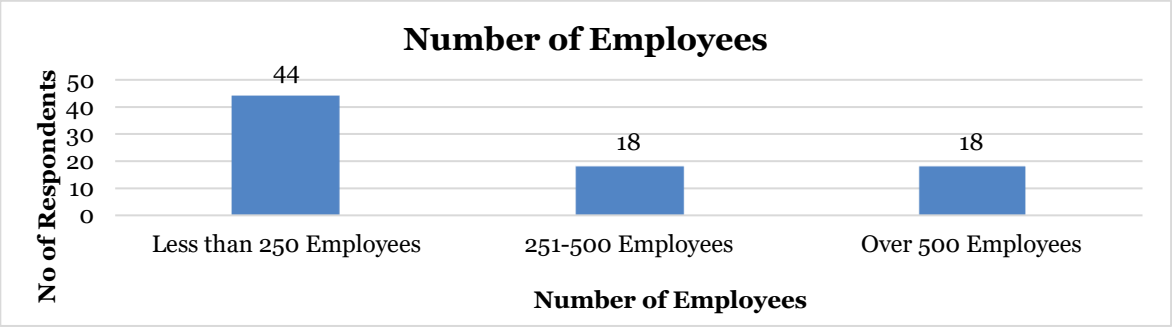
Figure 7.2: Annual revenues/sales of respondent firms



Source: Author

According to Table 7.2, more than half of the firms (55%) had annual revenue/ sales of less than 250 million PKR. In contrast, only 19% of respondent firms had more than 500 million PKR annual revenues/sales.

Figure 7.3: Number of employees in respondent firms



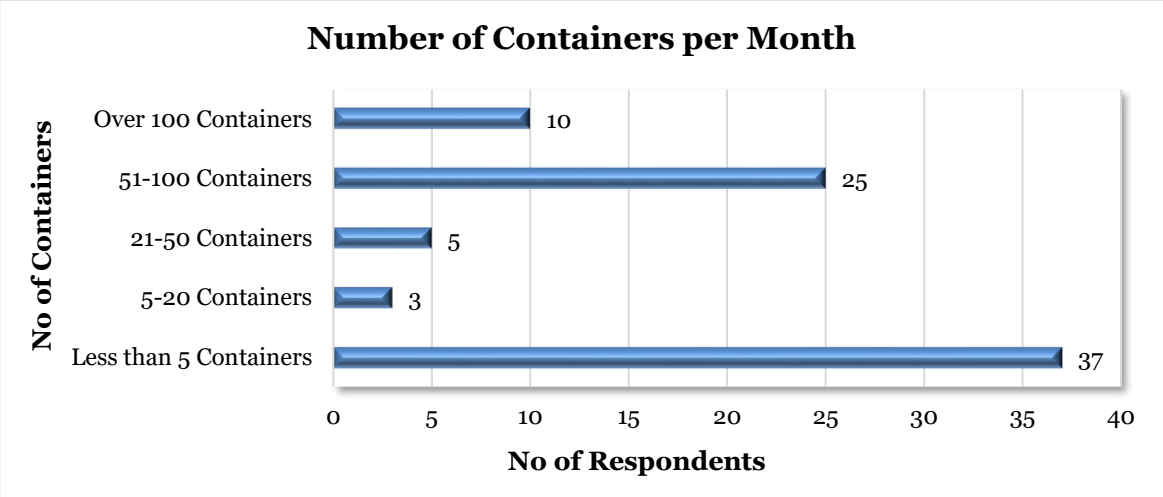
Source: Author

As shown in Table 7.3, 55% of the total respondent firms hired fewer than 250 employees, whereas 22% of them employed more than 500 employees. The number of employees in the rest of firms (22%) varied from 251–500.

Number of Containers

The SMEs handled quite small volumes of cargo because nearly half of the respondents revealed that their monthly cargo volumes were between fewer than 5 containers and 50 containers due to the lack of international trade in that area. However, 43% of the companies handled more than 50 containers per month. The details of cargo volume per month are shown in Table 7.4.

Figure 7.4: The number of containers handled by respondent firms per month

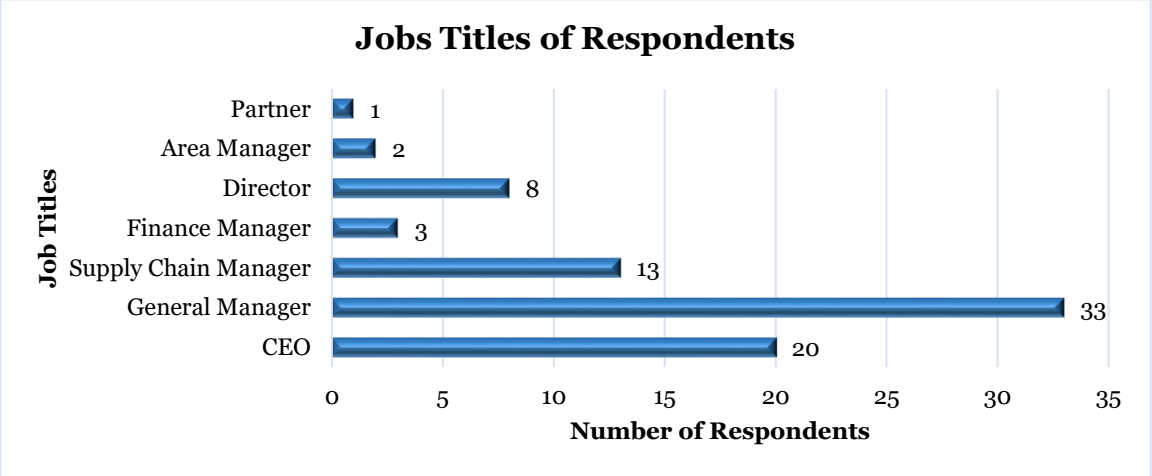


Source: Author

Job Title and Experience

The majority of respondents belonged to the top management of firm. Figure 7.5 shows that the job titles of respondents and their frequencies. The job titles can be divided into two main groups: top management (general manager, CEO, director, partner) and heads of department (logistics/ supply chain manager, finance manager, area manages and manager). Top management represented 80% of the sample and the other 20% of responses came from heads of department. Therefore, this survey constrained the target interviewees to top management, since the majority of respondents owned their firms. The data also provide an indication that all of the respondents (manager level or higher) could be deemed to be experts in logistics operations.

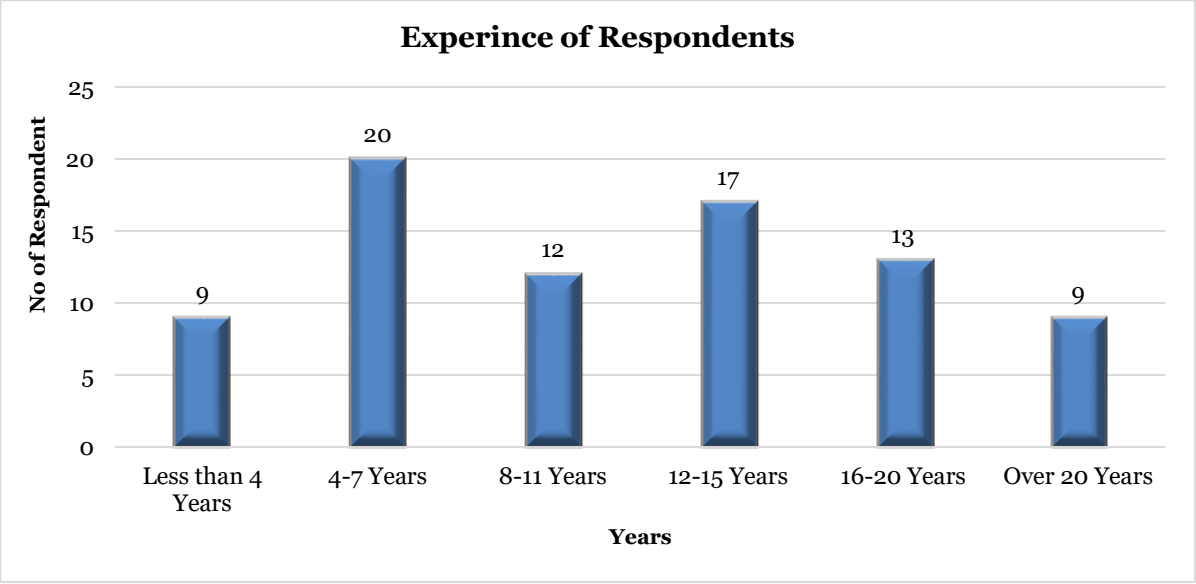
Figure 7.5: The respondents' job titles



Source: Author

Similarly, when they were asked about their logistics career expressed by number of years in supply chain/logistics operations, the majority of respondents (64%) had more than eight years' experience in supply chain/ logistics. Only 11% of respondent had less than four years' experience in logistics operations. From these results, it can be inferred that the participating persons had sufficient experience of and involvement in supply chain and logistics. Figure 7.6 highlights the respondents' years of experience in the field of supply chain and logistics.

Figure 7.6: The respondents' years of experience in supply chain/logistics



Source: Author

7.3- Survey Statistics

This section provides the data on SCRM strategies and presents to what extent they are implemented in practice. In addition, it provides descriptive statistics of FP in relation to industry and size.

7.3.1-Evaluation of Items

Summary statistics of the sample data are provided in the appendix E. The statistics include means and standard deviations for each item used to assess the constructs, information sharing, supply chain coordination, risk sharing , supply chain finance, supply chain security and facilitation payment strategies. From the mean value analysis, it was found that the respondents most frequently implemented the strategy of information sharing (μ=5.3), followed by SC coordination, risk sharing, SC finance and SC security. Moreover, information sharing has a low standard deviation (σ=1.2). This indicates that there is little variation in execution of this strategy among firms. However, the facilitation payment strategies has a low mean value and high standard deviation (μ=5.3, σ=1.7) as compared to other strategies.

With regard to information sharing, obtaining information from supplier (IS3) was implemented with a high mean and a low standard deviation (μ=5.7, σ=1.1). Sharing security information with employees (IS5) was another preferred strategy with (μ=5.5, σ=1.2). This can reduce security related incidents to employees, especially in TAR.

Regarding SC coordination, internal organizational coordination regarding to security threats (SCC2) was found to be an important strategy with (μ=5.4, σ=1.1). Similarly, effective coordinating of activities with partners (SCC1) was also a useful strategy with (μ=5.3, σ=1.3).

In the matter of risk sharing strategies, the findings indicate that buying an insurance policy for the business (RS7) is a significant risk management strategy, with a high mean value and low standard deviation (μ=5.5, σ=1.1) in that region. However, buying an insurance policy for employees (RS8) had a large standard deviation (σ = 1.8), which indicates that there is variation among firms in their practice of buying insurance for employees. Another significant risk sharing strategy (RS2) for firms is define clearly the terms and conditions with their partners and have formal and informal risk sharing contracts with their SC

partners. Generally, this also indicates that the firms in that region shared their SC risks through risk sharing contracts and insurance.

As for supply chain finance, this is a set of strategies aiming to enhance the management of financial flows at the SC level and mitigate financial risk. The findings show that transparency in payment processes (SCF9) and SC partners providing flexibility in payment processes (SCF10) are important strategies for reducing financial risk in that region with (μ=5.4, σ = 1.1). However, the strategy of checking the customer's credit score had a high standard deviation (σ = 1.8), indicating that the adoption of this strategy varies between SMEs and large enterprises. The findings show that the large enterprises (μ=5.0) more frequently adopted this strategy as compared to SMEs (μ=3.6).

Regarding SC security, four security initiatives (hiring security guards, using 24 hours CCTV operation, recording the entry/exit of vehicles and avoiding travel in high-risk areas) are extensively adopted in that region, with high mean values and low standard deviations. In contrast, four security initiatives (camouflaging the vehicles, having a specialized department for SC security, use of security equipment and hiring security escort for vehicles) have high standard deviations, which show that there is variation in adoption of these strategies.

In the matter of facilitation payment, surprisingly, the level of adoption of this strategy is far lower than the other five strategies (mean values from 2.9 to 4.2). Moreover, it has high standard deviation (1.5 to 2.1), which indicates that the implementation level varies significantly according to the business context as compared to other risk strategies. In addition, a Likert scale (ranging from one = never to seven =every time) was used to measure extent of corruption in the supply chain. The findings indicate that the majority of respondents had paid bribes (sometimes to every time) to public officials in the last year. Similarly, more than 60% of respondents reported that private officials had asked (sometimes to every time) for bribes in the last year. This also indicates that the firms usually used facilitation payment as a strategy to mitigate SC risks.

With regard FP, the literature and qualitative results indicated that SCRM strategies have a positive influence on FP. The quantitative findings of this study indicate that the average mean value is above 5 for FP, which indicates that SCRM strategies have a positive impact on FP. The growth of revenue (FP2) and return on

investments (FP3) have high mean value (μ=5.3). Similarly, the standard deviation (σ=1.1 to 1.3) indicates that there is relatively low variation among firms in FP (see Appendix E).

Top 10 SCRM Strategies

Table 7.1: Top ten SCRM strategies in the survey region

No	Sub-Strategies	Statistics	
		μ	**σ**
1	Obtaining transportation information	5.6	1.1
2	IS regarding security with employees	5.5	1.2
3	Insurance for business	5.5	1.1
4	Records the entry/exit of vehicles	5.5	1.3
5	Avoids travels in high-risk areas	5.4	1.4
6	Partners provide flexibility for payment processes	5.4	1.1
7	Internal coordination regarding the security threats	5.4	1.1
8	Transparency in payment processes	5.4	1.3
9	Security IS with customers	5.3	1.3
10	Business with trustworthy customers	5.3	1.4

Source: Author

Table 7.1 highlights the top ten SCRM mitigating strategies by combining all the items suggested in this study. Information sharing regarding transportation (IS3), sharing security information with employees (IS5), insurance for the business (RS7), recording the entry/exit of vehicles (SCS11), avoiding to traveling in high-risk areas (SCS13), partners providing flexibility for payment processes (SCF10), the internal coordination regarding security threats (SCC2), transparency in payment processes (SCF9), sharing security related information with customers (IS4) and doing business with trustworthy customers (SCF6) are found to be top ten practices in that region. These strategies have average mean value of 5.4. Three practices from each information sharing and SC finance strategies and two practices of SC security are included in the top ten list. Only one practices each from risk sharing and SC coordination strategies is included in this list.

In sum, these results also indicate that the information sharing strategies are the most important factors in FP, which can mitigate SC risks and build a stable logistics network with partners' efforts in order to minimise SC uncertainties by obtaining logistics information. Similarly, SC coordination, risk sharing, SC finance and SC security strategies are significant for FP and reduce the level of uncertainty in supply chain. However, it is not possible to compare these mean values with other studies, because no other studies are used the same constructs and

measurement items. However, the results suggest that these firms had developed SCRM strategies in order to survive, adapt and sustain their supply chain/logistics operations.

7.3.2-Firm Contexts

According to Mitchell (1995), risk perception can be influenced by factors such as firm size, product characteristics, job function and buyer demographics. Similarly, SCRM strategies can be influenced by factors such as industry and firm size (annual sales/revenue and the number of employees).

Industry

The surveyed industries fell into two main groups: manufacturing and services. The manufacturing industries included finished and half-finished goods firms, automobiles and raw material exporter/importer. The service industries were LSPs, trading companies and energy.

Table 7.2: Distribution of strategies used by industries

Strategies	Manufacturers (N=29)	Services (N=51)	F-statistics	p-value
Information Sharing	5.4621	5.2314	1.650	0.203
SC Coordination	5.2000	5.0745	0.319	0.574
Risk Sharing	5.0448	4.8725	0.599	0.441
SC Finance	4.9069	4.7784	0.418	0.520
SC Security	4.8793	4.7627	0.351	0.555
Facilitation Payment	3.9655	3.8000	0.255	0.615

Source: Author

Table 7.2 highlights the use of each SCRM strategy in the manufactures and services groups. The findings indicate that there is no mean difference between the two groups.

Firm Size

Firm size can measured by the number of employees and the annual revenues of the firm (Wagner & Neshat, 2012). In the context of Pakistan, generally, firms are divided into SME and large enterprises in order to determine the tax bracket and government subsidies. The researcher adopted the criteria for SME annual sales up to PKR 250 million and up to 250 employees (Small and Medium Enterprises Development Authority Paktistan, 2018; Security & Exchange Commission Of

Pakistan, 2018). Firm size can be a potential source of variance that confuses research results (Wagner & Bode, 2006). Therefore, this study divided the firms into two groups, SMEs and large enterprises.

Table 7.3: The differences in SCRM between the SMEs and larger firms

Strategies	SMEs Mean (N=44)	Large Mean (N=36)	F-statistics	p-value
Information Sharing	5.2889	5.3486	0.115	0.735
SC Coordination	4.9867	5.2914	2.046	0.157
Risk Sharing	4.8022	5.1057	2.015	0.160
SC Finance	4.6089	5.1029	7.144	0.009
SC Security	4.5178	5.1743	13.889	0.000
Facilitation Payment	3.8867	3.8257	0.037	0.849

Source: Author

Table 7.3 highlights the mean difference in each risk management strategy between the SMEs and large enterprises, as defined by annual sale/revenue and number of employees. The findings indicate that there is no significant difference in four strategies (information sharing, SC coordination, risk sharing and facilitation payment). However, two SCRM strategies (SC finance and SC security) show significant mean difference, indicating that use of these two SCRM strategies differs according to size of the firms.

Regarding FP, there is a mean difference (SMEs μ=4.9 and large enterprises μ=5.5) between the two groups, which is significant at the 5% level (F-statistics 5.4857 and p-value 0.019). From this, it may be interpreted that the large enterprises can achieve FP through SCRM strategies than SMEs.

7.4. Descriptive Statistics and Quality Checks

The descriptive statistics of fsQCA do not suggest any deep analysis, but can assist the researcher to identify the perspectives of respondents on the SCRM staregies and to what degree there is variation amongst the values assigned by respondents. The two features worthy of note are the Mean and Minimum values, as they reflect the consistency of the respondents' valuations. The mean column confirm reflects how each of the 80 cases valued that strategy, the higher the value, the greater the respondent's belief that the strategy in question influenced their FP. The minimum column identifies the respondents who gave the lowest value to the strategy. Again

the higher the value in this column, the greater the belief that the strategy influenced FP. In particular, the minimum column is a good gauge of how a strategy is appearing because if the lowest value remains relatively high, then, there is still more membership of 'in' than 'out' for that strategy (see Section 4.4.3). The descriptive analysis are divided into three sections: SMEs, large enterprises and all firms.

Descriptive Statistics of SMEs

Table 7.4 provides a summary of the descriptive statistics and correlation matrix for the set of risk strategies for SMEs. The calculations produced calibrated mean values for five strategies ranging from 0.65 to 0.81, while for the facilitation payment strategy, the mean was 0.55, thus showing good close ranges that may result in significant relations. Means above the cross mid-point (0.5) also indicates that the respondents believed these risk strategies contributed to FP. Similarly, the standard deviations are ranged from 0.13 to 0.18 for five strategies, which shows that there was no great variation in SCRM strategies adoption.

The correlation matrix provides an indication of the significant relationship between SCRM strategies and FP, with all values being significant at $p<0.01$ and at $p<0.05$ in SMEs. Specifically, information sharing, SC coordination strategies, risk sharing an SC finance strategies are strongly, positively correlated ($p<0.01$) with FP and with each other except that (information sharing and SC finance), (risk sharing and SC security) and (facilitation payment, SC corrdination, risk sharing and SC security) are not strongly positively correlated each other. Similarly, SC security and facilitation payment strategy are strongly positively correlated ($p<0.05$) with FP.

Table 7.4: Descriptive statistics and correlation matrix for SMEs

SCRM Strategies	μ	σ	Min	Max	Skew	Kurt	IS	SCC	RS	SCF	SCS	FPS	FP
Information sharing (IS)	0.81	0.16	0.67	1	0.38	-1.94	1						
Supply Chain Coordination (SCC)	0.80	0.18	0.33	1	-0.10	-1.00	0.572**	1					
Risk Sharing (RS)	0.76	0.17	0.33	1	0.43	-0.39	0.476**	0.697**	1				
Supply chain Finance (SCF)	0.69	0.13	0.33	1	0.53	3.67	0.21	0.518**	0.493**	1			
Supply chain security (SCS)	0.65	0.15	0.33	1	-0.39	2.12	0.332*	0.497**	0.29	0.545**	1		
Facilitation Payment Strategy (FPS)	0.55	0.29	0	1	-0.56	-0.29	0.302*	0.08	0.08	0.411**	0.23	1	
Financial Performance (FP)	0.76	0.18	0.33	1	0.07	-0.29	0.437**	0.639**	0.747**	0.670**	0.365*	0.316*	1

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Source: Author

Descriptive Statistics of Large Enterprises

Table 7.5 show a summary of the descriptive statistics and correlation matrix for large enterprises. The mean values for five SCRM strategies ranged from 0.75 to 0.81, while that for facilitation payment is 0.58. The results indicate reasonably close ranges that may result in significant relations. They also indicate that these SCRM strategies enhance FP, shown by means well above the mid-point (0.5). Similarly, the standard deviations of strategies range from 0.14 to 0.25, thus showing close variation range that may indicate the similar adoption of SCRM strategies among large enterprises.

The correlation matrix findings show that the SC coordination and SC security strategies are significantly related to FP at $p<0.01$ and risk sharing is significant at $p<0.05$ in large enterprises. However, no significant relationship was found between information sharing, SC finance or facilitation payment strategies and FP. Specifically, information sharing, SC coordination, risk sharing, SC finance and SC security strategies are strongly positively correlated with each other at $p<0.01$ and $p<0.05$, whilst facilitation payment shows inverse relations with other SCRM strategies and FP.

Table 7.5: Descriptive statistics and correlation matrix for large enterprises

SCRM Strategies	μ	σ	Min	Max	Skew	Kurt	IS	SCC	RS	SCF	SCS	FPS	FP
Information sharing (IS)	0.81	0.17	0.67	1	0.35	-1.99	1						
Supply Chain Coordination (SCC)	0.81	0.20	0.33	1	-0.52	-0.48	0.543**	1					
Risk Sharing (RS)	0.76	0.20	0.33	1	-0.27	-0.43	0.357*	0.679**	1				
Supply chain Finance (SCF)	0.75	0.14	0.67	1	1.21	-0.58	0.423*	0.350*	0.475**	1			
Supply chain security (SCS)	0.77	0.19	0.33	1	-0.15	-0.42	0.437**	0.609**	0.723**	0.590**	1		
Facilitation Payment Strategy (FPS)	0.58	0.25	0	1	-1.29	1.38	0.089	0.078	-0.013	0.043	-0.06	1	
Financial Performance (FP)	0.78	0.18	0.33	1	0.10	-0.70	0.321	0.622**	0.409*	0.243	0.497**	-0.117	1

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Source: Author

Descriptive Statistics of All Firms

Table 7.6 provides a summary of the descriptive statistics and correlation matrix for the set of SCRM strategies for all firms. The data produced mean values for the first five strategies ranging from 0.70 to 0.81, and for facilitation payment of 0.56, thus showing good close ranges that may result in significant relations. Moreover, the means exceed mid-point 0.5, which also indicates that the respondents believed these risk strategies contributed to FP. In addition, the standard deviations range from 0.14 to 0.19 for five strategies, while that for facilitation payment 0.27. This indicates that there is little variation in facilitation payment adoption.

The correlation matrix provides an indication of the significant relationship between SCRM strategies and FP, with the values of five SCRM strategies being significant at $p<0.01$, whilst facilitation payment shows no significant correlation with FP. There are strong positive correlations at ($p<0.01$) among five SCRM strategies, while facilitation payment shows only a strong positive correlation with SC finance.

Table 7.6: Descriptive statistics and correlation matrix for all data

SCRM Strategies	μ	σ	Min	Max	Skew	Kurt	IS	SCC	RS	SCF	SCS	FPS	FP
Information sharing (IS)	0.81	0.16	0.67	1	0.36	-1.92	1						
Supply Chain Coordination (SCC)	0.81	0.19	0.33	1	-0.32	-0.73	0.557**	1					
Risk Sharing (RS)	0.76	0.18	0.33	1	0.01	-0.36	0.414**	0.686**	1				
Supply chain Finance (SCF)	0.72	0.14	0.33	1	0.86	1.54	0.304**	0.425**	0.472**	1			
Supply chain security (SCS)	0.70	0.18	0.33	1	0.02	0.45	0.362**	0.524**	0.501**	0.594**	1		
Facilitation Payment Strategy (FPS)	0.56	0.27	0.00	1	-0.82	0.17	0.214	0.078	0.035	0.255*	0.107	1	
Financial Performance (FP)	0.77	0.18	0.33	1	0.08	-0.50	0.385**	0.629**	0.575**	0.471**	0.421**	0.142	1

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Source: Author

7.5-The fsQCA Findings and Hypotheses Validation

The fsQCA results can validate the inference that SCRM strategies are the predominant factors in FP. The qualitative results are vital to identify the conditions (SCRM strategies) respondents regard as significant in FP. fsQCA findings confirmed quantitatively the results drawn from qualitative analysis. In addition, the benefit of the fsQCA analysis is that not only does it identify the relevant conditions, but also it highlights the degree of the relationship between conditions, as well as their shared dependency. The statistical significance of the SCRM strategies or combination of strategies towards FP were examined, taking as a criterion a Ragin's consistency threshold of 0.85. A consistency threshold of at least 0.75 and up to 0.95 is recommended (Ragin, 2008). This value refers to the degree of conformity with necessity/sufficiency of SCRM strategies or combinations of these strategies. Conventionally, a condition or a combination of conditions is necessary or almost always necessary, if the consistency score surpasses the threshold (Ragin, 2008, Fiss, 2012) (see Section 4.4.1). A necessary condition implies that the firms could not achieve FP without SCRM strategies. In this study, hypotheses were formulated on the relationships between SCRM strategies and FP. The following hypothesises were tested in this study.

H_1*: Information sharing is positively related to FP*

H_2*: SC coordination is positively related to FP*

H_3*: Risk sharing strategy is positively related to FP*

H_4*: SC financial strategy is positively related to FP*

H_5*: SC security strategy is positively related to FP*

H_6*: Facilitation payment strategy is positively related to FP*

H_7: *A combination of information sharing and SC security strategies is positively correlated to FP.*

H_8: *Information sharing is positively related to SC coordination.*

H_9: *SC coordination mediates the relationship between information sharing and FP*

H_{10}: *SC security is positively related to SC coordination*

H_{11}: *SC coordination mediates the relationship between SC security and FP*

The fsQCA analysis was conducted with the aim of assessing whether any of the causal conditions or combination of conductions can be considered necessary conditions for the outcome. The inclusion or consistency value is the most important factor is assessing necessity (see Section 4.4.1). The super-Subset ( ) function of the R (QCA package) is a useful tool to calculate the score of a condition or combination of conditions (moderation of SCRM strategies), which is necessary for the outcome. An individual strategy or combination of strategies produce a score; if it surpasses Ragin's threshold it confirms full membership into the outcome.

In a similar way, sufficiency test estimates sufficient consistency and coverage. A high sufficiency consistency score indicates that the conditions are sufficient for FP. The truth table is an important phase of the fsQCA analysis to transform the fuzzy set values for each respondent and present all possible logical alternatives. Its main purpose is to identify the combination of conditions that best lead to the desired outcome (see Section 4.4.1). It provides two discrete steps: first, identify the sufficient conditions (strategies) for FP. Second, determine the patterns and dependencies of these strategies upon each other. This section is divided into three parts for SME, large enterprise and all firm, in each case identifying the necessary and sufficient conditions, and providing validation of the proposed hypotheses.

7.5.1-fsQCA & Hypotheses Validation for SMEs (n=44)

The hypotheses suggest that SCRM strategies positively impact on FP. These analyses are addressed in two parts. First, the hypotheses of SCRM strategies are tested with the necessity test (super-subset) and different necessity models are provided for moderation effects of these strategies. Second, the truth table provides different configurations and intermediate solution.

Necessity Test for SMEs

The necessity test (super-subset) is shown in Table 7.7. The super-subset generates 31 different models, which lead to FP. Five hypotheses (H1 to H5) are validated in the context of SMEs, while the exception being of H6. This indicates that the first five strategies are positively related to FP, while facilitation payment is not positively significant for performance. The five significant strategies all surpass Ragin's consistency threshold (0.85) and are necessary conditions for FP in the first

five models. The other 26 models showed different combinations of SCRM strategies, which achieve the FP. Ten models show the combination (moderation) of two SCRM strategies to produce FP in the survey region. Information sharing and SC security are moderated to achieve FP and validate hypothesis H7 in 98% of cases. Similarly, the moderation of three risk strategies leads to FP in 10 models. For example, the combination of IS*SCC*RS strategies surpassed Ragin's threshold with a consistency score 0.931 for necessary conditions in 93% of cases. The conjunction of four SCRM strategies also leads to FP in five models. For instance, the combination of IS*SCC*RS*SCF strategies achieved a 0.891 consistency score in all cases. Only one model shows that the combination of five SCRM strategies (all except facilitation payment) surpassed Ragin's consistency threshold in all cases. However, these combination models are outside the scope of this study. All models indicate the high relevance of the necessity (RoN) of the conditions. This means that a strategy or combination of strategies is non-trivial for FP (Duşa, 2017).

Table 7.7: Necessity test, models and hypotheses results for SMEs

Necessity Results & Models	Incl.	RoN	CovN	Hypothesis Support	IS	SCC	RS	SCF	SCS	FPS
Information Sharing (IS)	0.961	0.721	0.906	H1 is supported	√	-	-	-	-	-
Supply chain Coordination (SCC)	0.980	0.764	0.925	H2 is supported	-	√	-	-	-	-
Risk Sharing (RS)	0.970	0.914	0.970	H3 is supported	-	-	√	-	-	-
Supply Chain Finance (SCF)	0.911	1.000	1.000	H4 is supported	-	-	-	√	-	-
Supply Chain Security (SCS)	0.845	0.979	0.988	H5 is supported	-	-	-	-	√	-
Facilitation Payment Strategy (FPS)	0.710	0.984	0.980	H6 is not supported	-	-	-	-	-	**X**
SCS*IS	0.841	0.979	0.988	H7 is supported	**Θ**	-	-	-	**Θ**	-
A Few Additional Models										
IS*SCC	0.941	0.815	0.931	These models are outside	**Θ**	**Θ**	-	-	-	-
IS*RS	0.941	0.920	0.969	the scope of this study	**Θ**	-	**Θ**	-	-	-
SCC*RS	0.961	0.916	0.970		-	**Θ**	**Θ**	-	-	-
SCC*SCF	0.911	1.000	1.000		-	**Θ**	-	**Θ**	-	-
IS*SCC*RS	0.931	0.922	0.969		**Θ**	**Θ**	**Θ**	-	-	-
SCC*RS*SCF	0.901	1.000	1.000		-	**Θ**	**Θ**	**Θ**	-	-
IS*SCC*RS*SCF	0.891	1.000	1.000		**Θ**	**Θ**	**Θ**	**Θ**	-	-
SCS*IS*SCC*RS	0.841	1.000	1.000		**Θ**	**Θ**	**Θ**	-	**Θ**	-
SCS*IS*SCC*RS*SCF	0.841	1.000	1.000		**Θ**	**Θ**	**Θ**	**Θ**	**Θ**	-

Note: Key: UPPER CASE shows presence of the variable; the "*"sign means combination of variables; √ =Variables present; Θ =Variables moderating; X=Not supported.

Source: Author

Sufficiency Test for SMEs

The truth table provides the sufficiency test on Ragin's threshold at 0.85. This means that 85% of the cases' respondents' membership scores in a combination of conditions must be consistent. Cases with a consistency value higher than 0.85 assigned a one in the outcome for the minimization process to come to the solution of sufficient conditions. The truth table recognises the combinations that lead to the outcome of zero or one scores (Crilly, 2011).

Table 7.8: Truth table for SMEs

No	IS	SCC	RS	SCF	SCS	FPS	Out	n	Incl.	PRI	DCC
1	1	1	1	1	1	1	1	27	1.000	1.000	
2	1	1	1	1	1	0	1	11	1.000	1.000	
3	1	1	1	1	0	1	1	2	1.000	1.000	
4	1	1	1	1	0	0	1	2	1.000	1.000	
5	1	1	1	0	0	0	1	1	0.972	0.886	19
6	1	0	0	0	0	0	1	1	0.657	0.493	43

No = number of configurations; **Out**= output value (1=high performance and 0= non-performance); **n**= number of cases in configuration; **Incl**.= sufficiency inclusion score; **PRI**= proportional reduction in inconsistency; **DCC** = deviant case consistency

Source: Author

Table 7.8 provides six configurations with positive outcome and consistency scores of one or close to one. It summarizes all possible combinations of conditions for the outcome and categorizes that cases fit to each row of possible combinations. All six strategy combinations provide output with the value one. This indicates all combinations leads to FP. The sign '~' denotes the negation or absence of condition. In configuration one, the presence of all six strategies shows high sufficiency (1.000) for FP in 27 cases. In configuration 2, five SCRM strategies (~facilitation payment) are sufficient with a consistency score (1.000) for FP in 11 cases. Configuration 3 shows five SCRM strategies (~SCS) can lead to FP with a sufficiency consistency score (1.000) in two cases. Similarly, configuration 4 indicates that four strategies (~SCS and ~FPS) can achieve performance in two case. Three SCRM strategies (~SCF, ~SCS and ~FPS) have a high sufficiency consistency score and lead to FP in configuration five. However, in configuration 6, only the presence of information sharing can lead to FP, with low sufficiency inclusion (0.66) in one case.

The PRI scores (0.957 to 1) provide the sufficiency relations for the presence of the outcome. Similarly, deviant cases' consistency appeared in only two cases (19 and

43). In these cases, the inclusion in the configuration is higher than 0.5; however, the inclusion in the outcome is lower than 0.5. (see Section 4.4.1)

Therefore, it can safely be concluded that all strategies are sufficient for FP. Six hypotheses (H1 to H6) are supported the sufficiency test. However, the necessity test supported five hypotheses (H1, H2, H3, H4 and H5) in the context of SMEs.

The truth table rows that contribute to the parsimony of the solution term are called the parsimonious solution. Logical reminders and contradiction '? & C' are a huge issue in TT analysis (Dusa, 2018). However, the parsimonious solution of this study is free from any contradiction and logical reminders. Besides, the researcher obtained the intermediate solution on the truth table to minimize further configuration of strategies. In terms of complexity, this solution more complex than to the parsimonious solution, but less complex than the conservative solution. It is always in the middle between the parsimonious and the conservative solutions and more interpretable (Ragin, 2008; Dusa, 2018).

Table 7.9: Intermediate solution of truth table

No	Configurations	InclS	PRI	CovS	CovU
1	IS*SCC*RS*SCF	1.000	1.000	0.891	0.506
2	IS*SCC*RS*scs*fps	0.974	0.915	0.386	0.000
3	IS*scc*rs*scf*scs*fps	0.957	0.493	0.227	0.000
	Total	0.978	0.967	0.891	

UPPER CASE= Presence**, lower case** = Absence, **InclS**= Sufficiency inclusion score; **PRI**= Proportional reduction in inconsistency; **DCC** = Deviant case consistency; **CovS** = Raw coverage; **CovU** = Unique coverage

Source: Author

The three intermediate solutions for SMEs are provided in Table 7.9. Three novel configurations can all stimulate FP. The information sharing strategy is present in all three configurations. It shows the significance of this strategy for FP. In the first configuration, the adoption of the combination of strategies (IS, SCC, RS and SCF) can achieve a high solution consistency score (1.000), with a higher raw coverage score (0.981) and unique coverage (0.506). Higher coverage values indicate greater empirical relevance. Interpreting the first configuration, 98% of cases (here, firms) can achieve FP, when they adopt these SCRM strategies. The second configuration indicates that in 39% cases, adopting three strategies (~SCS and ~facilitation payment strategies), can lead to performance. The third configuration indicates that information sharing alone can achieve FP in 23% of cases.

7.5.2-fsQCA & Hypotheses Validation for Large Enterprises (n=36)

The same hypotheses are tested for large enterprises with the help of two tests: the necessity test and sufficiency test.

Necessity Test for Large Enterprises

The necessity test is shown in Table 7.10, which indicates that five hypotheses (H1 to H5) are supported. Information sharing, coordination, risk sharing, SC finance and SC security strategies are positively related to FP. However, the facilitation payment strategy does not lead to FP in that context. Overall, the super-subset showed 31 different models. In ten models, the moderation of two risk strategies can lead to financial performance. Hypothesis 7 postulated that information sharing plays a moderating role between SC security and FP. The fsQCA finding validated H7 with a consistency score (0.894) confirmed by 95% of firms. Combinations of three SCRM strategies lead to performance in ten models. For example, the combination of IS*SCF*SCS surpassed Ragin's consistency threshold in 96% of cases. Similarly, in five models, the combination of four risk strategies can lead to FP. For example, the combination of IS*SCC*SCF*SCS surpasses the threshold for performance in 97% of cases. However, one model indicated that the combination of five risk management strategies (~facilitation payment) can lead to FP in 97% of cases. All models in Table 7.10 indicate a high RoN for strategy or combination of strategies.

Table 7.10: Necessity test, models and hypotheses results for large enterprises

Necessity Results & Models	Incl.	RoN	CovN	Hypothesis Support	IS	SCC	RS	SCF	SCS	FPS
Information Sharing (IS)	0.941	0.723	0.909	H1 is supported	√	-	-	-	-	-
Supply Chain Coordination (SCC)	0.964	0.778	0.932	H2 is supported	-	√	-	-	-	-
Risk Sharing (RS)	0.905	0.813	0.928	H3 is supported	-	-	√	-	-	-
Supply Chain Finance (SCF)	0.906	0.843	0.939	H4 is supported	-	-	-	√	-	-
Supply Chain Security (SCS)	0.929	0.834	0.940	H5 is supported	-	-	-	-	√	-
Facilitation Payment Strategy (FPS)	0.715	0.959	0.968	H6 is not supported	-	-	-	-	-	**X**
IS*SCS	0.894	0.879	0.950	H7 is supported	**Θ**	-	-	-	**Θ**	-
A Few Additional Models										
IS*SCC	0.929	0.867	0.952	These models are outside the scope of this study	**Θ**	**Θ**	-	-	-	-
SCC*SCS	0.905	0.875	0.951		-	**Θ**	-	-	**Θ**	-
SCF*SCS	0.894	0.909	0.962		-	-	-	**Θ**	**Θ**	-
IS*SCC*SCS	0.882	0.912	0.962		**Θ**	**Θ**	-	-	**Θ**	-
IS*SCF*SCS	0.870	0.914	0.961		**Θ**	-	-	**Θ**	**Θ**	-
IS*SCC*SCF*SCS	0.858	0.945	0.973		**Θ**	**Θ**	-	**Θ**	**Θ**	-
SCC*RS*SCF*SCS	0.846	0.946	0.973		-	**Θ**	**Θ**	**Θ**	**Θ**	-
IS*SCC*RS*SCF*SCS	0.834	0.948	0.973		**Θ**	**Θ**	**Θ**	**Θ**	**Θ**	-

Note: Key: UPPER CASE shows presence of the variable; the "*"sign means combination of variables; √ =Variables present; Θ =Variables moderating; X=Not supported.

Source: Author

Sufficiency Test for Large Enterprises

Table 7.11: Truth table for large enterprises

No	IS	SCC	RS	SCF	SCS	FPS	Out	N	Incl.	PRI	DCC
1	1	1	1	1	1	1	1	26	1.000	1.000	
2	1	1	1	1	1	0	1	6	1.000	1.000	
3	1	1	0	1	1	1	1	1	1.000	1.000	
4	1	1	0	1	0	1	1	1	1.000	1.000	
5	1	0	1	1	1	0	1	1	1.000	1.000	
6	1	0	0	1	0	0	1	1	0.940	0.493	1

No = number of configurations; **Out**= output value (1 = performance and 0 = non-performance); **n**= number of cases in configuration; **Incl**.= sufficiency inclusion score; **PRI**= proportional reduction in inconsistency; **DCC** = deviant case consistency

Source: Author

The truth table that provides the sufficiency test is shown in Table 7.11. It provides six different configurations of SCRM strategies with consistency scores ranging from 0.94 to 1. It indicates all possible configurations of SCRM strategies for FP. In configuration 1, all six SCRM strategies are sufficient for FP in 26 cases. Configuration 2 shows that five SCRM strategies (~FPS) are sufficient for performance in six cases. In configuration three, the FP can be achieved in the absence of (~RS) risk sharing strategy in one case. Similarly, in one case four SCRM strategies (~ RS and ~SCS) can lead to performance in configuration four. Configuration 5 indicates that FP can be achieved in the absence of ~SCC and ~SCF strategies in one case. Similarly, the last configuration indicates that the presence of IS and SCF can lead to FP with a 0.940 sufficiency score in one case.

The PRI scores also indicate the high sufficiency relation for the presence of the outcome in five configurations except one. Deviant case consistency appears in case one. Therefore, it can be safely concluded that all strategies are sufficient for FP and six hypotheses (H1 to H6) are validated for large enterprises in terms of the sufficiency test.

Table 7.12: Intermediate solution of truth table

No	Configurations	InclS	PRI	CovS	CovU
1	IS*SCC*rs*SCF*FPS	1.000	1.000	0.271	0.012
2	IS*RS*SCF*SCS*fps	1.000	1.000	0.485	0.108
3	IS*scc*rs*scf*scs*fps	0.940	0.493	0.188	0.000
4	IS*SCC*RS*SCF*SCS	0.973	0.960	0.834	0.024
	Total	0.961	0.944	0.871	

UPPER CASE= Presence**, lower case =** Absence, **InclS**= Sufficiency inclusion score; **PRI**= Proportional reduction in inconsistency; **DCC** = Deviant case consistency; **CovS** = Raw coverage; **CovU** = Unique coverage

Source: Author

In the intermediate solution, the fsQCA provides four configuration of SCRM strategies that can lead to FP as shown in Table 7.12. In the first configuration, the implementation (presence) of a set of strategies (IS, SCC, SCF and SCS) and absence of risk sharing can achieve a high consistency score (1.000), with a low raw coverage score (0.271) and unique coverage (0.012). It means that 27% of cases are confirming their FP is because of this combination. The second configuration indicates that 49% of cases adopted four strategies (IS, RS, SCF and SCS) without facilitation payment, which can lead to performance. The third configuration indicates that information sharing alone can achieve FP in 19% of cases. The fourth configuration indicates that FP can be achieved with a set of five strategies (IS, SCC, RS, SCF and SCS) in 83% of cases.

Six hypotheses (H1 to H6) are supported by the sufficiency test. However, the necessity test supported five hypotheses (H1, H2, H3, H4 and H5) in the context of large enterprises.

7.5.3-fsQCA & Hypotheses Validation for All Firms (n=80)

This section is divided into two main parts to validate the hypotheses, which posit that SCRM strategies positively impact on FP through necessity and sufficiency tests for all firms.

Necessity Test for All Firms

The super-subset is an important tool for the necessity test. The findings obtained from the super-subset of data for the whole sample are shown in Table 7.13. The super-subset identified 31 models for FP. The models indicate that the five SCRM strategies (all except facilitation payment) are positively related to FP. Therefore, hypotheses from H1 to H5 are supported in necessity test, whereas is not H6. Ten models indicate that the moderation of two SCRM strategies surpassed Ragin's consistency threshold for necessary conditions. The fsQCA findings validate hypothesis H7, which posits that information sharing play a moderating role between SCS and FP in 98% of cases. Similarly, coordination plays a moderating role between risk sharing strategies and FP in 95 % of cases.

The combination of three SCRM strategies can lead to FP in ten different models. For example, the combination of strategies, IS*SCC*RS can achieve performance in 96% of cases. Five models indicate different combinations of four SCRM strategies, which can achieve FP. For example, the combination of SCRM strategies, IS*SCC*RS*SCS surpassed Ragin's consistency threshold for positive outcome in 99% of cases (here, firms). Only one model showed that combination of five SCRM strategies (all except facilitation payment) can lead to performance in 99% of cases.

Table 7.13: Necessity condition analysis, models, and hypotheses results for all firms

Necessity Results & Models	Incl.	RoN	CovN	Hypothesis support	IS	SCC	RS	SCF	SCS	FPS
Information Sharing (IS)	0.951	0.772	0.907	H1 is supported	√	-	-	-	-	-
Supply Chain Coordination (SCC)	0.973	0.770	0.928	H2 is supported	-	√	-	-	-	-
Risk Sharing (RS)	0.941	0.866	0.951	H3 is supported	-	-	√	-	-	-
Supply Chain Finance (SCF)	0.909	0.931	0.971	H4 is supported	-	-	-	√	-	-
Supply Chain Security (SCS)	0.881	0.923	0.965	H5 is supported	-	-	-	-	√	-
Facilitation Payment Strategy (FPS)	0.715	0.973	0.978	H6 is not supported	-	-	-	-	-	**X**
SCS*IS	0.865	0.938	0.970	H7 is supported	**Θ**	-	-	-	**Θ**	-
A Few Additional Models										
IS*SCC	0.935	0.838	0.940	These models are outside	**Θ**	**Θ**	-	-	-	-
SCC*RS	0.924	0.871	0.950	the scope of this study	-	**Θ**	**Θ**	-	-	-
IS*RS	0.908	0.904	0.960		**Θ**	-	**Θ**	-	-	-
IS*SCC*RS	0.898	0.906	0.960		**Θ**	**Θ**	**Θ**	-	-	-
IS*SCC*SCF	0.882	0.962	0.982		**Θ**	**Θ**	-	**Θ**	-	-
SCC*RS*SCF	0.876	0.962	0.982		-	**Θ**	**Θ**	**Θ**	-	-
IS*RS*SCF	0.871	0.963	0.982		**Θ**	-	**Θ**	**Θ**	-	-
IS*SCC*RS*SCF	0.865	0.963	0.982		**Θ**	**Θ**	**Θ**	**Θ**	-	-
IS*SCC*SCF*SCS	0.849	0.976	0.988		**Θ**	**Θ**	-	-	**Θ**	-
SCS*IS*SCC*RS*SCF	0.838	0.977	0.987		**Θ**	**Θ**	**Θ**	**Θ**	**Θ**	-

Note: Key: UPPER CASE shows presence of the variable; the "*"sign means combination of variables; √ =Variables present; Θ =Variables moderating; X=not supported.

Source: Author

Sufficiency Test for All Firms

Table 7.14: Truth table for all firms

No	IS	SCC	RS	SCF	SCS	FPS	Out	N	Incl.	PRI	DCC
1	1	1	1	1	1	1	1	53	1.000	1.000	
2	1	1	1	1	1	0	1	17	1.000	1.000	
3	1	1	1	1	0	1	1	2	1.000	1.000	
4	1	1	1	1	0	0	1	2	1.000	1.000	
5	1	1	0	1	1	1	1	1	1.000	1.000	
6	1	0	1	1	1	0	1	1	1.000	1.000	
7	1	1	0	1	0	1	1	1	1.000	1.000	
8	1	1	1	0	0	0	1	1	0.982	0.927	55
9	1	0	0	1	0	0	1	1	0.974	0.660	1
10	1	0	0	0	0	0	1	1	0.974	0.660	79

No = number of configurations; **Out**= output value (1= performance and 0= non-performance); **n**= number of cases in configuration; **Incl**.= sufficiency inclusion score; **PRI**= proportional reduction in inconsistency; **DCC** = deviant case consistency

Source: Author

Table 7.14 provides ten configurations with positive outcome and high consistency scores (0.974 to 1.000). Configuration 1 indicates that all six SCRM strategies have highly sufficiency scores for FP in 53 cases. In 17 cases, five SCRM strategies (~FPS) are sufficient for performance (Configuration 2). Similarly, configuration 3 indicates five SCRM strategies (~SCS) can achieve high sufficiency scores for FP in two cases. In two cases, four strategies (~SCS and ~FPS) surpass Ragin's consistency threshold for sufficiency (configuration 4).

In each of the remaining six configurations, one case shows they can lead to the relevant outcome. Configuration 5 shows that five SCRM strategies and the absence of risk sharing can achieve performance. The presence of four strategies (~SCC and ~FPS) can surpass the threshold for FP in Configuration 6. Configuration 7 indicates that four SCRM strategies (IS, SCC, SCF and FPS) can lead to outcome. The presence of three strategies (IS, SCC and RS) and absence of three (SCF, SCS and FPS) can achieve FP in Configuration 8. Configuration 9 shows that two SCRM strategies (IS and SCF) can also lead to outcome of the interest (FP). The information sharing strategy alone can achieve FP in Configuration 10 with a high consistency score.

Deviant case consistency appeared in three cases (1, 55 and 79). The PRI scores also indicate sufficiency for the presence of the outcome, which have high score (1.000) in seven configurations. There are no contradiction and logical reminders in the

TT. Therefore, it can be safely concluded that all strategies are sufficient for FP. Moreover, the results indicate that the TT supported all six hypotheses with high-level inclusion sufficiency scores in the sufficiency test.

Table 7.15: Intermediate solution of truth table

No	Configurations	InclS	PRI	CovS	CovU
1	RS*SCF*SCS*fps	1.000	1.000	0.491	0.110
2	IS*SCC*SCF*FPS	0.992	0.988	0.702	0.363
3	IS*SCC*RS*scs*fps	0.983	0.940	0.322	0.011
4	IS*scc*rs*scs*fps	0.950	0.493	0.209	0.000
	Total	0.975	0.964	0.866	

UPPER CASE= Presence**, lower case =** Absence, **InclS**= Sufficiency inclusion score; **PRI**= Proportional reduction in inconsistency; **DCC** = Deviant case consistency; **CovS** = Raw coverage; **CovU** = Unique coverage

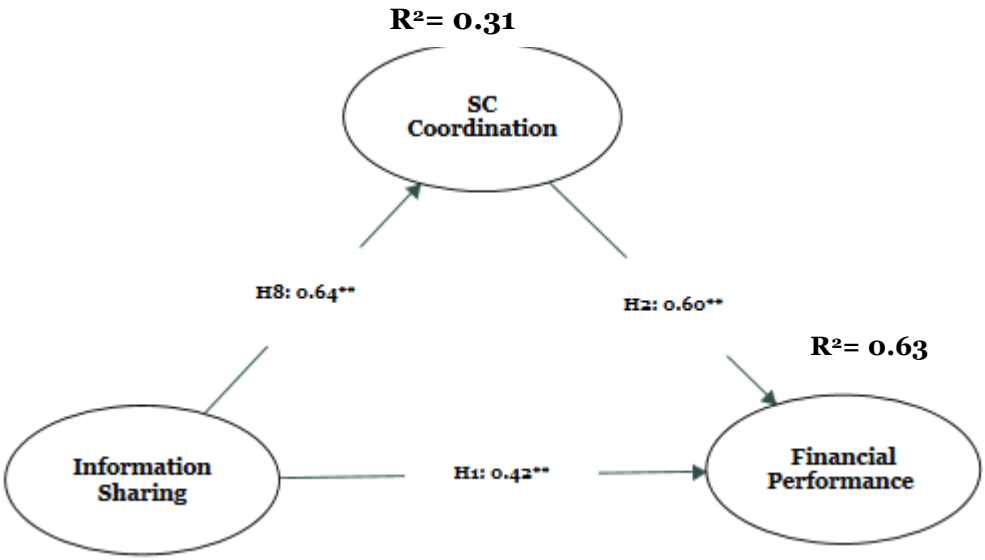
Source: Author

The four intermediate solutions for all firms are provided in Table 7.15. These are four novel configurations that can lead to FP. Information sharing strategy is present in three configurations, which shows its significance for FP. In the first configuration, the combination of strategies RS*SCF*SCS and absence of (~FPS) can achieve a high solution consistency score (1.000), with a low raw coverage score (0.491) and unique coverage (0.110). Interpreting the first configuration, 49% of cases adopted these strategies combination to achieve their FP. The second configuration indicates that 70% of cases adopted four strategies (IS*SCC*SCF*FPS), to lead to the outcome. Third configuration indicates that the presence of three SCRM strategies (IS*SCC*RS) and absence of two strategies (~SCS and ~FPS) led to FP in 32% of cases. The last configuration shows that the presence of information sharing and absence of SC coordintion, SC finance, SC security and facilitation payment strategy achieved performance in 20% of cases.

7.6-Strategy Mediation

Figure 7.7 depicts the hypotheses and the relevant standardized results. Hypothesis H1 proposed that information sharing is positively related to FP. This hypothesis is supported at $p < 0.00$ with $\beta = 0.42$. Hypotheses H8 (information sharing is positively related to SC coordination) and H2 (SC coordination is positively related to FP) are also supported with $\beta = 0.64$ ($p < 0.00$) and $\beta = 0.60$ ($p < 0.00$) respectively. Additionally, R^2 values ranging from 31% to 63% are given below Figure 7.7, showing strong support to the final model.

Figure 7.7: Structural findings for hypothesis testing



** Satatically significant at p=0.05

H9: SC coordination mediates the relationship between IS and FP

Source: Author

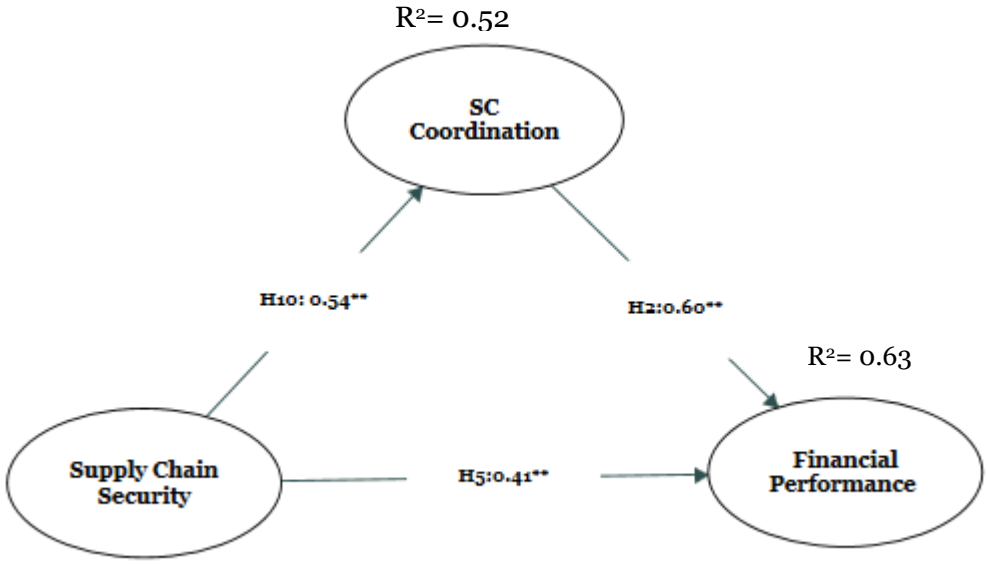
With regard mediating analysis, H9 (SC coordination mediates information sharing and FP) and H11 (mediating analysis, SC coordination mediates SC security and FP) was tested by using two approaches: the causal-steps approach (Baron & Kenny, 1986) and bootstrapping (Preacher & Hayes, 2008). The causal-steps approach showed that the independent variable information sharing significantly affects the dependent variable FP with $\beta = 0.42$ and t-value = 3.69 at $p < 0.000$. The independent variable (information sharing) also significantly affects the mediating variable (SC coordination), as $\beta = 0.88$ and t-value = 9.09 at $p < 0.000$. Further, SC coordination (mediator) significantly affects FP with $\beta = 0.60$ and t-value = 7.14 at $p < 0.000$. Finally, when the model was controlled for the mediating

variable (SC coordination), the previous relationship (i.e., between information sharing and FP) was reduced (β = -0.15 and t-value = -0.11 at p < 0.915) and became non-significant. The results thus showed full mediation of SC coordination between information sharing and FP.

The bootstrapping method with 5000 samples and a 95% confidence interval was employed (Preacher & Hayes, 2008) with parcelling as a strategy to conduct the required analyses. First, it was found that IS was positively associated with FP [(β = 0.71, t (78 df) = 5.64, p < 0.000)], total effects. It was also found that IS was positively related to SC coordination [(β = 0.64, t (78 df) = 5.92, p < 0.000)]. Moreover, the mediator (SC coordination) was positively associated with FP [(β = 0.56, t (78 df) = 5.64, p < 0.000)]. Additionally, the result indicated that the direct effect of IS on FP was reduced [(β = 0.06, t (78 df) = 0.47, p < 0.639)] when controlling for SC coordintion. Thus, it indicated full mediated of SC coordination between information sharing and FP.

Figure 7.8 depicts the hypotheses and the relevant standardized results. Hypothesis H5 proposed that SC security is positively related to FP. This hypothesis is supported at p < 0.00 with β = 0.41. Hypotheses H10 (SC security is positively related to SC coordination) and H2 (SC coordination is positively related to FP) are also supported with β = 0.54 (p < 0.00) and β = 0.60 (p < 0.00) respectively. Additionally, R^2 values ranging from 52% to 63% are given below Figure 7.8, showing strong support to the final model.

Figure 7.8: Structural findings for hypothesis testing



** Satatically significant at p=0.05

H11: SC coordination mediates the relationship between IS and FP

Source: Author

Similarly, both approaches were used to answer H11. The causal-steps approach findings showed that the independent variable SC security significantly affects the dependent variable FP with β = 0.41 and t-value = 4.09 at p < 0.000. The independent variable (SC security) also significantly affects the mediating variable (SC coordination), as β = 0.54 and t-value = 5.44 at p < 0.000. Further, SC coordination (mediator) significantly affects FP with β = 0.60 and t-value = 7.14 at p < 0.000. Finally, when the mediating variable (SC coordination) was controlled for, the previous relationship (i.e., between SC security and FP) was reduced (β = 0.12 and t-value = 1.21 at p < 0.227) and became non-significant. The finding thus showed the full mediation of SC coordination between SC security and FP.

The bootstrapping method (with 5000 samples and 95% confidence interval) was employed. First, it was found that SC security was positively associated with FP [(β = 0.41, t (78 df) = 4.09, p < 0.000)], total effects. It was also found that SC security was positively related to SC coordination [(β = 0.55, t (78 df) = 5.43, p < 0.000)]. Moreover, the mediator (SC coordination) was positively associated with FP [(β = 0.53, t (78 df) = 5.47, p < 0.000)]. Additionally, the result indicated that the direct effect of SC security on FP was reduced [(β = 0.12, t (78 df) = 1.22, p < 0.227)] when

SC coordination was controlled. Thus, it showed the full mediation of SC coordination between SC security and FP.

7.7-Summary

The descriptive statistics and fsQCA findings in the prior sections identify several issues for discussion (next chapter) with respect to SCRM strategies in TAR. The SCRM are generated to mitigate self-enhancing risks within SC operations, particularly relating to terrorism related risks. A literature review of SCRM studies combined with 35 semi-structural interviews were used in order to conceptualise the strategies within that region (see Section 6.2). The research model of this study proposed that SCRM strategies enhanced FP. It was analysed in a predictive manner by fsQCA along with producing descriptive statistics and ANOVA results.

This chapter presented the findings of fsQCA. The researcher set the acceptable level of consistency at 0.85, which means that the proportion of cases showing a specific combination of causal conditions and the outcome in relation to the same combination of causal conditions not exhibiting the outcome should be at least 85%. This conservative threshold implies a relatively high level of consistency required for solutions.

Lastly, the researcher conducted tests to find the mediating role of SCRM strategies on FP in the survey region. The results show that SC coordination plays a significant mediating role between information sharing and FP, and between SC security and FP. A detailed discussion of the research questions, linking the literature empirical findings, is presented in the next chapter.

Chapter Eight

Discussion

8.1-Introduction

This chapter highlights the novel insights by connecting the results obtained the from qualitative and quantitative data to the current SCRM literature by research questions. Following this introduction, section 8.2 discusses the research questions. The first research question and the related findings are discussed in section 8.3. The second and third research questions are discussed in section 8.4. Section 8.5 presents the fsQCA findings and the different configurations and mediation of SCRM strategies that lead to FP. The fourth question, the impact of the war on terror on the local logistics industry is debated in section 8.6. Section 8.7 provides a summary of the whole chapter.

8.2-Discussion of the Research Findings by Research Questions

In this section the novel qualitative and quantitative findings are discussed and linked with the existing literature by research questions. The key assumptions that emerged from the empirical findings will be associated with the literature review to examine the relationships between the research findings and to further explore ideas on the phenomenon of SCRM in the context of terrorism-affected regions. The theoretical, methodological, and managerial implications of these findings are discussed in next chapter. The research questions suggested in Chapter 1 are:

RQ 1: *What is the current state-of-the-art in SCRM literature on terrorism risk?*

RQ 2a: *What are the supply chain risks in a TAR (Pakistan)?*

RQ 2b: *What are the most frequent risks to the supply chain in that region?*

RQ 3a: *What are the SCRM mitigation strategies employed by the firms in that region?*

RQ 3b: *What are the main risk management strategies to be considered?*

RQ 4: *What is the impact of the SCRM strategies on firms' financial performance?*

RQ 5: *What is the impact of the war on terror on logistics service providers in that region?*

8.3-RQ 1: Supply Chain and Terrorism Risk

This study is the first to provide a systematic review on terrorism risk, decision-making practices and interlocking effects on SCRM and security. The findings identified five key knowledge gaps in SCRM literature. Frist, there is a lack of mixed methodology in SCRM literature and a need for a multi-method approach (Markmann et al., 2013). For instance, simulations and other mathematical programming techniques could be employed to evaluate terrorism impact on the supply chain (Urciuoli et al., 2014). Second, the existing literature is mainly focused on the SC security discipline. Further research is required to explore other disciplines of SC, such as energy and food. For instance, it should be focused on bio-terrorism effects in the food SC (Pinior et al., 2015; Navarrete & Esteban, 2016).

SCRM may help to ensure profitability (e.g. Blos et al., 2004; Tang, 2006; Faisal et al., 2007), reduce costs (Blos et al., 2004; Manuj & Mentzer, 2008b) and potentially increase value (Zsidisin & Ritchie, 2008; Lavastre et al., 2012). This study identified a third knowledge gap, that there is only limited research on the effect of TRM on SC performance in low terrorism areas (Czinkota et al., 2005; Bueno-Solano & Cedillo-Campos, 2014). Thus, further research is needed that investigates the impact of TRM on SC performance in the context of TAR and need of a holistic research approach in order to understand and then prevent terrorism risk in the SC, for example, the comparison of TRM strategies and public-private partnerships (e.g. C-TPAT) in terms of costs and benefits for firms and society (Urciuoli et al., 2014).

Fourth, the study classified selected articles based on the geographical view of their collected data. The geographical analysis of the literature showed that the majority of the articles are based on the USA (27 percent) data. A limited number of articles focused on Asian or European contexts. This omission clearly demonstrates an important knowledge gap that needs to be addressed by future research (Hong & Ng, 2010).

Last, most of the literature (51 percent) focused on transportation industries. This finding is not surprising given the fact that various components of transportation systems have been shown historically to be prone to attacks both in wars and by terrorists (broadly defined). In total, 37 percent of the articles do not entail industry-specific research. This finding highlights the need for future researchers

to carry out a larger number of industry-specific studies on terrorism-related risk in diverse sectors.

From the network analysis, the findings clearly highlight the need for future research to engage inter-disciplinary or transdisciplinary teams in order to develop a more complete and coherent understanding of terrorism-related risks for SCM. This is an important pre-requisite for enabling managers to devise appropriate strategies for addressing the factors that give rise to these risks, and for developing more resilient business and operational models to avoid or mitigate the impact of potential threats and risks associated with terrorist activity in their environment. There is a view that universities should invest in institutions to address the roots of terrorism in their research and teaching, developing measures to counter terrorist activity and reduce or eliminate those factors that encourage terrorism. Such institutions would potentially have an important role in society by promoting peace and countering terrorism through education.

In addition, the findings show that Asian, Middle Eastern and African countries have received less attention in the study terrorism risk in the context of supply chain. They are amongst those countries experiencing the highest levels of terrorist activity (British Standards Institution, 2017). It is possible that researchers from these countries are inhibited from researching or publishing on this issue due to security considerations and/or the fear of reprisal from powerful individuals/ groups/countries. However, their absence constitutes an important knowledge gap as published accounts risk omitting critical contextual factors that shape the situated impact of terrorist activity on supply chains located in those countries.

This finding provides an analysis of the content of individual research papers identified clusters of papers dealing with particular aspects of risk and security, showing a fragmentation of the literature in the domain. To address the fragmentation, it developed an integrative conceptual framework to define and articulate the relationship between SCRM strategies, TRM strategies and relevant decision-making strategies.

8.4-RQ 2 (a, b) Supply Chain Risks in TAR

The literature review (see Chapter 2) examined the existing literature on the SCRM. It identified the different definitions and various types of SC risks. The empirical evidence drawn from the 35 semi-structured interviews indicated the most common definition of SC risk in the region. The researcher compared the empirical evidence linked to the major findings with the existing literature.

8.4.1-Supply Chain Risk Definition

The existing literature on SCRM can define SC risk in term of: a mismatch between supply and demand; disruption of information, materials, and finances; negative deviation in performance; inability to meet demand; and operational, financial, and life losses (March & Shapira, 1987; Harland et al., 2003; Sheffi, 2005; Peck, 2006; Craighead et al., 2007; Wagner & Bode, 2008; Heckmann et al., 2014).

The empirical evidence revealed that most respondents defined SC risk in terms of financial and life losses (see Section 5.3.1). Therefore, the findings of this study strongly support those found in the existing literature (e.g., Yates & Stone, 1992; Robinson, 2008; Schlegel & Robert, 2014), which defined the risk as a probability of financial and life loss. On the other hand, this study provides interesting insights by exploring how the SC risk definition is influenced by terrorism in the region, which caused the financial and life risk to the SC. Therefore, the findings of this study strongly support the SC risk definition given by Christopher & Lee (2004): "*the effect of external events*".

Many of the definitions found in the literature (see Table 2.2) are concerned with process and performance; however, the empirical data suggest that, in regions affected by terrorism:

- SC risk is characterised by existential risk.
- Existential risk is associated with the nature of the external events occurring in the region.

8.4.2-Supply Chain Risks

In total, 105 different SC risks were identified by this study. However, the researcher did not exclusively discuss SC risk. SC risk was divided into three main categories for discussion: disruption, operational, and financial risks. The findings of this study regarding SC risks are associated with the existing literature.

Disruption Risk

Disruption risks are divided into two main categories according to their causes: man-made risks and risks resulting from natural disasters. Man-made risks arise primarily from human intention or error, and include events such as accidents, wars, terrorist attacks, strikes, etc.

The significance of terrorism risk has been widely investigated in the SCRM literature (e.g., Sheffi, 2001; Thissen, 2004; Czinkota et al., 2005; Barnes & Oloruntoba, 2005; Raymond, 2006; MacPherson, 2008; Reade, 2009; Cox et al., 2011; Markmann et al., 2013; Bueno-Solano & Cedillo-Campos, 2014; Pinior et al., 2015; Anagnostakis, 2016; Kauppi et al., 2016; Khan et al., 2018), which highlights terrorism as a fundamental risk to global SCs. The focus of these earlier studies was confined to low terrorism areas. The novel empirical evidence from this study establishes that the firms in TAR suffering more from terrorism risk due to their location (see Section 5.5.1). For example, employee morale is more affected due to the high terrorism risk in the region. Consequently, the firms' efficiency and performance are affected. Particularly, the risk of disruption to international product delivery and roads, which is linked with the Taliban and their allied radical religious parties stopping and destroying international product supplies in TAR. Similarly, the risk of frequent border closures aimed at stopping the movement of terrorists between countries is also associated with terrorism risk. One surprising finding was that terrorism is also associated with other criminal activities in the SC (e.g., armed robberies, kidnappings and killings of logistics employees). Several criminal and tribal groups pose as Taliban or other terrorist groups to loot and kidnap logistics vehicles and employees, because of the sluggish police investigation of terrorism cases as compared to other criminal activities in the region (see Section 5.5.3).

Other man-made risks, such as goods security-related risks, human resource related risks, border specific risks, strikes, political risks, kidnapping risks, traffic jams, fraud, piracy risks are also widely discussed in the SCRM literature (e.g., Sheffi, 2001; Jüttner et al., 2003; Chopra & Sodhi, 2004; Craighead et al., 2007; Sandler & Enders, 2007; Hong & Ng, 2010; Rao & Goldsby, 2009; Yang, 2011; Ekwall, 2010; Wieland, 2013; Das & Lashkari, 2015). However, the previous studies identified these man-made risks specifically in the context of low terrorism areas.

The findings of this study were partially consistent with those of the existing literature in that, while it confirmed the existence of these risks, this study is distinctive in identifying novel risks that no previous study had found: the terrorist groups' or warlords' corruption in logistics, paedophilia, and the use of containers to block protesters in the region.

The corruption risk of terrorist groups and warlords is a distinctive risk in the region. The terrorist groups or warlords levy bribes to grant safe passage to vehicles through their controlled areas, which creates a culture of security corruption in the region and is directly linked with terrorism risk. This is the first study to identify this risk in the context of TAR.

The paedophilia risk is broadly discussed in the social science literature in various contexts. Yet, it is still novel to the SCRM literature, in which this may the first study to identify it. Paedophilia risk has a significance effect on supply chain performance in certain regions. It triggers the risk of kidnapping (employees and vehicles) in the logistics industry. It is also important to bear in mind the possible bias of some responses toward this risk. However, with a small number of respondents, caution must be applied, as the finding might not be transferable to the entire supply chain in TAR. It may just exist in specific geographical locations of the region.

Another novel SC risk identified by this study is the usage of containers to obstruct protesters from the main cities. This significantly affects SCs in terms of customer satisfaction and performance. Moreover, it seriously affects the FP of the logistics industry, and is particularly lethal to small and medium enterprises (SMEs) in the region. These findings make an important contribution to the SCRM field.

Similarly, natural disasters are widely discussed by different authors in the SCRM literature (e.g., Chopra & Sodhi, 2004; Das & Lashkari, 2015). According to the World Economic Forum (2018), natural disasters pose the second highest risk to SCs. However, this study found that it occupies the ninth position in the list of SC risks in the TAR context. Therefore, the findings of this study are only partially consistent with those of earlier studies in relation to the significance of natural disaster SC risks. It is likely that this result is due to the huge threat of terrorism in the region. Therefore, natural disasters are less relevant in SCRM in TAR. However, this study is distinctive in identifying a novel risk that had not been considered by

previous research: smog is a distinctive natural risk specific to the SC in the region. It creates huge SC operational hazards in winter. The number of road accidents increases as a result of smog, which affects the SC's operational and FP.

Operational Risks

This study identifies different operational risks in the region, such as supply side, demand, corruption, and custom clearance. This study's empirical findings seem to be consistent with those of other research, which identified the supply and demand risks in low terrorist activity contexts (e.g., Christopher & Lee, 2004; Blackhurst et al., 2008; Lockamy & McCormack, 2012; Schmitt & Singh, 2012; Tiwari et al., 2013; Nejad et al., 2014; He, 2017). However, this study provides the novel insight of supply side risk in the context of TAR (see Section 5.5.4). This study also identifies the novel insight of sudden increases or decreases in the demand for various items and services in the context of the war on terror (see Section 5.9).

Similarly, custom clearance risk is identified by different studies on SCRM in low terrorist activity contexts (e.g., Giunipero & Eltantawy, 2004; Rogers et al., 2016). This study's finding is only partially supported by the previous research on custom clearance risk; this study found that custom clearance risk is generated from two risk sources in TAR; custom authority corruption and tightened security in response to terrorism.

The existing literature on corruption risk is in its infancy stage and only a limited number of studies are available (e.g., Arnold et al., 2012; Schlegel & Trent., 2014; Silvestre et al., 2018). However, these studies discuss corruption risk mainly in low terrorist activity contexts. The empirical evidence of this study confirms that the level of corruption in the SC is very high in TAR. It is an operational risk—rather than a disruption one—for firms in the region, which face it on a daily basis. It is also interesting to note that some respondents considered corruption as a SC risk, while others considered it a SCRM strategy. Therefore, the findings of this study are only partially consistent with those found in the existing literature on corruption in SCs. Corruption risk is also partially confirmed by the U.S Congress Report (2010) and Clemente & Evans (2014) who reported on SC operations in the region. However, this study provides a novel insight into various corruption practices in the SC, such as those of terrorist groups or warlords, and police or tax

collection authorities blackmailing and illegally detaining employees and vehicles to extort bribes (see Section 5.5.2).

Detention risk is widely discussed in the maritime context (e.g., Marlow, 2010; Fu et al., 2013; Jens Vestergaard et al., 2013), in which the detention risk arises when containers are not returned to shipping firm's locations in time due to delays in the loading and unloading schedule. This study revealed detention risk in land logistics for the first time. However, the causes of land detention risk are different from those found in maritime logistics; bureaucrats—who use it as a technique to increase bribe rates—and the sluggish justice system. Similarly, previous studies have noted tax corruption in different contexts (e.g., Vial & Hanoteau, 2010; Blackburn et al., 2010). However, this study identified a novel SC risk (police and tax collection authorities blackmailing to extort bribes) that had not previously been described in the SCRM literature.

Financial Risks

Various financial risks are discussed in the SCRM literature: credit risk, price risk, exchange rate risk, interest risk, market risk, and cash flow risk (e.g., Hendricks & Singhal, 2003, 2005; Hendricks et al., 2007; Trkman & McCormack, 2009; Grosse-Ruyken et al., 2011; Mandal, 2011; Kim & Park, 2014; Su & Lu, 2015; Zhu et al., 2016; Moretto et al., 2018). However, the existing literature discussed SC financial risks in more stable environments.

The empirical evidence established that firms are experiencing various SC financial risks in the region, such as inflation risk, credit risk, exchange rates risk, interest risk, market risk, and cash flow risk. However, this study generated the novel insight that credit risk is the sixth highest risk to SCs in the region due to the fragile economy and sluggish legal system. Another important finding was that inflation was the most common financial risk to SCs in TAR. Similarly, the other financial risks are linked to the overall economic condition of the region.

Terrorism can affect the overall economy in two ways. First, it has a direct effect (e.g., through the destruction of physical and human capital) on the economy. Second, it increases the level of fear and uncertainty among economic agents (Abadie & Dermisi, 2008). Consequently, high levels of terrorism can seriously affect the overall economy of a region, which can also increase financial risks to

SCs. Therefore, the findings of this study support the existing literature, confirming that terrorism can increase various financial risks in the global SC.

In addition, the semi-structured interviews revealed that logistics and SC operations face more disruptive and distinctive types of risks in the region than they do in low terrorism affected ones. Specifically, terrorist groups and security forces generate a composite SC risk in the region. Security forces conduct a number of unnecessary checks at security points and border crossings in the name of security and extort bribes to grant passage. Similarly, terrorist groups demand security fees to grant safe passage through their controlled areas. Consequently, firms pay both parties for security, which seriously affects operational and FP. The findings of this study indicate that various governing bodies and terrorist and criminal groups are involved in looting the logistics industry in the form of security fees, bribes, and robbery or theft.

According to the World Economic Forum (2018), global SCs face the following top ten risks: extreme weather events, natural disasters, cyber-attacks, data fraud or theft, failure of climate-change mitigation and adaptation, large-scale involuntary migration, man-made environmental disasters, terrorist attacks, illicit trade, and asset bubbles in major economies. In contrast, this study revealed the following top ten SC risks in TAR: terrorism, corruption, theft and robbery, supply risk, demand risk, credit risk, custom clearance risk, human resource related risk, natural disasters, and inflation. There is some inconsistency regarding SC risks and their rankings in terms of disruption. A possible explanation for these findings may be that this study identified SC risks in a particular region, while the World Economic Forum provided an overview of global SC risks. However, these findings had not previously been produced in the SCRM literature, particularly in the context of TAR.

8.5-RQ3 & RQ4: SCRM Strategies and Financial Performance

This section provides a discussion of SCRM strategies in relation to the existing literature. The semi-structured interviews enabled the identification of 95 SCRM strategies adopted in the region. However, the researcher only discussed the six top most executed ones and identified their novel understandings in the context of TAR. The section then goes on to validate the hypotheses and assesses the impact of these six strategies on FP through fsQCA. The fsQCA employs two tools for

testing—necessity and sufficiency—which are conceptualized in set-theoretic terms (see Section 4.4.3). There are two measures—consistency and coverage—appropriate to gauge the goodness-of-fit of both necessary and sufficient conditions; these measure the significance of a condition to an outcome on a range from 0.0 to 1.0. A 1.0 score signifies 'necessity', while scores of less than 1.0 indicate a corresponding degree of inconsistency. For instance, a score of 0.90 would indicate that, whenever the outcome occurs, the condition is 'almost always' present. However, the necessity and sufficiency conditions should be analysed individually (Schneider & Wagemann, 2012).

8.5.1-Information Sharing Strategies

In the literature, there is an extensive discussion about the role played by information sharing in SCRM (e.g., Kleindorfer & Saad, 2005; Li et al., 2006; Yu et al., 2010; Pandey et al., 2010; Wakolbinger & Cruz, 2011; Ye & Wang, 2013; Rached et al., 2015; Kumar et al., 2017). Oztekin et al. (2015) argued that it may increase a firm's redundancy and lost information privacy. Hence, the findings of this study are consistent with those found in the existing literature and confirm the significant role played by information sharing in SCRM. However, this study's novel empirical finding shows that information sharing not only increases FP, but also plays a significant role in save human lives in TAR.

As mentioned in the literature review, information sharing has a positive impact on performance (e.g.,Ural, 2009; Oh & Kim, 2011; Schloetzer, 2012; Okongwu et al., 2015; Yu et al., 2018); similarly, it has a positive impact on FP (e.g., Yang et al., 2011; Schloetzer, 2012; Huo et al., 2014; Okongwu et al., 2015; Zhao et al., 2015; Chang et al., 2016). Thus, quantitative analysis, to some extent, reinforces the importance of information sharing in improving FP. This study provides the novel insight of the influence of information sharing strategies on FP in the TAR context. They can increase the FP in the following ways: by building and strengthening the relationship with security forces and customers through security information, providing early terrorism threat detection, reducing the cost of security measurements and the custom clearance lead-time through C-TPAT, improving tracing and tracking, increasing visibility, saving employee lives, increasing productivity and organizational efficiency, and improving customer service.

Similarly, the fsQCA findings of this study also confirm that there is a significant correlation between information sharing and FP; it is necessary condition for a FP, and this validates hypothesis H1. Information sharing strategies are over Ragin's threshold (0.85) for necessary and sufficient conditions. They have the necessary consistency (0.961 in SMEs, 0.941 in large enterprises, and 0.952 in all enterprises) and sufficiency consistency scores (0.906 in SMEs, 0.906 in large enterprises, and 0.907 in all enterprises). Although, this study differs from some published studies (e.g., Huo et al., 2017; Yu et al., 2018), which found that no significant correlation exists between information sharing and FP. To summarise, this study validated the existing SCRM literature to a certain extent and supported H1; i.e., that FP is significantly associated with information sharing strategies.

8.5.2-SC Coordination Strategies

SC coordination strategies can enhance SC efficiency and performance through the coordination of activities with SC partners. In a complex SC network, partners manage a significant portion of the logistic functions of a firm. Therefore, the coordination between SC partners becomes a critical strategy. In a similar vein, SCRM practices mainly rely on closely coordinating activities with SC partners to identify risk sources in order to mitigate and tackle them. In addition, the application of a coordination strategy to satisfy the needs of an individual firm and its SC partners does not require much effort and/or resources.

The existing literature highlighted the importance of coordination in SCs and its significant role in SCRM (e.g., Martha et al., 1997; Andraski, 1998; Cachon, 2002; Sinkovics & Roath, 2004; Fugate et al., 2006; Choi et al., 2016). However, to the knowledge of this researcher, no attempt had hitherto been made to study SC coordination among partners in TAR. The qualitative findings of this study mainly agree with those of Sheffi (2001), who suggested that coordination plays a significant role in mitigating the terrorism risk. Therefore, this finding further supports the role played by coordination in the context of TAR, where firms need to effectively coordinate with security forces and other SC partners to deal with security threats and protect employee lives. The novel empirical evidence from this study establishes that firms coordinate not only with security forces, but also with terrorist groups to gain safe passage and protect lives.

The quantitative result of this study is partly consistent with those of previous studies (e.g., Yu et al., 2013; Zhang & Huo, 2013; Lobo et al., 2013; Foerstl et al., 2013; Zhao et al., 2015; O'Neill et al., 2016; Akhtar et al., 2017; Yu et al., 2018), which suggested that coordination is positively correlated to SC performance. As mentioned in the literature review, very little was found in the extant literature on coordination strategies being positively related to FP (e.g., Pezeshki et al., 2013, Xiao et al., 2017). However, these studies had been conducted in more stable environments. Hence, the empirical findings of this study provide a new understanding of the impact of coordination strategies on FP in the context of TAR.

The fsQCA results also confirm that coordination strategies have a positive effect on FP and validate hypothesis H2 in TAR. Coordination's necessity consistency scores (0.980 in SMEs, 0.964 in large enterprises, and 0.973 in all enterprises) were over Ragin's threshold. Hence, it appears to be a necessary condition for FP. Similarly, its sufficiency consistency scores (0.925 in SMEs, 0.932 in large enterprises, and 0.928 in all firms) were over Ragin's sufficient condition threshold. Therefore, it could conceivably be hypothesised that coordination strategies are positively correlated to FP. This finding differs from those of Das et al. (2006) and Cuijpers et al. (2011), who argued that coordination strategies may hurt FP.

8.5.3-Risk Sharing Strategies

As mentioned in the literature review (Chapter 2), risk sharing strategies are generally based on two factors: contracts and insurance. They are not only critical enablers of effective SCRM, but also play a significant role in long-term cooperation and competitive advantage (e.g., Ellram & Cooper, 1990; Martha et al., 1997; Jüttner, 2005; Faisal et al., 2006; Wakolbinger & Cruz, 2011). However, these studies were conducted in area of low terrorism risk. The empirical findings of this study are partly consistent with those found in the existing literature, which suggest that risk sharing plays a significant role in SCRM. However, this study provides a novel insight into risk sharing in the context of TAR. In a high-risk environment, it becomes critical for a firm to share risk with its SC partners. Risk sharing contracts are particularly beneficial in mitigating the huge financial damages arising from terrorism risk (see Section 5.6.4**)**. Another important finding is that most SMEs do not buy SC insurance, and their risk sharing contracts are mainly verbal.

As mentioned in the literature review, a few studies examined the positive effect of risk sharing strategies on SC performance (e.g., Dana & Spier, 2001; Wakolbinger & Cruz, 2011; Li et al., 2015; Fan et al., 2017). However, far too little attention has been paid to examining the risk sharing strategies' impact on FP. Thus, the empirical findings of this study provide the new understanding that risk sharing strategies have a positive impact on FP in the context of TAR.

Similarly, this finding is confirmed by the fsQCA results, which indicate that risk sharing strategies are a necessary condition for FP, with consistency scores (0.970 in SMEs, 0.905 in large, and 0.941 in all firms) that exceed Ragin's threshold for outcome (FP). They are also a sufficient condition for outcome with sufficiency consistency scores of 0.970 in SMEs, 0.928 in large enterprises, and 0.951 in all firms). On the basis of this finding, it safe to conclude that risk sharing strategies are is positively correlated to FP, which validates hypothesis H3.

8.5.4-Supply Chain Financial Strategies

In the current hostile business environment, the conjunction of SCRM strategies and SC financial ones can increase cash flow predictability, reduce risk-related costs and improve working capital. Through SC financial strategies, managers can efficiently estimate financial future, manage trade receivables or payables, and achieve significant cost savings (Anwar, 2004).

Prior studies have noted the importance of financial strategies in SCs (e.g., Pfohl & Gomm, 2009; Gomm, 2010; Hofmann, 2011, 2013; Blackman et al., 2013; Wuttke el al., 2013a, 2013b; Iacono et al., 2015; Caniato et al., 2016; Wuttke et al., 2016; Song et al., 2018; Moretto et al., 2018). Financial strategies are also increasingly recognized as an significant factor in driving SC operational performance (Protopappa-sieke & Seifert, 2010). However, far too little attention has been paid to empirical research on SC financial strategies in TAR. The novel empirical evidence provided by this study establishes that trust plays a significant role in all SC financial strategies and is considered to be a significant factor in business dealings in TAR. Another important finding is that personal guarantees play a very important role in SC financial strategies to mitigate the financial risks in SMEs. Large enterprises also adopt various other financial strategies (e.g. conducting business with trustworthy suppliers and customers, assessing customer credit scores, taking advance security deposits, keeping sufficient funds in banks and

linking prices to foreign currency). Similarly, large enterprises also provide SC financing facilities (e.g. in the form of financial loans, seeds, and raw materials) to their suppliers.

Similarly, several studies have been conducted on the effects of financial strategies on operational and FP (e.g., Mello et al., 1995; Chowdhry & Howe, 1999; Hommel, 2003; Ding et al., 2007; Chen et al., 2014; Steeman, 2016; Pellegrino et al., 2018). However, very little was found in the literature on the effects of SC finance on FP (e.g., Randall & Farris, 2009; Shou et al., 2012; Wuttke et al., 2016) Klapper 2006; Gelsomino et al., 2016). In addition, to the knowledge of this researcher, no study had hitherto found that SC finance affects FP in TAR. The current study provides the novel finding that SC finance is positively correlated to FP.

The fsQCA results establish that SC finance is significantly correlated and a necessary condition of FP, and also validate hypothesis H4. SC financial strategies scored over Ragin's threshold with consistency scores of 0.911 in SMEs, 0.906 in large enterprises, and 0.909 in all firms). Similarly, they are also a sufficient condition for outcome, with sufficiency consistency scores of 1.000 in SMEs, 0.939 in large enterprises, and 0.971 in all firms). These findings suggest that SC finance has a significant impact on FP.

8.5.5-Supply Chain Security

SC security is a key SCRM strategy against terrorism and other security-related risks. Prior studies have extensively discussed the importance of SC security (new terrorism-related security regulations) and its impact on SC performance (e.g., Rice & Caniato, 2003; Williams et al., 2008; Zhang et al., 2011; Belzer & Swan, 2012; Voss & Williams, 2013). However, these SC security strategies were discussed in more stable environments. The empirical evidence drawn from this study adds a set of security strategies to the existing SC security literature in the context of TAR. This study provides novel insights by exploring SC security strategies (e.g., scouting, camouflage, SC security arrangements with terrorist groups, security escort, hiring local tribes, carrying guns in vehicles, travelling during daylight hours, and employing monkeys) in the context of TAR. However, the strategies involving scouting, camouflage, security escort, travelling during in daylight hours, hiring local tribes, and carrying guns in vehicles had not been described in the existing SCRM literature, but may be found in the military logistics literature.

Similarly, the monkey strategy is related to the sniffer dog one mentioned in the SCRM literature for drugs control (Townsend, 2006; Basu, 2014). However, this study's empirical findings provide novel insights into SC security strategies that employ monkeys for vehicle security. It is important to bear in mind the possible the SC security strategy that involves striking deals with terrorist groups. However, caution must be applied, as this finding might not be transferable to all enterprises in TAR. This SC security strategy is commonly adopted by logistics service providers (LSPs), which operate in Afghanistan and northern Pakistan.

The findings of this study add to the growing body of literature on the impact of SC security on performance (e.g., Banomyong, 2005; Peleg-Gillai et al., 2006; Sheu et al., 2006; European Commission, 2006; Autry & Bobbitt, 2008; Closs et al., 2008; Whipple et al., 2009; Yang, 2011; Voss & Williams, 2013; Yang & Wei, 2013; Zailani et al., 2015; Cigolini et al., 2016). However, these studies were conducted in low terrorism affected regions. The few studies that have also investigated the impact of SC security strategies on FP (e.g., Bearing Point, 2003) were also conducted in more stable environments. The novel empirical findings of this study provide a new understanding of SC security and of its impact on FP in the context of TAR.

The QCA result indicates that SC security is a necessary condition for FP. It achieved high scores as a necessary condition for outcome (0.841 in SMEs, 0.929 in large enterprises, and 0.881 in all enterprises). In large enterprises, SC security achieved a consistency score higher than that in SMEs. Obviously, large enterprises have more resources than SMEs to spend in SC security. Consequently, this improves their FP. SC security is also a sufficient condition for FP, with high sufficient consistency scores (0.988 in SMEs, 0.940 in large firms, and 0.965 in all firms). This novel finding suggests that SC security has a significant impact on FP and validates hypothesis H5. However, this finding contradicts Thibault et al. (2006), who argued that SC security could increase cost, thus jeopardizing customer relationships.

8.5.6-Facilitation Payment Strategies

A number of studies have mentioned corruption/bribery (facilitation payments) as an SC risk (e.g., Mont & Leire, 2009; Arnold et al., 2012; Schlegel & Trent, 2014; Männistö et al., 2014; Hofmann et al., 2014; Loh & Thai, 2015; Silvestre et al., 2018). No study has mentioned it as a risk management strategy in the SCRM

literature; this is due to various reasons, such as the illegality of bribery, ethical considerations, and the damage it does to sustainability. As a result, firms cannot openly admit to practising facilitation payments as a risk management strategy. However, many firms have recently been involved in them, for example, Brazilian multinational Odebrecht, Panasonic, Rolls-Royce, etc. (The Guardian, 2017; Pressly, 2018; BBC, 2018). These cases indicate that firms might be using covert bribery as a management strategy aimed at mitigating risk or gaining economic benefits. The novel empirical findings of this study support that facilitation payments are multifaceted; they represent the second SC risk to firms in the region (see Figure 5.4), while also being the sixth most adopted SCRM strategy in TAR (see Figure 5.5). Therefore, this study identifies facilitation payments as a way of doing business, especially in logistics, in the region.

The fsQCA findings indicate that facilitation payments are not a necessary condition for FP as it does not pass Ragin's threshold for necessity, with consistency scores of 0.710 in SMEs, 0.715 in large enterprises, and 0.712 in all enterprises. They also do not support hypothesis H6. Surprisingly, facilitation payments were found to be a sufficient condition for FP, with sufficiency scores of 0.986 in SMEs, 0.968 in large, and 0.978 in all firms). These findings may help us to understand that facilitation payments are not a necessary condition for FP, but may be a sufficient one. This study is partially consistent with Funga (2015) and Hanousek & Kochanova (2016), who found that it has positive correlation with performance.

8.6-SCRM Strategy Configurations

The novel fsQCA evidence presented in this section suggests the holistic effect of SCRM strategies on FP. It indicate the scores for necessity and validate the hypotheses from H1 to H5 in all contexts (SMEs, large firms, all enterprises). It means that the absence of facilitation payment can also lead to FP (see Table 7.7, 7.10 and 7.13).

The fsQCA analysis showed sufficient configurations of SCRM strategies (after an intermediate truth table solution) that seem to produce FP. Therefore, these causal paths (sufficient configurations) equifinally lead to FP. Conventional statistical analysis may not able to identify these sufficient configurations (Fiss, 2012). In other words, these sufficient configurations of SCRM strategies are only made

possible in the QCA methodology, and are constructed based on the analysis of a truth table to describe several combinations of conditions related to the presence/absence of FP. These configurations mean that firms do not need to adopt all strategies simultaneously, but specific configurations of two or three strategies may be sufficient for FP. The intermediate truth table solution provides four novel configurations for all enterprises in the region (see Table 7.15).

IS*SCC*SCF*FPS + IS*scc*rs*scs*fps + IS*SCC*RS*scs*fps + IS*RS*SCF*SCS*fps => FP Eq. (8.1)

In set theoretical statements, '*' means 'and', '+' means 'or', UPPER CASE means 'presence', and lower case means 'absence or negation'. The current study identifies how different configurations of these strategies lead to FP. These findings confirm the significance and dominance of information sharing for FP in the context of TAR. Similarly, coordination appears in two configurations, which indicates its significance for outcome. One sufficient configuration shows that facilitation payments, combined with other strategies (information sharing, SC coordination and SC financial) can lead to FP. The other three sufficient configurations indicate that FP can occur in the absence of facilitation payments.

Similarly, the intermediate truth table solution shows three novel sufficient SCRM configurations that could lead to FP in the context of SMEs (see Table 7.13).

IS*SCC*RS*SCF + IS*SCC*RS*scs*fps +IS*SCC*rs*scf*scs*fps => FP Eq. (8.2)

Eq. (8.2) indicates that information sharing and SC coordination are significant strategies for SMEs to achieve FP. Similarly, risk sharing is also a significant strategy for FP in two configurations. In contrast, other strategies (SC financial, SC security, and facilitation payments) are absent in these configurations, which means that FP could be achieved even in their absence. A possible explanation for facilitation payment sufficiency is that it may help mitigate a huge financial loss (e.g., in the form of payments to a terrorist group) or help to get profitable logistics contracts (see Section 5.6.3).

In addition, the intermediate truth table solution indicates four different novel sufficient configurations of SCRM strategies that could lead to outcome in the context of large enterprises (see Table 7.14).

IS*SCC*rs*SCF*FPS + IS*RS*SCF*SCS*fps + IS*scc*rs*SCF*scs*fps + IS*SCC*RS*SCF*SCS => FP Eq. (8.3)

Eq. (8.3) shows that information sharing, SC coordination and SC financial are significant strategies for large enterprises to achieve FP. Similarly, risk sharing and SC security are also significant strategies for FP in two configurations.

However, this study provides novel findings about various combination of SCRM strategies, which are lead to FP. They may be partially consistent with those studies that suggest that SCRM strategies have a positive impact on FP (e.g., Bearing Point, 2003; Klapper, 2006; Oztekin et al., 2015; Gelsomino et al., 2016; O'Neill et al., 2016; Huo et al., 2017; Akhtar et al., 2017; Yu et al., 2018). No previous study had employed fsQCA to investigate the impact of SCRM strategies on FP. Further, previous studies had focussed exclusively on the net effects of these strategies; they had not captured the complexity of the associations between SCRM strategies and performance. These novel findings not only identify the individual effects of SCRM strategies, but also provide their configuration effect on FP in TAR. The fsQCA findings that show the presence of multiple paths to FP clearly indicated equifinality. The findings also indicate asymmetric causality; i.e., that the SMEs' configurations of SCRM strategies for FP differ from those of large enterprises.

8.6.1-Moderating and Mediating Strategies

The novel fsQCA results show the moderating and mediating effects of strategies on FP. One SCRM strategy may be non-significant when analysed for direct effects, but become more valuable when combined with others (Ordanini & Rubera, 2008). In practice, there may be more than one combination of SCRM strategies leading to FP. This study provides novel empirical evidence of the moderating effects of individual SCRM strategies (or in interaction with additional strategies) on FP in the context of TAR.

The superset analysis showed 26 different combinations of strategies leading to FP. Due to its limited scope, this study explored just one moderating effect of information sharing strategies on the correlation between SC security and FP. Empirically, a few studies found that both information sharing and SC security play significant roles in high FP (e.g., Bearing Point, 2003; Oztekin et al., 2015; Huo et al., 2017; Yu et al., 2018). Furthermore, to this researcher's knowledge, no previous

study had investigated the moderating effect of information sharing strategies on the correlation between SC security and FP, especially in the context of TAR. In contrast, a large number of studies discussed the significance of security information sharing on SC performance (e.g., Sheu et al., 2006; Lee et al., 2011; Furia et al., 2011; Sternberg et al., 2012; Panahifar et al., 2018). The significance of SC security on FP is confirmed by this study. Information sharing can also enhance FP (e.g., Huo et al., 2014; Zhao et al., 2015; Chang et al., 2016). The significance of information sharing in moderating the correlation between SC security and FP confirms the hypothesis that the higher is information sharing between SC partners and the higher is SC security, the greater is the effect on FP. The fsQCA findings provide a novel evidence and validate hypothesis H7 (information sharing moderates the correlation between SC security and FP in TAR). One possible reason for the significant moderating effect of information sharing could be that it can increase the competency of SC partners to design effective SC security strategies that, ultimately, may improve FP (e.g., Sarathy, 2006; Gould & Macharis, 2010). Various combinations of SCRM strategies point to new avenues of research (see Tables 7.7, 7.10 and 7.13).

The findings provide novel empirical evidence that coordination mediates the correlation between information sharing and FP, and thus validate hypothesis H8. The SCRM literature widely discusses the significance of coordination in information sharing (e.g., Christopher, 1998; Handfield et al., 1999; Akhtar et al., 2012). However, far too little attention has been paid to coordination as a mediator between information sharing and FP, especially in TAR.

There are several possible explanations for this result. For example, voluntary SC security regulations (e.g., C-TPAT, FAST, CSI, SST, and AMR) establish coordination between firms and governments, which can increase the flow of information shared between them, and may ultimately improve FP. This finding validated the qualitative result that coordination (between security forces and firms) is a key mechanism for effective information sharing aimed at mitigating risks and financial losses in the region.

The findings support that coordination also mediates the correlation between SC security and FP, and thus validate hypothesis H9. This novel mediating effect finding provides significant insights into the underlying mechanisms through

which SC security can affect FP via the mediating role of coordination. A considerable amount of literature has been published on the role of coordination in SC security (e.g., Sheffi, 2001; Rice & Caniato, 2003; Kleindorfer & Saad, 2005; Sheffi, 2005; Bohle et al., 2014). However, so far, the mediating role played by coordination between SC security and FP has not been theorized and tested in the existing SCRM literature.

A probable explanation for the mediating role of coordination is that, in the wake of 9/11, various SC security initiatives were introduced in the form of private/government coordination (i.e., the C-TPAT certification), which can improve FP (Thibault et al., 2006; Sheu et al., 2006; Faisal et al., 2006). Specifically, the mediating role of coordination (i.e., working with security forces and SC partners, or maybe even with terrorist groups) is very significant for SC security in order to achieve performance in TAR.

8.6.2-Firm Contexts

The SCRM strategies aimed at reducing risk and mitigating major disruptions to SCs chain vary across firms. However, these strategies need to overcome the challenges of strategic fit, cost/benefit analysis, and proactive implementation (C. S. Tang, 2006b). Craighead et al. (2007) and Manuj & Mentzer (2008) drew our attention to the business context of a firm, which has an impact on the selection and implementation of these SCRM strategies, as often observed by researchers. For example, SMEs tend to spend limited time and resources on risk strategies (Ellegaard, 2008). Therefore, SCRM strategies are dependent on the resources and knowledge possessed by firms. Risk perception can be impacted by factors such as firm size, product characteristics, job functions, and buyer demographics (V. W. Mitchell, 1985). The researcher examined those factors, such as industry and firm size, which may influence the SCRM strategies implemented by organizations.

Numerous studies have discussed the control variable (industry) in different contexts in the SCRM literature (e.g., Jüttner, 2005; Wagner & Bode, 2006; Chen et al., 2013; Mikalef et al., 2015; Balodi, 2016; O'Neill et al., 2016). So far, however, there has been little discussion in the SCRM literature to determine the strategies' impacts on FP among different industries, especially in the context of TAR. The empirical evidence from this study establishes that there is no mean difference between manufacturer and service provider groups in the implementation of SCRM

strategies in TAR (see Table 7.2). Similarly, there is no mean difference between manufacturer and service provider groups in terms of FP.

In regard to the firm size context, a number of studies have examined the control variable (firm size) in the SCRM literature (e.g., Sezen, 2008; Hendricks & Singhal, 2008; Hendricks et al., 2009; Bode et al., 2011; Wagner et al., 2012; Li et al., 2013; Revilla & Saenz, 2017). However, far too little attention has been paid to analysing the implementation of SCRM strategies in terms of firm size, particularly in the context of TAR. The novel empirical evidence provided by this study establishes that there is no mean difference between SMEs and large enterprises in terms of four SCRM strategies (information sharing, SC coordination, risk sharing, and facilitation payments). Surprisingly, there is a significant difference (see Table 7.3) between the two groups in terms of two SCRM strategies (SC financial and SC security); the finding advocates that larger enterprises are more effective than SMEs in implementing them.

There might be several reasons for the implementation differences of these two SCRM strategies based on firm size. A possible explanation could be that SMEs may have fewer financial and managerial resources available for their implementation than larger enterprises (e.g. Jiang et al., 2006; Cao & Zhang, 2011). The ANOVA (one-way) showed statistically significant mean differences between the two groups in terms of FP. However, the fsQCA findings showed no difference between SMEs and large enterprises in terms of their FP. This result may be due to sample size, the ANOVA test is more sensitive to it, while the fsQCA analysis is not affected by sample sizes and is thus more suitable for small samples (Ragin, 2008; Fiss, 2012; Ordanini et al., 2014).

8.7- The Impact of RQ4 War on Terror on LSPs

This section discusses the positive and negative impacts of the war on terror (WoT) on the logistics industries in Afghanistan and Pakistan. A large and growing body of literature has investigated war economies in different disciplines (e.g., Rubin et al., 2000; Galbraith, 2001; Goodhand, 2003; Clemente & Evans, 2014). So far, however, there has been little discussion on the positive/negative impacts of the WoT on local economies.

8.7.1-Positive Impacts

Very few reports on SCs have investigated the positive impact of the WoT on local logistics industries (e.g., US Congress Report, 2010; The international Trade Centre, 2012; Gulati, 2012; Evans & Masternak, 2012; Clemente & Evans, 2014). However, to this researcher's knowledge, no previous study had hitherto exclusively investigated the effect of the WoT on the logistics industry. The current study fills this gap by providing novel understandings of the positive impacts of the WoT on the logistics industry. These are listed below.

1. *Profitability:* the empirical evidence shows a significant positive impact of the WoT on the local logistics industry. For instance, the profit ratio doubled during the WoT, as the local logistics industry was receiving high fares from NATO contracts. However, this finding may be consistent with that of Clemente & Evans (2014), who indicated the high profitability of the Iraqi and Afghan logistics industries during the WoT.
2. *Business Growth*: the current study identified a huge increase in trade between Afghanistan and Pakistan during the WoT. A possible explanation for this could be that the international community poured funds into Afghanistan to rebuild after the toppling of the Taliban government. This provided the local logistics industry with a huge business opportunity. This finding is relatively consistent with that of Clemente & Evans (2014), who said that the logistics industry grew exponentially in that region during the WoT due to large numbers of NATO logistics contracts. War and calamities may increase demand for logistics in the form of supplies to both military and relief operations. However, this study provides a novel insight into business growth in Pakistani industries, especially the cement industry.
3. *Knowledge Sharing:* this study provides novel evidence regarding the WoT's impact on increasing the knowledge shared between SC partners. A large volume of published studies in the SC literature describe the role played by knowledge sharing (e.g., Eng, 2006; Soosay et al., 2008; Wiengarten et al., 2016). However, to this researcher's knowledge, no previous study had hitherto investigated the WoT's impact in relation to the rise of knowledge sharing between partners. Before the WoT, the local logistics industry was based on logistics procedures dating back hundreds of years and on outdated

technologies. In addition, there were no clear-cut governmental logistics policies in the region. The WoT brought new logistics technologies and knowledge (e.g., IT-technology, logistics insurance, GPS trackers, other security specific measurements) to the region. The local logistics industry also increased its knowledge sharing and improved its technologies by working with multi-national companies during the WoT.

4. *Employment Opportunity:* historically, sitting at heart of the Silk Road, the local population had for centuries been associated with logistics. The US Congress Report (2010) and Clemente and Evans (2014) pointed out that one fourth of the population was employed in the logistics industry during the WoT. However, no reliable data are available in relation to logistics employment; it is thus very difficult to quantitatively calculate increases in logistics employment. The qualitative analysis conducted by this study indicates that there was an enormous increase in employment opportunities during the WoT. A possible explanation for this could be that NATO contracts provided the local population with huge employment opportunities. These contracts also increased employment opportunities in businesses associated with logistics (e.g., logistics security service providers, truck hotels, 'highway motels', and other logistics related services).
5. *Infrastructure Development*: this study provides novel empirical evidence that the WoT had a positive impact on the local logistics infrastructure. However, previous research had indicated that terrorism and war have a negative impact on logistics infrastructures (e.g., Ekwall, 2010; Raymond, 2006). A possible explanation for this finding might be that the region was little developed in terms of its logistics infrastructure (e.g., roads, terminals, warehouses, ports security, and logistics technologies) before the WoT. Similarly, NATO heavily invested in the development of a logistics infrastructure in the region, especially in roads to Afghanistan.

8.7.2-The Negative Impacts

A large volume of published studies has identified the various negative impacts of terrorism on the global logistics industry (e.g., Sheffi, 2001; Marlow, 2010; Hong & Ng, 2010; Bueno-Solano & Cedillo-Campos, 2014; Urciuoli et al., 2014). However, the empirical evidence drawn from this study establishes the following negative impacts of the WoT on the logistics industry.

1. *Sudden Decline in Demand*: this study indicates that there was a sudden decline in demand for LSPs after the partial NATO withdrawal from Afghanistan. This view is also supported by Clemente & Evans (2014), who predicted that LSP demand would decline after NATO withdrawal. There are several possible explanations for this finding. First, the local logistics industry was mainly dependent on NATO supplies, and demand suddenly dropped after withdrawal. Second, political and security uncertainties affected regional economic activities; consequently, the local economy did not create enough demand for the logistics industry.
2. *Personal and Financial Losses:* a large volume of published studies have identified the personal and financial losses incurred due to terrorism (e.g., Tzannatos, 2003; King, 2005; Banomyong, 2005; Europol, 2007; Autry & Bobbitt, 2008; Stecke & Kumar, 2009; Blomberg & Rose, 2009; Modarress et al., 2012). So far, however, there has been little discussion about the negative impact of the WoT on personal and financial resources. This study provides novel empirical evidence that large numbers of logistics employees were killed in the line of duty in the region (see Table 3.4). Similarly, during the WoT, firms suffered severe financial losses due to terrorist attacks and other security-related accidents.
3. *High Operational Disruption*: a large and growing body of SCRM literature has investigated the impact of operational risk on SCs in low terrorist activity areas (e.g., Kleindorfer & Saad, 2005; Liu et al., 2010; Cox et al., 2011; Baghalian et al., 2013; Kauppi et al., 2016). This study provides an understanding of the high operational risk found in the context of the WoT. The novel empirical evidence provided by this study establishes that the firms in TAR were suffering from heightened operational risk during the WoT. Specifically, those firms that were dealing with NATO suffered more from operational disruption. During the WoT, firms were confronting two types of operational disruption from terrorist attacks: direct and indirect. Direct operational disruption directly arose from terrorist attacks (e.g., attacks on premises and loss of employees, vehicles, and goods), which were creating major disruption in SC operations. Indirect operational disruption mainly arose from the tight security measures enacted in the wake of terrorist attacks (e.g., limited or no vehicle entry in specific areas, extra checks at security posts, and the closure of international or provisional

borders). Similarly, a few local religious and political parties were against NATO supplies entering Pakistan; thus, they staged protests and frequently blocked the main roads to Afghanistan during the WoT, which also instigated disuption in logistics operations. The findings of this study are relatively consistent with those of Evans & Masternak (2012), who revealed the widespread disruption plaguing fuel SCs during wartime.

4. *Organizational Ethical Vulnerability*: the WoT not only increased business vulnerability, but also affected business ethics in the region. The empirical evidence produced by this study establishes that local organizational ethical vulnerability may have increased due to two reasons. First, much corruption plagued the NATO contracts, which were granted and often used as a form of political bribe, particularly, when they were granted to Afghan warlords, who were mainly involved in war crimes and human right violations. These findings seem to be consistent with those of other studies that found warlord corruption enacted in NATO contracts (e.g., Young, 2010; US Congress Report, 2010; Clemente & Evans, 2014). Second, NATO allowed a 10% rate of pilferage in its supplies, which not only encouraged the dishonesty of LSP employees, but also motived the theft of goods. This result is in agreement with that of Clemente and Evans (2014), who showed the high degree of corruption present in logistics contracts and how these opened new avenues for logistics corruption during the WoT.
5. *Transportation Shortage*: A number of studies examined the opportunistic behaviours of suppliers (e.g., Williamson, 1985; Speckman et al., 1998; Smeltzer, 1998; Moura et al., 2003; Spekman & Davis, 2004); however, to date, no study has addressed the opportunistic behaviours of LSPs in TAR. Thus, this finding had not previously been described in the SCRM literature. The novel empirical evidence drawn from this study establishes that, during the WoT and due to lucrative NATO contracts, firms were confronted with a lack of logistics services for local transportation. Consequently, the local economy suffered heavily from the opportunistic behaviours of LSPs.
6. *Logistics Infrastructural Damage:* a large volume of published studies (e.g., Rice & Caniato, 2003; Stecke & Kumar, 2009; Taquechel, 2010; Männistö et al., 2014; Zeneli et al., 2018), identified the negative impact of terrorism on logistics infrastructures in the context of low terrorism areas. The findings of this study

are relatively consistent with the existing literature. This study also provides the novel finding that NATO could damage the region's road infrastructure with its heavyweight supply transports. However, this finding does not support the previous one that NATO had improved the logistics infrastructure. A possible explanation for this may be that most respondents from the north of Pakistan believed that supplies had wrecked their road infrastructure, especially the roads to Afghanistan. Another possible explanation is that the number of improvised explosive device (roadside bombs) attacks increased during the WoT, becoming the main cause of the road destruction in the region. However, given the small sample size of respondents from the north of Pakistan, caution must be applied, as the finding that NATO supplies had a negative impact on the logistics infrastructure may not be generalizable.

8.8-Summary

This chapter offered a comprehensive discussion of the SC definition, SC risks, and mitigation SCRM strategies in the context of TAR. Further, it provided a discussion of the impact of SCRM strategies on FP. This chapter began by providing a definition of SC risk, which is linked with existential risk in the region. It discussed the SC risks identified within the existing SCRM literature in TAR. It provided a general discussion of a number of distinctive SC risks in the context of TAR. In particularly it discussed the novel SC risks in the region, such as terrorist group corruption, paedophilia, the use of containers to block protests, a culture of exploitation in the name of security, the blackmail enacted by authorities for bribes, and smog.

In order to understand the SCRM strategies and practices that mitigate SC risks in the TAR context, it went on to discuss the SCRM strategies' significance and impact on SC performance found in the literature, especially discussing and identifying any novel SCRM strategies in the region. This study identified several novel SCRM strategies, such as scouting, camouflage, SC security arrangements with terrorist groups, security escort, hiring local tribes, carrying guns in vehicles, travelling during daylight hours, and employing monkeys in the terrorism context. Similarly, it discussed the six most effective and prominent SCRM strategies and provided novel insights into these in the context of TAR.

The significance of SCRM strategies in relation to FP was discussed and the hypotheses were validated through fsQCA analysis (necessity test). Thus, five of the six SCRM strategies identified were found to be statistically significant (facilitation payments were not). Similarly, it discussed the various configurations of SCRM strategies that could lead to FP in the context of firm size. This study also provided novel findings regarding the moderating and mediating roles played by SCRM strategies in FP. Information sharing plays a moderating role between SC security and FP. Coordination strategies play a mediating role both between information sharing and FP and between SC security and FP. Last, the distinctive findings in relation to the positive and negative impacts of the WoT on the local logistics industry were debated. The next chapter draws this study to a close by providing its conclusion, implications, and limitations, and by pointing at future research directions.

Chapter Nine

Conclusions and Contributions

9.1-Introduction

The purposes of this chapter are to conclude, present a brief overview of the study, suggest contributions of this study and introduce future directions for developing the work. Initially the chapter provides a summary of the study in section 9.2. Section 9.3 delineates significant qualitative and quantitative findings. This is followed by a description of the contribution to established theory as well as managerial and practical contributions in section 9.4. The chapter then provides an acknowledgement of the limitations of the study and finally concludes the thesis with formulation of future research directions in the last section.

9.2-Summary of Study

The main objective of this study was to investigate the impact of SCRM strategies on FP in the context of a TAR. First, in the exploratory study, a systematic literature review was conducted to identify published literature on SC and terrorism risk. Further, through interviews, a holistic approach to SCRM was utilised to identify and analyse various SC risks, and recognise the most effective strategies for managing these risks in relation to FP in that region. Second, in the confirmatory study, fsQCA was employed to confirm the impact of these strategies on FP.

This study is composed of nine chapters. The first part (Chapter 1) provided an introduction and pointed out the significance of the study. The literature review (Chapter 2) identified several research gaps. The main research gap was a lack of research on SCRM practices in the context of TARs, where SC networks and processes are more complex and disruptive due to the threat of terrorism. The second research gap was the need of a holistic approach to identify SCRM practices in that region. The third was the limitation of studies to examine the impact of SCRM strategies on FP, especially in a TAR. The fourth gap was a need of mixed and rigorous statistical methods for analysis of the impact of SCRM strategies on FP. Last, there is no systemic literature review on terrorism risk and its links with SCRM.

Chapter 3 began by describing the context of this study. Chapter 4 described the methods used in this study. Mixed methods were employed, which consisted of two

interrelated research stages. The first stage of this study was an exploratory study employing SLR and semi-structural interviews to identify published studies on SC and terrorism and the profiles of SC risks and SCRM strategies in a TAR (Chapter 5). On the basis of these findings and the literature review, a framework was developed for the impact of SCRM strategies on FP. Hypotheses were also proposed for strategies, and moderation and mediation relationships of these strategies (Chapter 6). The second stage was designed to assess SCRM strategies' impact on FP through fsQCA analysis (Chapter 7). Chapter 8 discussed the novel qualitative and quantitative findings with reference to existing literature. This final chapter draws upon the entire study, tying up the various theoretical and empirical strands in order to provide a broad understanding of SCRM practices and includes a discussion of the implications of the findings for future research into this area.

In the following section, the researcher will briefly highlight the research questions and the answers generated by this study.

9.3-Conclusion Regarding the Research Questions

RQ 1: What is the current state-of-the-art in SCRM literature on terrorism risk?

This study's analysis of the content of individual research papers identified clusters of papers dealing with particular terrorism risk, showing gaps in the SCRM literature. This study identified the following research gaps: a limited number of studies published on the context of terrorism, most such studies being focused on the discipline of transportation, limited available research on SC performance, and the fact that the majority of studies have been conducted in the context of low terrorism affected regions. Further, the study detected a recent rise in the popularity of quantitative methods, and this suggests that there is a positive appetite in the research community to develop large-scale investigations to quantify the relationship between the types of terrorism risks and individual indicators of SC performance.

RQ 2a: What are the supply chain risks in a TAR (Pakistan)?

The semi-structured interviews revealed that logistics and SC operations have faced more disruptive and distinctive risks in such regions as compared to less terrorism affected regions. This study provided novel insights on the SC risks. For

example, terrorist, corruption and criminal activities are the main sources of SC risks. The nexus of various governing bodies, terrorist and criminal groups about corruption affects firms, particularly logistics firms. Especially, terrorist groups' corruption generated a variety of security threats to firms such as kidnaping, killing of employees and asking for protection money in the name of charity and security. In addition, terrorism not only increases the lead-time domestically, but also affects international trade due to extra security checking on roads and border crossing. Specifically, smog, paedophilia risk, use of containers to block the protesters and blackmailing of tax authority for bribes are unique supply chain risks in that region.

RQ 2b: What are the most frequent risks to the supply chain in that region?

In total, 103 different risks were found in TARs. Further analysis revealed that the top ten SC risks in such regions are terrorism, corruption, theft, robbery and pilferages, supply risk, demand risk, credit risk, custom clearance, human resource related risk, natural disasters and inflation. Terrorism and corruption are the most disruptive risks for logistics/supply chain operations. Terrorism can also generate other SC risks such as employee life risk, crimes in SC, delay, financial risk, international or regional border closure and corruption. Corruption can increase organizational ethical vulnerability and generate other SC risks.

RQ 3a: What are the SCRM mitigation strategies employed by the firms in that region?

A large number of SCRM strategies are discussed in SCM literature. Nevertheless, it was observed from the existing literature that SCM researchers have not yet explored SCRM strategies in the context of TAR. Therefore, the third research question in this study sought to identify SCRM strategies in that context. The empirical evidence revealed 105 SCRM strategies adopted by firms, which range from military strategies to employing monkeys for security. Common strategies include scouting, camouflage of vehicles, negotiation with terrorist groups for safe passage, hiring local tribes, carrying gun in vehicles and traveling by daylight. However, the firms mainly focus on following SCRM strategies such as security, information sharing, coordination with SC partners and security forces, facilitation

payment, insurance, strategic investments and buffer stocks and financial strategies.

RQ 3b: What are the main risk management strategies to be considered?

This study identified several SCRM strategies employed by firms to mitigate their SC risks in that region. The Nvivo analysis revealed the six strategies most frequently adopted in that region. The basic groups of strategies are information sharing, supply chain coordination, risk sharing, supply chain finance, supply chain security and facilitation payment.

RQ 4: What is the impact of the SCRM strategies on firms' financial performance?

This study explored how SCRM strategies affect FP. This study adopted the COSO framework and contingency theory to develop SCRM strategies, which affect the FP. In order to understand the strategies to manage SC risks in the context of TAR, the framework was further conceptualised by a literature review as well as interviews with logistics/supply chain practitioners. Hypotheses relating to SCRM strategies were derived from literature and qualitative findings. They were tested by using the fsQCA and data collected from firms in Pakistan, as a TAR. The fsQCA analysis revealed the following findings.

First, this study has found that the first five SCRM strategies are positively related to FP according to necessity test and all six SCRM strategies are positively related to FP based on the sufficiency test. However, the facilitation payment strategy was negatively correlated with FP in the context of large enterprises. In addition, the fsQCA analysis provided empirical evidence of the need for holistic insights into the interrelationships between SCRM strategies, by unravelling their relative role in FP. It established that FP is sensitive to the way SCRM strategies are employed, indicating that firms should pay attention to how these SCRM strategies mutually strengthen each other and on the degree to which they are implemented.

Second, this study revealed the different configurations of SCRM strategies, which lead to FP. It showed 31 combinations of six the SCRM strategies (models) for outcome in the necessity test. This study also demonstrated three configurations of

strategies in intermediate solutions for FP in SME, Similarly, four configurations for large firms and all firms leads to FP.

Third, this study examined the moderation and mediation roles of SCRM strategies. It revealed that information sharing plays a significant moderating role between SC security and FP in the context of TAR. Obviously, there are other different SCRM strategy combination (moderations) that need to be considered for explaining FP but this goes beyond the scope of this study.

Last, this study also provided empirical evidence that SCRM strategies have a full mediating impact between strategies and FP. The causal-steps approach and bootstrapping tests validated that SC coordination plays a full mediating role in relationship between information sharing and FP. Moreover, these tests also established that SC coordination has a full mediating impact between supply chain security and FP. Table 9.1 shows the summary of hypothesises.

Table 9. 1: Summary of hypothesis

Hypothesis	Description	Result
H_1	Information sharing is positively related to financial performance	Accepted
H_2	SC coordination is positively related to financial performance	Accepted
H_3	Risk sharing strategy is positively related to financial performance	Accepted
H_4	SC financial strategy is positively related to financial performance	Accepted
H_5	SC security strategy is positively related to financial performance	Accepted
H_6	Facilitation payment strategy is positively related to financial performance	Rejected
H_7	A combination of information sharing and SC security strategies is positively correlated to financial performance	Accepted
H_8	Information sharing is positively related to SC coordination	Accepted
H_9	SC coordination mediates the relationship between information sharing and financial performance	Accepted
H_{10}	SC security is positively related to SC coordination	Accepted
H_{11}	SC coordination mediates the relationship between SC security and financial performance	Accepted

Source: Author

RQ 5: What is the impact of the war on terror on logistics service providers in that region?

The empirical evidence revealed the positive and negative impacts of the WoT on the logistics industry in Pakistan. With regard to positive impacts, the WoT can increase the capacity and ability of logistics firms to deal more efficiently with logistics risks, especially terrorism risk, in that region. The NATO contracts bring

modern logistics knowledge and technologies to the local logistics industry. The WOT has also increased the business profitability and growth of logistics firms. In addition, is beneficial for local communities in terms of logistics and road infrastructures. One of the significant findings to emerge from this study is that the demand for logistics was significantly increased during the WOT.

However, the WoT has also had negative effects on local logistics industry. The WOT caused huge personal and financial losses to the local population. It also caused high disruption risk and demand risk for logistics firms after NATO withdrawal. Similarly, it caused a risk of opportunistic behaviour of logistics firms in the form of logistics shortage for the local market, which seriously affected the progress of some local industries. The most obvious negative impact that emerged from this study's that it introduced a corruption culture in the logistics industry in terms of security and the award of logistics contracts in that region. In sum, it seems that the WoT is more profitable and educational in term of knowledge sharing for local logistics industry.

9.4-Research Contributions

This study's findings provided three main contributions to the SCRM. It provided abundant insights about SCRM practices in TAR, for example, how risks can be understood in that region, how logistics firms can effectively mitigate these risks and what influences SCRM strategies on FP. As a result, this study has produced a number of theoretical, methodological and managerial contributions.

9.4.1-Theoretical Contributions

This study contributes to and extends the growing research on SCRM. Specifically, we investigated SCRM practices in an area highly affected by terrorism. The following theoretical contributions can be drawn from this study.

1. This study contributed knowledge on SC risk and SCRM and a new theory of SCRM strategies impact on FP in a TAR (Pakistan). Its main contribution to knowledge is with regard to the COSO framework in terms of SCRM and TAR. The COSO framework comprises objectives setting, event identification, risk management, risk responses, control activities, information and communication, and monitoring, which can effectively influence FP. The most important aim of the COSO framework is to improve business performance.

Therefore, this study contributed to the overall organisational risk management in relation to event identification, risk responses, control activities, information and communication. Similarly, this study also drew upon contingency theory to investigate SCRM practices' impact on financial performance. The study has added important insight into and extension of the contingency theory. First, the environment of the TAR and the strategy of the focal company should be considered when estimating the likelihood of supplier non-performance. The same supplier characteristics can entail considerably different risks in different situations. Second, the supplier portfolio matrix introduces the notion that the role of a supplier as one of the suppliers in the chain should be included. The fit between the supplier portfolio and the SC strategy is crucial for successful operation of the chain

2. This study contributes to the current literature on the practice of risk management in supply chains from the TAR perspective. Previous studies have tended to focus on the issue from the perspective of more secure environment (e.g. Jüttner, 2005; Kleindorfer & Saad, 2005; Ritchie & Brindley, 2007; Handfield & McCormack, 2007; Neiger et al., 2009; Vilko et al., 2014; Männistö et al., 2014; Monroe et al., 2014; Revilla & Saenz, 2017). To what extent these studies are applicable to different contexts has become increasingly significant to validate. Unfortunately, research on SCRM practices in a TAR is non-existent. This study makes a substantial contribution in identifying the knowledge gaps by mapping the literature on the impacts of terrorism-related risk on SCs and explicitly defining the significant aspects covered in the specific content of relevant articles, and exploring the developments in this emerging knowledge domain. In the context of a TAR, this is the first study to adopt a holistic approach to SCRM processes. It adds to prior studies in multiple ways. First, a significant volume of research has been conducted to identify SC risks. However, this study explored several novel SC risks and contributed in terms of risk identification in a TAR (see Section 8.4.2). Second, this study also contributed to literature by assessing the most frequent SC risks in TAR. Third, although numerous studies have been conducted on SCRM strategies, this study contributed novel insights into SCRM strategies in the context of high terrorism risk. In addition, the study explored the practices for each strategy in fostering a comprehensive knowledge of SCRM strategies. This study also contributed to

the overall global SCRM strategies literature, which was largely focused on more steady environments (e.g., Manuj & Mentzer, 2008a, 2008b; Bode et al., 2011).

3. The prior literature indicates that SCRM practices could increase organizational performance during SC disruptions (e.g., Ritchie & Brindley, 2007, Lavastre et al., 2012; Wiengarten et al., 2016; Kauppi et al., 2016; Fan et al., 2017). However, these studies were conducted in more stable environments. In the present era of globalization, where firms are increasingly expanding across international boundaries (Speier et al., 2011), firms must anticipate risks and adopt SCRM mitigation strategies to manage SC disruption (Sheffi, 2005; Sheffi & Rice, 2005; Zsidisin & Ritchie, 2008; Zsidisin & Wagner, 2010; Monroe et al., 2014). Therefore, this study fills this gap by determining the impact of SCRM practice on FP in the context of a TAR. The study demonstrates empirically that SCRM strategies (information sharing, SC coordination, risk sharing, SC finance and SC security) not only improved FP individually, but also moderated and mediated other strategies to improve FP. This study provided 11 different configurations of SCRM strategies that lead to FP. More significantly, though, this study's finding suggested that not only the presence of certain SCRM strategies, but also their absence could lead to FP. This is a major contribution to SCRM literature and provides a better understanding about predictors of FP.
4. The initial review of the literature on terrorism-related risk in SCRM identifies the following major gaps. First, although several authors have carried out literature reviews on SCRM at various stages over the last 15 years, there is no systemic literature review on terrorism risk and its links with SCRM. Second, whilst the frequency of terrorist attacks and associated threats to global SCs is increasing, existing strategies and relevant decision-making frameworks to address the risk arising from terrorism are inadequate and have not been systematically investigated (Markmann et al., 2013; Ni et al., 2016). Additionally, although a few studies provide some guidelines (e.g., Sheffi, 2001; Nurthen, 2003; Bueno-Solano & Cedillo-Campos, 2014; Shan & Zhuang, 2014), the contributions to the topic by different academic disciplines and countries have not been systematically categorized in order to explore differences in academic perspectives or the peculiarities of contextual settings (Khan et al., 2018). Therefore, this study contributes to existing knowledge on terrorism risk in global SCs by providing a SLR, text mining and citation networking.

5. Discussion of facilitation payment and ethical issues is in its infancy in SCM literature (Dickel & Graeff, 2016) and it is a poorly understood phenomenon (Silvestre et al., 2018; Monteiro et al., 2018). A few prior studies investigated the corruption in global supply chains (e.g., Mont & Leire, 2009; Arnold et al., 2012; Basu, 2014; Monteiro et al., 2018; Silvestre et al., 2018). It also is a major risk for firms' sustainability (Speier et al., 2011). Therefore, this study attempted to understand corruption in global supply chains and its effects on firms' FP. The study contributed to SCRM literature in two ways. First, it identified the security corruption culture among firms, terrorist groups and various authorities in TAR. Second, it empirically validated that it is a sufficient factor for FP in the form of facilitation payment strategy.

9.4.2-Managerial Contributions

From this study, three main managerial contributions can be derived.

1. This study is focused on the managerial aspect of the characteristics of the firm doing SCRM practices in the TAR, and the risk mitigation methods used in SCRM. The 11 proposed models of this study can equip managers and practitioners with a powerful tool to assess the effectiveness of adopting these six SCRM strategies for mitigating SC risk under the condition of a TAR, and then choose the most appropriate SCRM mitigation strategy depending on the context. This study's findings show that the adoption of information sharing, SC coordination, risk sharing , SC finance and SC security strategies strongly influence on firms' financial performance. For example, information sharing strategies can increase SC visibility, save employees' lives, increase SC efficiency, avoid SC disruption and enhance financial performance. Ultimately it can affect firms' financial viability. Similarly, SC coordination strategies can develop a higher degree of cooperation among firms and with security forces, which is the key to enhancing SC security and financial performance. This study may also encourage global SC managers to understand strategic contracts as a possible long term risk mitigation strategy and to help managers in better understanding behavioural aspects during contract negotiations in that region. This study also focuses on the relationship between SC finance strategies and financial performance. Therefore, managers can further base their decisions on which SC finance strategies to choose according to their need to mitigate SC

risk. Especially, in the context of TAR, this study provides many SC security strategies. It will assist global SC managers and logisticians to re-examine their existing SC security strategies by considering the selected SC security strategies, which have a significant impact on SC performance. Firms (local or multinational) need to strategize their SC security strategies according to high terrorism risk, which will surely give them a competitive advantage over other players in that region. It will also help global risk managers to adopt these SC strategies in similar regions of the world. In addition, the findings of this study can assist risk managers to re-examine their current SC security strategies by considering the selected SC security practices, which have a significant impact on financial performance.

Finally, this study also reveals moderating and mediating effects of SCRM strategies on FP. The findings suggested that the intensity of information sharing and SC security together may provide better FP. Therefore, managers need to improve their information sharing and SC security capabilities to achieve FP. Similarly, the findings show that SC coordination plays a significant role between information sharing and FP, SC security and FP. Therefore, SC managers need to develop and implement SC coordination strategies to obtain timely information regarding terrorism attacks. In terms of SC security, SC managers should require constant coordination with government officials and SC partners to mitigate risks and improve FP.

The key managerial contribution of this study is that FP can be guaranteed if a certain set of SCRM strategies is adopted. Firms always face scarcity of resources and there is a need for SC managers to reconfigure how resources are used. Therefore, several combinations of strategies can provide an understanding for managers to invest resources in specific SCRM strategies that can lead to achieve performance. In this study's context, the findings suggested that FP could be achieved through distinct attribute configurations in different contexts (see Section 7.5).

2. Understanding and managing risk is an important issue of business and has been widely studied in many disciplines. Even though there is a rich stream of literature investigating SC risk, there has been little research applied to the SC risk that exists in the context of TAR. In order to start closing the research gap in SCRM, this study identified the risk profiles in a region highly affected by

terrorism, which will enable local and global managers to anticipate and proactively deal with potential SC risks or terrorism-related risks. The profile of risks revealed in this study may not be completely comprehensive but is still very significant because the participants among whom they were explored from different industries and worked in the context of a TAR. Similarly, this study identified the main risk sources in that region (disruption, operational and financial), which can provide guidance to managers in examining their SC risks and categorising them.

In addition, this study adopted a holistic approach to cover all SCRM stages by using a multi-stage research method. It showed the application of both qualitative and quantitative research methods within the positivist paradigm, combining the benefits of each method. In particular, the linkages between different methods were clearly employed to develop a holistic SCRM approach. Managers can follow the series of research methods suggested in this study to find out critical risks in their organisations' supply chain operations, the existing status of their SCRM practices and future guidelines for mitigating critical risks in a TAR.

3. This study will potentially help SC managers in TAR to better understand their respective risky business environments. This also presents an opportunity to adopt best SCRM practices in order to optimize financial performance and play a contributory role in steering public policy in logistics industry. Considering the limited resources of firms and developing countries' financial limitation, it is important for Pakistani SC managers, before selecting any SCRM strategies, to assess carefully their strategic needs; otherwise there could be a competitively negative effect on FP. Similarly, it is also vital for Pakistani firms to analyse current SCRM practices during the development of new SCRM strategy.
4. Finally, this study also identified positive and negative impacts of the WoT on local logistics industry. It provides some understanding and guidelines for managers, on how to coordinate with their SC partners and security forces in a war situation. It is also important for SC professionals to understand the use of their limited resources, because many firms in that region were forced into bankruptcy after the WoT.

9.5- Limitations and Future Research

Though this study tried to deal all the theoretical and methodological issues, it still suffered from a number of limitations; however, it will open new avenue for future research relating to SCRM.

1. This study highlights the need for future research to engage inter-disciplinary or transdisciplinary teams in order to develop a more complete and coherent understanding of terrorism-related risks for SCRM. Another future research need is to develop more sector-specific studies and cover a greater diversity of sectors. In addition, there is a need for more studies based in Asia, the Middle East and Africa, with increased participation of scholars and practitioners from those regions.
2. The process of risk identification and analysis can be replicated in other business functions. However, this study focused only on logistics/supply chain in a TAR (Pakistan), so the findings maybe very specific to a terrorism affected region. However, there are need to investigate other similar regions in the world. The application of the same research process to other areas will increase the body of knowledge in SCRM literature. In particular, terrorism-related or man-made risks need further exploration.
3. This study interviewed practitioners who were dealing with the logistics and SC in different industries, without any classification of industry. The diversity of interviewees may facilitate a further discussion about SC risks in different industries. Besides, although this study interviewed interviewees from LSPs, exporters, importers, international freight forwarder, manufactures (e.g. textile, brewages, paramedical, pharmaceutical and tobacco), the qualitative findings identified that the LSPs industry is more developed and gained more financial advantages from the war on terror in that region as compared to other industries. It would be interesting to study industry-specific SCRM practices in the context of TAR. In addition, in future study it would be significant to evaluate the impact of terrorism-related risk impact on particular industry.
4. Cross-validation of the structural model would be possible by widening the geographical scope of the study. This study only investigated SCRM practices in Pakistan albeit with a good sample. It would be interesting to cross-validate this model with other regions and establish the general applicability of the research

model and results. In particular, a comparative analysis between regions with high and low terrorism risk would provide fresh understanding into the development of SCRM strategies.

5. The fsQCA method has recently received considerable attention in SCM literature (e.g. Huang & Hsieh, 2015; Reimann et al., 2017; Rekik & Bergeron, 2017; Kapsali et al., 2018; Galeazzo & Furlan, 2018). However, the potential generalizability of fsQCA results is still open to debate. In this study, the researcher used only six SCRM strategies to examine the impact of these strategies on FP. The extension of the fsQCA analysis with integration of other SCRM strategies is highly recommended.
6. This study has identified various combinations of strategies, which are positively related to FP. The examination of these configurations is beyond the scope of this study. These combinations also showed different causal relationships among strategies, which will help researchers in hypothesis formulation. In addition, QCA is limited by the sample size of causal conditions included in the truth table (Ragin, 2008). Future studies should be conducted with a large number of causal conditions, for example, including other factors that affects performance.
7. The findings of this study suggest that facilitation payment is used as a strategy of risk management. The findings showed that this is not a necessary condition for FP as strategy in that particular region. However, it is a sufficient condition for outcome. It would be interesting to assess the effects of facilitation payment strategy on performance in different parts of the world. Another possible area of future research would be to investigate, how corruption risk impact on SC performance.
8. Lastly, further research is needed to examine more closely the links between the configurations of SCRM strategies and their mediating and moderating effects on FP. More rigorous analysis methods (e.g. Simulation Analysis, Structural Equation Modelling) with a large sample size in this context would help us to establish a greater degree of accuracy.

9.6-Concluding Remarks

This study conducted a large-scale empirical analysis that examined SC risk, SCRM strategies (information sharing, SC coordination, risk sharing, SC finance and SC security) and their impact on financial performance in the context of a terrorism affected region. This study found that five SCRM strategies are significantly positively related to financial performance. Therefore, this study offers several theoretical and managerial contributions. First, the findings of this study contribute to the overall SCM literature in context of TAR. In addition, it has systematically reviewed the state of the art of literature on terrorism risk in the context of SCRM. Second, this study provides a huge contribution to mainstream literature on SCRM to identify SC risk and strategies in the context of TAR. It also contributes to the COSO framework in the context of SCRM. Similarly, it contributes to contingency theory in relation to SCRM. Third, it provides 11 different combinations of SCRM strategies to managers for enhancing their financial performance. Fourth, it attempted to identify the impact of the war on terror on local logistics service providers. Finally, this study provides guidelines to future users of CPEC to deal with SC risks in that region.

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Appendix A: Thesis title submission form

Thesis Title Submission Form

UNIVERSITY OF HULL | DOCTORAL COLLEGE

Name: Muhammad Naveed Khan Student Number: 200408722

Faculty / Programme: Hull University Business School Degree: PhD

Full Title: Terrorism Affected Regions: The Impact of Different Supply Chain Risk Management Strategies on Financial Performance.

Six-word Title (to be used when the degree is presented at the Degree Ceremony):

The SCRM strategies impact on financial performance in terrorism affected Regions.

I accept that the electronic copy of the thesis must be submitted in accordance with University regulations as laid down by the Doctoral College.

Signature: Date: 16/11/2018

In order to best manage your thesis post-award, please review and sign the following clauses. Please indicate any queries regarding these agreements on the reverse of this form.

(1) I have exercised reasonable care to ensure that the thesis is original, and does not to the best of my knowledge break any UK law or infringe any third party's copyright or other Intellectual Property Right.

Signature: Date: 16/11/2018

(2) I agree to the electronic copy of the thesis being submitted to an appropriate service for guarding against plagiarism of the thesis in the future.

Signature: Date: 16/11/1208

(3) I acknowledge that the thesis has been checked for any possible IPR that might require management as a patentable output and, where it does contain protectable IPR, that the Head of Commercialisation has been notified so that appropriate steps can be undertaken by the University to protect that IPR.

.Signature: Supervisor signature: Date: 16/11/2018

This form must be returned to the Doctoral College prior to commencement of the three-month submission period. Please print your responses clearly.

Appendix B: Thesis deposit for University Library

The University of Hull

Deposit of thesis in the University Library

Name: Muhammad Naveed Khan ____________________________________

Department / Programme: Hull University Business School__ ____________________

Degree: PhD____

I Muhammad Naveed Khan ____ hereby give consent that the completed and corrected copy of my thesis: Terrorism Affected Regions: The Impact of Different Supply Chain Risk Management Strategies on Financial Performance ____________________________________(title)

if accepted for the degree of _ PhD____________________(e.g. PhD, MPhil) in the University of Hull and thereafter deposited in the University Library and the University's digital repository will be made available for University and public access as follows:

The electronic copy shall be made available for access by any person or institution via the world wide web. Please provide a copy of the final, examined version via Box.

I do not require my thesis to be withheld from general access ☐

Signature: ____________________________________ Date: ______________

If in special circumstances, the author wishes to withhold this consent for **a period of not more than five years** from the date of the degree being awarded, he or she should complete and sign sections (1) and/or (2) below, as appropriate. Email address is requested in case of any follow-up query required.

(1) I wish access to my thesis to be withheld until _ 14/05/2022___ ________________

for the following reason papers publication ______________________________

Signature: __ Email: mnaveed76@hotmail.com Date: 14/05/2019

(2) I further wish that full details of the title and subject of my thesis are not to be presented via the University Library's catalogue or repository or forwarded to any indexing or abstracting organisation until
_________________ for the following reason______________________________

Signature: ___________________________________ Date: ______________

Proper processing of the thesis for its long-term management cannot take place until this form has been completed and returned. If no form is returned to the doctoral college **within 2 months of submitting the thesis**, it will be assumed that the author consents to the thesis being made available.

Appendix C: Research Ethics Letter

UNIVERSITY OF Hull

Hull University Business School
Research Office
T +44(0)1482 463536
E david.griffiths@hull.ac.uk

Ref: HUBSREC 2016/26

19 December 2016

Dear Naveed

Re: Exploring Risk Management and Financial Sustainability of Business Models of Logistics Service Providers (LSPs) in a Region Highly Affected by Terrorism

Thank you for your research ethics application.

I am pleased to inform you that on behalf of the Business School Research Ethics Committee at the University of Hull, Dr Ashish Dwivedi has approved your application on Monday 19th December 2016.

I wish you every success with your research.

Yours sincerely,

David Griffiths
Secretary,
Research Ethics Committee

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Appendix D: Invitation Letter for Research Participation

UNIVERSITY OF Hull

Subject: INVITATION LETTER FOR RESEARCH PARTICIPANTS

Research project titled "Terrorism Affected Regions: The Impact of Different Supply Chain Risk Management Strategies on Financial Performance".

Dear Sir/ Madam,

We are conducting skype interviews as part of a research study to explore supply chain risks and risk management strategies in this region. As a practitioner, you are in an ideal position to give us valuable first-hand information from your own perspective. The interview takes around 50 minutes and is very informal.

We are simply trying to capture your thoughts and perspectives on supply chain risk and risk management strategies its impact on financial performance of business. Your responses to the questions will be kept confidential. Each interview will be assigned a number code for anonimisation in the published research. There is no compensation for participating in this study. However, your participation will be a valuable addition to our research and findings could lead to greater understanding of supply chain risk management, risk management strategies and its impact on financial performance in a terrorism affected region.

If you are willing to participate could you please indicate your consent to be interviewed on the attached form and contact me so that we can arrange a day and time that is convenient for you to speak with me on Skype.

Many thanks in advance for your valuable inputs. I highly appreciate your time to help me in this Skype interview. If you need further information, please do not hesitate to contact me/my supervisors.

I ……., consent to participate in the research conducted by Muhammad Naveed Khan, I have understood the nature of this project and wish to participate. I am not waiving any of my legal rights by signing this form. My signature below indicates my consent.

Signature _____ **Date** _____

Participant

Signature _____ **Date** _____

Principal Investigator

Yours sincerely

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Appendix E: Scales and Measurement Items

No	Items	Source
SC Security Strategies (1: Strongly disagree; 7, Strongly agree)		
SCS1	Our company has a function that specializes in supply chain security	Park et al. (2016)
SCS2	Our company installed security equipment's (e.g. CCTV, GPS trackers, walk through gate, search lights etc.	Interviews
SCS3	Our company hires own and private security guards.	Interviews
SCS4	Our company hires security escort for vehicles	Interviews
SCS5	Our company's vehicles travelling in daylight	Interviews
SCS6	Our company used alternative routes in case of security threats	Interviews
SCS7	Our company adopt scouting strategy	Interviews
SCS8	Our company camouflage their vehicles	Interviews
SCS9	Our company installed a 24hr camera system or CCTV	Yang & Wei (2013)
SCS10	Our company records the entry/exit of people	Yang & Wei (2013)
SCS11	Our company records the entry/exit of vehicles	Yang & Wei (2013)
SCS12	Our company follows government or industry initiated security guidelines (e.g., C-PAT, CSI, FAST, and AMR)	Park et al. (2016)
SCS13	Our company avoids travels through high-risk areas	Interviews
Information Sharing Strategies (1: Strongly disagree; 7, Strongly agree)		
IS1	Our company exchanges more information with our partners	Yu et al. (2018)
IS2	Our company exchanges more information with security forces (e.g. Police, Customs, Army)	Yang & Wei (2013)
IS3	Our company obtains transportation information from supplier	Chen et al. (2004) Wei et al. (2012)
IS4	Our company provides security information concerning deliveries to customers	Zhao et al. (2013)
IS5	Our company shares security related information with employees	Yang & Wei (2013)
Coordination strategies (1: Strongly disagree; 7, Strongly agree)		
SCC1	Our company is effective in coordinating activities with our partners	Yu et al. (2018)
SCC2	Our company has effective internal coordination with our employees regarding the security threats	Martens et al. (2011)
SCC3	Our company effectively coordinates external activities with our supply chain partners regarding the security threats	Martens et al. (2011)
SCC4	Our company is effective in coordinating activities with the relevant government agencies (e.g. customs, the federal board of revenue (FBR), provincial transport authority)	Pettit et al. (2013)

SCC5	Our company effectively coordinates activities with relevant government agencies regarding the security threats (e.g. Police and the Army)	Pettit et al. (2013)
SCC6	Our company is willing to make cooperative changes with our contingency planning partners	Zsidisin & Ritchie (2008)

Risk Sharing Strategies (1: Strongly disagree; 7, Strongly agree)		
RS1	Our company utilizes a strategy of sharing supply chain risk with our supply chain partners (e.g., buy-back agreements, cost/revenue sharing, loss sharing).	Fan et al. (2017)
RS2	Our company has risk management contract that define responsibilities for each partners	Speier et al. (2011)
RS3	Our company has formal mechanisms (e.g., buy-back agreement) to share risk with our supply chain partners	Fan et al. (2017)
RS4	Our company has informal mechanisms (e.g., verbal commitment) to share risk with our supply chain partners	Fan et al. (2017)
RS5	Our company has wildly accepted risk-sharing mechanisms with our supply chain partners	Fan et al. (2017)
RS5	Our company insures against supply chain related risks, when possible	Zsidisin & Ritchie (2008)
RS6	Our company purchases business insurance	Meuwissen et al. (2001)
RS7	Our company purchases insurance for our employees	Meuwissen et al. (2001)

Facilitation Payment Strategy (1: Strongly disagree; 7, Strongly agree)		
FPS1	How often, if ever, a public official asked your company for a facilitation payment in return for a service in the last years?	Rotondi & Stanca (2015)
FPS2	How often, if ever, other company employees asked yours company for a facilitation payment in return for a business contract in the last years?	Rotondi & Stanca (2015)
FPS3	Our company is often required to make facilitation payments to public officials to deal with (e.g., police, customs, taxes, licenses authority)	Fisman & Svensson (2007)
FPS4	The facilitation payment is an effective supply chain risk strategy for clearances (e.g., custom clearness, police check post, public offices)	Fisman & Svensson (2007)
FPS5	The facilitation payment is useful everywhere	Interviews
FPS6	The facilitation payment is an effective strategy against terrorism risk (e.g., payment to Taliban and other terrorist groups for vehicles security)	Interviews
FPS7	The facilitation payment is a way of doing business in this area	Interviews

Supply chain Finance (1: Strongly disagree; 7, Strongly agree)		
SCF1	Our company always ensures sufficient liquidity	Interviews
SCF2	Our company has arrangements with financial institutions regarding working capital risk	Interviews
SCF3	Our company evaluates customer's credit scores	Interviews
SCF4	Our company always ask for advance security payment	Interviews
SCF5	Our company works with trustworthy customers	Interviews
SCF6	Our company links the prices with foreign currency rate	Interviews
SCF7	Our company adopts financial hedging (investment) strategies	Interviews
SCF8	Our supply chain has transparency in payment processes	Wuttke et al. (2013b)
SCF9	Our supply chain partners provide flexibility for payment processes	Wuttke et al. (2013b) Caniato et al. (2016)
SCF10	Our financially strong supply chain partners provide credit to support small (less financially strong) supply chain partners	Wuttke et al. (2013b)
SCF11	Financial institutes also give loans to our supply chain partners based on easy terms (e.g., offering low interest rates)	Wuttke et al. (2013b) Caniato et al. (2016)
SCF12	Our financially strong supply chain partners provide advanced payments to support small supply chain partners	Caniato et al. (2016)
SCF13	Our contracts facilitate financial flows between our supply chain partners	Wuttke et al. (2013a)
SCF14	We along with our supply chain partners reduce end-to-end supply chain cost by effectively managing financial flows	Wuttke et al. (2013a)
SCF15	We along with our supply chain partners improve end-to-end supply chain working capital	Wuttke et al. (2013b)
SCF16	We share supply chain finance risk among supply chain partners	Wandfluh et al. (2016)
SCF17	Our financial collaboration with our supply chain partners streamlines our supply chain cash-flows	Wandfluh et al. (2016)
SCF18	Our financial collaboration support end-to-end shipment procedures (i.e., raw material, purchasing, in-transit processes and after sales services)	More & Basu (2013) Wandfluh et al. (2016)

Financial Performance (1: Strongly disagree; 7, Strongly agree)		
FP1	Our company growth of sales is increasing.	Lai et al. (2007) Liu & Lyons (2011) Yu et al. (2017)
FP2	Our company growth of revenue is increasing	Lai et al. (2007) Liu & Lyons (2011) Yu et al. (2017)
FP3	Our company return on investment (ROI) is increasing.	Chen et al. (2004) Wu et al. (2006) Yang (2016)
FP4	Our company return on asset (ROA) is increasing	Yang (2016) Yu et al. (2017)
FP5	Our company profitability is increasing	Chen et al. (2004) Wu et al. (2006) Liu & Lyons (2011)

Appendix F: Questionnaire

UNIVERSITY OF Hull

Questionnaire

1. General questions, please indicate the most appropriate answers to the following questions/statements regarding you and your company.

Please tick the industry your company is placed in.			
(1) Finished Goods Manufacturer		(2) Half-finished Goods Manufacturer	
(3) Raw Material Exporter/Importer		(4) Trading Company	
(5) 3PL Provider		(6) International Freight Forwarder	
(7) Automobiles		(8) Other, please specify ……	
Please tick the annual sales (million) that applies to your company for 2017.			
(1) Less than PKR 250m	(2) PKR 251m – PKR 500m		(3) Over PKR 500 m
How many employees does your company have?			
(1) Less than 50	(2) 51 – 100		(3) Over 100
How many containers does your company export/import or deliver per a month?			
(1) Less than 5	(2) 5 – 20		(3) 21- 50
(4) 51 – 100	(5) Over 100		
What is your job title in the company?			
(1) CEO	(2) Director	(3) Supply chain / Logistics Manager	
(4) General Manager	(5) Finance Manager	(6) Other, please specify ……	
How many years have you worked in the logistics/ supply chain-related industry?			
1) Less than 4 years	(2) 4 - 7 years		(3) 8 - 11 years
(4) 12 - 15 years	(5) 16 - 19 years		(6) Over 20 years

2. Please indicate whether you agree or disagree with the following statements regarding the **use/practice** of the following strategies.

1	2	3	4	5	6	7
Strongly Disagree	**Moderately Disagree**	**Slightly Disagree**	**Neither Agree nor Disagree**	**Slightly Agree**	**Moderately Agree**	**Strongly Agree**

Supply Chain Security Strategies							
Our company,	Strongly Disagree <-> Strongly Agree						
has a function that specializes in supply chain security	1	2	3	4	5	6	7
uses security equipment (e.g CCTV, GPS trackers, walk through gate, search lights etc.)	1	2	3	4	5	6	7
hires security guards	1	2	3	4	5	6	7
hires security escort for vehicles	1	2	3	4	5	6	7
vehicles travelling in daylight	1	2	3	4	5	6	7
utilizes alternative routes as security measures	1	2	3	4	5	6	7
adopts the scouting (clearing and moving) strategy	1	2	3	4	5	6	7
camouflages company's vehicles	1	2	3	4	5	6	7
operates a 24hr CCTV	1	2	3	4	5	6	7
records the entry/exit of people	1	2	3	4	5	6	7
records the entry/exit of vehicles	1	2	3	4	5	6	7
follows industry initiated security guidelines (e.g., C-PAT, CSI, FAST, and AMR)	1	2	3	4	5	6	7
avoids travels through high-risk areas	1	2	3	4	5	6	7
Information Sharing Strategies							
Our company,	Strongly Disagree <-> Strongly Agree						
exchanges more information with our partners	1	2	3	4	5	6	7
exchanges more information with security forces (e.g. Police, Customs, Army)	1	2	3	4	5	6	7
obtains transportation information from supplier	1	2	3	4	5	6	7
provides security information concerning deliveries to customers	1	2	3	4	5	6	7

shares security related information with employees	1	2	3	4	5	6	7
Supply Chain Coordination Strategies							
Our company,	Strongly Disagree <-> Strongly Agree						
is effective in coordinating activities with our partners	1	2	3	4	5	6	7
has effective internal coordination with our employees regarding the security threats	1	2	3	4	5	6	7
effectively coordinates external activities with our supply chain partners regarding the security threats	1	2	3	4	5	6	7
is effective in coordinating activities with the relevant government agencies (e.g. customs, the federal board of revenue (FBR), provincial transport authority)	1	2	3	4	5	6	7
effectively coordinates activities with relevant government agencies regarding the security threats (e.g. Police and the Army)	1	2	3	4	5	6	7
is willing to make cooperative changes with our contingency planning partners	1	2	3	4	5	6	7
Risk Sharing Strategies							
Our company,	Strongly Disagree <-> Strongly Agree						
utilizes a strategy of sharing supply chain risk with our supply chain partners (e.g., buy-back agreements, cost/revenue sharing, loss sharing).	1	2	3	4	5	6	7
has risk management contract that define responsibilities for each partners	1	2	3	4	5	6	7
has formal mechanisms (e.g., buy-back agreement) to share risk with our supply chain partners	1	2	3	4	5	6	7
has informal mechanisms (e.g., verbal commitment) to share risk with our supply chain partners	1	2	3	4	5	6	7
has wildly accepted risk-sharing mechanisms with our supply chain partners	1	2	3	4	5	6	7
insures against supply chain related risks, when possible	1	2	3	4	5	6	7
purchases business insurance	1	2	3	4	5	6	7
purchases insurance for our employees	1	2	3	4	5	6	7
Supply Chain Financial Risk Strategies							
Our company,	Strongly Disagree <-> Strongly Agree						

has sufficient funds in banks for financial risk	1	2	3	4	5	6	7
always ensures sufficient liquidity	1	2	3	4	5	6	7
has arrangements with financial institutions regarding working capital risk	1	2	3	4	5	6	7
evaluates customer's credit scores	1	2	3	4	5	6	7
always ask for advance security payment	1	2	3	4	5	6	7
works with trustworthy customers	1	2	3	4	5	6	7
links the prices with foreign currency rate	1	2	3	4	5	6	7
adopts financial hedging (investment) strategies	1	2	3	4	5	6	7
Supply chain Finance							
	Strongly Disagree <->Strongly Agree						
Our supply chain has transparency in payment processes	1	2	3	4	5	6	7
Our supply chain partners provide flexibility for payment processes	1	2	3	4	5	6	7
Our financially strong supply chain partners provide credit to support small (less financially strong) supply chain partners	1	2	3	4	5	6	7
Financial institutes also give loans to our supply chain partners based on easy terms (e.g., offering low interest rates)	1	2	3	4	5	6	7
Our financially strong supply chain partners provide advanced payments to support small supply chain partners	1	2	3	4	5	6	7
Our contracts facilitate financial flows between our supply chain partners	1	2	3	4	5	6	7
We along with our supply chain partners reduce end-to-end supply chain cost by effectively managing financial flows	1	2	3	4	5	6	7
We along with our supply chain partners improve end-to-end supply chain working capital	1	2	3	4	5	6	7
We share supply chain finance risk among supply chain partners	1	2	3	4	5	6	7
Our financial collaboration with our supply chain partners streamlines our supply chain cash-flows	1	2	3	4	5	6	7
Our financial collaboration supports end-to-end shipment procedures (i.e., raw material, purchasing, in-transit processes and after sales services)	1	2	3	4	5	6	7
Financial Performance							
Our company's,	Strongly Disagree <->Strongly Agree						
growth of sales is increasing.	1	2	3	4	5	6	7
growth of revenue is increasing.	1	2	3	4	5	6	7
return on investment (ROI) is increasing.	1	2	3	4	5	6	7
return on asset (ROA) is increasing.	1	2	3	4	5	6	7
market share is increasing.	1	2	3	4	5	6	7
profitability is increasing.	1	2	3	4	5	6	7

Facilitation Payment Strategy (Bribe)							
	Strongly Disagree <->Strongly Agree						
Our company is often required to make facilitation payments to public officials to deal with (e.g., police, customs, taxes, licenses authority)	1	2	3	4	5	6	7
The facilitation payment is an effective supply chain risk strategy for clearances (e.g., custom clearness, police check post, public offices)	1	2	3	4	5	6	7
The facilitation payment is useful everywhere	1	2	3	4	5	6	7
The facilitation payment is an effective strategy against terrorism risk (e.g., payment to Taliban and other terrorist groups for vehicles security)	1	2	3	4	5	6	7
The facilitation payment is a way of doing business in this area	1	2	3	4	5	6	7

3. Please indicate whether you agree or disagree with the following statements regarding the **use/practices** of the following strategies.

1	**2**	**3**	**4**	**5**	**6**	**7**
Never	**Rarely**	**Occasionally**	**Sometimes**	**Frequently**	**Usually**	**Every time**

	Never < ---> Every time						
How often, if ever, a public official asked your company for a facilitation payment in return for a service in the last years?	1	2	3	4	5	6	7
How often, if ever, other company employees asked yours company for a facilitation payment in return for a business contract in the last years?	1	2	3	4	5	6	7

.....End of questions.....

Thank you for taking the time to complete this questionnaire and assistance in this research. Please be assured that all information obtained will remain **confidential**. If you would like the results to be sent to you, then please insert your personal details below. **These details will be stored separately from the questionnaire responses in order to maintain confidentially**.

Name:	
Designation/Job Tittle:	
Company	
Phone	
Fax Number	
E-mail:	

Appendix G: Descriptive Statistics

The Descriptive Statistics of Items

Items	**Statistics**	
	Mean	**Std. Dev.**
	Information Sharing	
IS1	5.2	1.3
IS2	5.0	1.3
IS3	5.7	1.1
IS4	5.3	1.3
IS5	5.5	1.2
	Supply Chain Coordination	
SCC1	5.3	1.3
SCC2	5.4	1.1
SCC3	5.1	1.1
SCC4	5.0	1.2
SCC5	5.0	1.3
SCC6	5.0	1.2
	Risk Sharing	
RS1	4.9	1.4
RS2	5.2	1.3
RS3	4.8	1.4
RS4	4.6	1.4
RS5	4.7	1.3
RS6	5.1	1.2
RS7	5.5	1.1
RS8	4.6	1.8
	Supply Chain Finance	
SCF1	5.3	1.3
SCF2	5.2	1.3
SCF3	4.8	1.5
SCF4	4.2	1.8
SCF5	4.7	1.6
SCF6	5.3	1.4
SCF7	4.9	1.6
SCF8	4.6	1.5
SCF9	5.4	1.3
SCF10	5.4	1.1
SCF11	4.8	1.3
SCF12	4.5	1.3
SCF13	4.4	1.2
SCF14	4.6	1.2
SCF15	4.9	1.4
SCF16	4.7	1.2
SCF17	4.7	1.3
SCF18	4.8	1.3
SCF19	4.8	1.4

	Supply Chain Security	
SCS1	3.9	1.6
SCS2	4.8	1.7
SCS3	5.2	1.4
SCS4	4.0	1.6
SCS5	4.6	1.3
SCS6	4.9	1.2
SCS7	4.5	1.3
SCS8	3.5	1.9
SCS9	5.1	1.4
SCS10	4.9	1.6
SCS11	5.5	1.3
SCS12	4.7	1.3
SCS13	5.4	1.4
	Facilitation Payment Strategy	
FPS1	4.2	1.8
FPS2	4.2	1.7
FPS3	4.1	1.7
FPS4	2.9	2.1
FPS5	4.1	1.7
FPS6	3.8	1.5
FPS7	3.8	1.5
	Financial Performance	
FP1	5.1	1.3
FP2	5.3	1.2
FP3	5.2	1.2
FP4	5.1	1.1
FP5	5.3	1.1
FP6	5.1	1.1