An Analysis of Barriers to Supply Chain Management Performance in Saudi Arabia

Muslem Alhashim

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An Analysis of Barriers to Supply Chain Management Performance in Saudi Arabia

By Muslem Alhashim M.S., B.A.

Dublin City University Business School

Supervisor: Professor. PJ Byrne and Professor. Vikas Kumar

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Declaration

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Signed: Muslem Alhashim   ID No: 12211093   Date: 12.01.2018

In memory of my father; Jawad Alhashim

Acknowledgements

Table of Contents

List of Tables

List of Figures

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Muslem Alhashim

Abstract

Supply Chain Management is relatively new to Saudi Arabia. The application of its processes and practices requires setting the right foundations on which managers can run a successful supply chain. Recently, Saudi Arabia started a series of improvements in infrastructure and economy which should massively help Supply Chain Management. However, not knowing the challenges developers may miss improving issues in relation to the Supply Chain cycle. This study is concerned with the assessment of Supply Chain Management barriers in Saudi Arabia.

The approach of this research is a mixed method that applies a survey and semi-structured-interviews. The primary method is the survey where respondents were asked to rate the influence of a set of previously identified barriers which were extracted from literature. The interviews were structured to support collected data from the survey and they were conducted at a consecutive stage. Usable survey responses included in this study are 181. To support the survey data 15 interviews were conducted. The survey data was quantitatively analysed utilising factor analysis, regressions and mediation analysis. The interview data was qualitatively analysed using thematic analysis method.

The study specifically investigates the effects of culture, organisational structure, information sharing, connectedness and purchase & supply practices on Supply Chain performance. Findings from the survey data confirmed most proposed assumptions about the

barriers. In addition to confirming the influence of barriers the interview data resulted in the identification of additional themes like policies and regulations as being challenges to effective Supply Chain Management. The identification of additional themes indicates that they can be more of current concern as compared to the survey issues which may be more of traditional barriers.

CHAPTER ONE: INTRODUCTION

1.1 RESEARCH BACKGROUND

Supply chain management (SCM) is now not a new domain having initially come to prominence in the 1980s. Since its inception, supply chain management has continued to evolve, grow, and expand as is evident by the continued number of published research articles and dedicated journals in the discipline. Researchers' interest has been changing which can indicate future directions of research focus. The emergence of personal computers in the 1980s provided better access to decision making and planning tools for logistics, integration and international supply chain management (Oliver and Weber, 1982; Houlihan, 1985; Stevens, 1989). In the 1990s, interest in supply chain management has increased alongside the continuous evolution of technology which led to increased interest in interacting and connecting supply chains. Topics in relation to information sharing, connectedness and green supply chain management have come to prominence in the 1990s (Thomas and Griffin, 1996; Lee, Padmanabhan and Whang, 1997; Beamon, 1999a). Globalization and free trade agreements have shifted the research focus in the 2000s to address issues in relation to information technology, collaboration, sustainability and supply chain performance (Bose, Pal and Ye, 2008; Gold, Seuring and Beske, 2010; Vanichchinchai and Igel, 2011).

International trade, and the production of goods and services, has been evolving rapidly over this time, with suppliers, manufacturers, couriers, and customers all gaining competitive advantage from free trade agreements. Because firms continue to seek greater benefits and profit, supply chain management has become an essential part of managing business processes at an international level, through improving different aspects of the supply chain, which can provide

increasing levels of competitive advantage (Cheng, Lee and Chen, 2014; Kache and Seuring, 2014).

However, the changing nature of different regions around the world creates numerous ways of bringing about change, which can enhance supply chain performance. Differences of culture, organisational governance, and regulations have close connections to managing supply chains in diverse parts of the world (Cadden *et al.*, 2010; Cadden, Marshall and Cao, 2013). One such area is the Middle East (ME), which is one of the fastest growing regions presently, witness supply chain management growth, both in practice and in applications. In recognition of this changing position, one such region in the Middle East, Saudi Arabia, has formed Government policy, specifically targeting supply chain (SC) growth and evolution.

In an effort to decrease dependency on oil production, the Saudi government has proposed the Transformation Programme of 2020, which aims to diversify sources of income. Improving competitive advantages of supply chains operating in the country is an essential component of this programme, to leverage its unique location, working as a regional supply chain and logistics centre (Vision, 2016). The transformation includes, improving supply chain related infrastructure across the country, and the development is focused on services and infrastructure that facilitate supply chain management operations such as landlines, airports, seaports, and railways. Although this programme is an essential step forward towards transformation, it is also important to recognise that this part of the world is relatively new to modern supply chain management practices.

Supply chain management has been studied by a wide array of researchers, who explored various dimensions of the supply chain, such as performance, integration, information

technology, e-SCM, organisational structure, coordination, and green supply chain management (Wu and Chang, 2012; Wu, Chuang and Hsu, 2014; Kumar, Mukherjee and Adlakha, 2015; Saldanha, Mello and Knemeyer, 2015; Wang, 2015). These are interconnected aspects of the supply chain, which are closely related to people and the regional culture. Therefore, supply chain effectiveness can vary in different parts of the world (Fawcett, Magnan and McCarter, 2008; Zhao *et al.*, 2008). As modern supply chain management is in its infancy in Saudi Arabia, it faces different challenges, compared to supply chains in other parts of the world, such as in Western countries. In such Western countries supply chain management practices have evolved and developed through practice and study over recent decades. This study both tests and reveals that supply chain management barriers in emerging supply chain management markets such as Saudi Arabia, are not well understood and researched. This research explores the challenges to supply chain performance in the context of Saudi Arabia as a country transitioning itself from its position as a practice based modern supply chain management novice towards a competent performer and further on towards a leading international nation. This research will contribute to the literature on both supply chain management and supply chain performance.

1.2 RESEARCH CONTEXT

The primary aim of this thesis is to empirically test barriers to effective supply chain management, with a particular focus on the practices of nations transitioning from supply chain management practice novice. For this study Saudi Arabia has been selected as the context for this thesis, for two primary reasons: 1) Saudi Arabia is part of an evolving region that is only newly adopting modern supply chain management, and 2) the country has a Government policy specifically targeting supply chain growth and evolution (Vision, 2016). There is also the

additional benefit, of this research, that understanding barriers to effective supply chain management can help improve growth and policy evolution. Thus, it is critical to identify such challenges facing supply chain management efficiency in the country.

Middle Eastern economies have been trading internationally for long periods of time as is the case for comparative Western economies. What differentiates Middle Eastern economies is the transition by Western economies towards formal supply chain management techniques in the 1980s. Countries in the ME, such as Saudi Arabia, have been continuing to trade with the international marketplace in a very traditional sense with only a recent recognition of the role of modern supply chain management and practices as evidenced by the Saudi National Transformation Plan and the Vision of 2030. With a recognition of the potential over reliance of oil production and a desire to take advantage of geographical location, modern supply chain management is only beginning to emerge in Saudi Arabia. Although the country has a number of advantages, such as, location, geography, a strong economy and stable international trade relations, these have not been well utilised in improving supply chain practice to modern international standards. Some of the potential aspects for improvement, as recognised in recent Saudi policy, include supply chain infrastructure, regulations, funding and the business environment.

In general, supply chain management can be very complex as it deals with upstream and downstream linkages of the chain. The process includes dealing with the diverse tiers along the supply chain. Successful management requires complexity and challenges associated with regional and international supply chains to be overcome.

1.3.1 Research Aims:

1. To identify the barriers to effective supply chain management in organisations operating within the Saudi Arabian market.

2. To investigate the influence of barriers to supply chain management on supply chain performance in organisations operating in Saudi Arabia.

1.3.2 Research objectives:

An analysis of the barriers to effective supply chain management is guided by four objectives: (1) to explain the relationship between supply chain management and supply chain performance in Saudi Arabia; (2) to present and discuss the current issues of supply chain performance; (3) to assess supply chain management practices in the Middle East, with a specific focus on Saudi Arabia; and (4) to identify challenges facing effective supply chain management which could potentially obstruct supply chain management in organisations operating in Saudi Arabia.

1.4 RESEARCH METHODOLOGY

Ontological and epistemological assumptions are taken from realism, where the quantitative and qualitative methods are not expected to encounter problems complementing each other (Sommer Harrits, 2011), which is fundamental in selecting this approach in conducting this research. This research takes a mixed-methods approach in answering the research questions which is a commonly used approach in supply chain management research. The quantitative study investigates challenges to effective supply chain management in Saudi Arabia. The survey method has been used to collect quantitative data which is used to validate,

confirm and expand the understanding in relation to barriers to supply chain management in Saudi Arabia. Semi-structured interviews were then used to expand on the survey findings while also providing deeper insight and better conceptualisation of the challenges.

Although the study has broader implications for countries across the ME, the scope of this thesis is limited to supply chain management professionals in Saudi Arabia. All respondents to both survey and interview were targeted based on their practical experience of Saudi supply chains. Candidates for the survey have significant experience and/or are directly working in supply chain management roles, and at the time of the survey working in Saudi Arabia. The survey participant list was developed as part of this study using two available sources: an official directory, which is produced by the Ministry of Commerce and Industry in Saudi Arabia, and a commercial directory, Daleeli 2013/2014. This list may not represent all Saudi supply chains but it is sufficient as a sample for this study as it represents diverse sectors and industries and is generally reflective of the country as a whole. Interview participants were supply chain professionals who have gained their experience from working directly in supply chain roles in Saudi Arabia. Interview questions were related to the barriers facing supply chain management, in Saudi Arabia. Data from the survey and the literature review were analysed and used for generating questions for the semi-structured interview questionnaire. The survey was distributed to 1300 potential respondents and resulted in 181 usable responses. This was then supplemented through the completion of fifteen semi structured interviews.

Many of the respondents organisations involved in this research have both internal and external supply chains that extend beyond their organisation or industry. Although the findings of the study were gained from a sample, the results can be generalised for the purpose of identifying barriers to supply chain performance in Saudi Arabia and be extended in concept to

the broader Middle Eastern region. Survey data was analysed using IBM SPSS Statistics 21 and IBM Amos 23, using factor analysis, regressions, mediation analysis, and structural equation modelling. Interview data was thematically analysed.

1.5 THESIS STRUCTURE

This thesis consists of seven interconnected chapters, which can be further categorised into two main parts. The first part introduces a detailed background literature, which underpins this thesis, while the second part presents the research undertaken.

1.5.1 Background Literature

Chapter Two - Chapter Two introduces a critical review of the relevant literature in order to locate and position the research gap. In this chapter, definitions of supply chain management, prominent dimensions, supply chain performance, and barriers to supply chain management are discussed. This discussion sets the stage for examining the influence of supply chain management barriers on supply chain performance. Then, the main research objectives are identified, which leads to the research hypotheses.

Chapter Three – Chapter Three discusses supply chain management in the Middle East, within the international trade environment. The chapter provides details on supply chain management in the region, before introducing the status of supply chain management in Saudi Arabia. This includes providing information on facilities, improvements, support and infrastructure, which were introduced to facilitate the flow of supply chains in the country.

1.5.2 Empirical Research

Chapter Four - Chapter Four illustrates the research strategy, which includes discussions on research design and methods used for this thesis. The chapter justifies the philosophical stance undertaken by the researcher and describes the approaches for data collection and analysis. It also discusses, in detail, how the data and results will be examined.

Chapter Five - Chapter Five is dedicated to analysing the quantitative data, which was collected in the first phase of the research. The chapter employs quantitative methods in analysing the survey data, including factor analysis, reliability tests, regression analysis and mediation analysis. The results are then explained and interpreted.

Chapter Six - Chapter Six is dedicated to analysing the qualitative data, which was collected in the second phase of the research. The chapter presents a thematic analysis of the qualitative data, which was collected via the semi-structured interviews. The analysis identifies the main themes from the collected data, which were collected via interviewing supply chain managers who accumulated knowledge and experience working in Saudi Arabia.

Chapter Seven – Chapter Seven discusses findings from the quantitative and the qualitative analysis. The chapter pulls together key findings across the two phases of the research, to propose a universal set of factors that can act as barriers to supply chain performance in Saudi Arabia. This final chapter concludes the research, along with a presentation on its significance, with scope for future research. Figure 1.1, below, provides an overview on the structure of this thesis.

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┌─────────────────┐      ┌─────────────────┐      ┌─────────────────┐
│                 │      │ Understanding of │      │                 │
│                 │      │ SCM              │      │                 │
│ Literature      │ ───▷ │ definitions, SC  │ ───▷ │ SCM in the      │
│ Review          │      │ dimesions,       │      │ Middle East     │
│                 │      │ SC performance   │      │ and Saudi Arabia│
│                 │      │ and SC barriers  │      │                 │
└─────────────────┘      └─────────────────┘      └─────────────────┘
        │
        ▽
┌─────────────────┐      ┌─────────────────┐      ┌─────────────────┐
│                 │      │                 │      │ Qualitative     │
│ Research        │ ───▷ │ Quantitative    │ ───▷ │ analysis of     │
│ Methodologies   │      │ analysis of     │      │ semi-structured │
│                 │      │ the survey data │      │ interview data  │
└─────────────────┘      └─────────────────┘      └─────────────────┘
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│                 │
│ Discussion on   │
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│ from resaerch   │
│ results         │
└─────────────────┘
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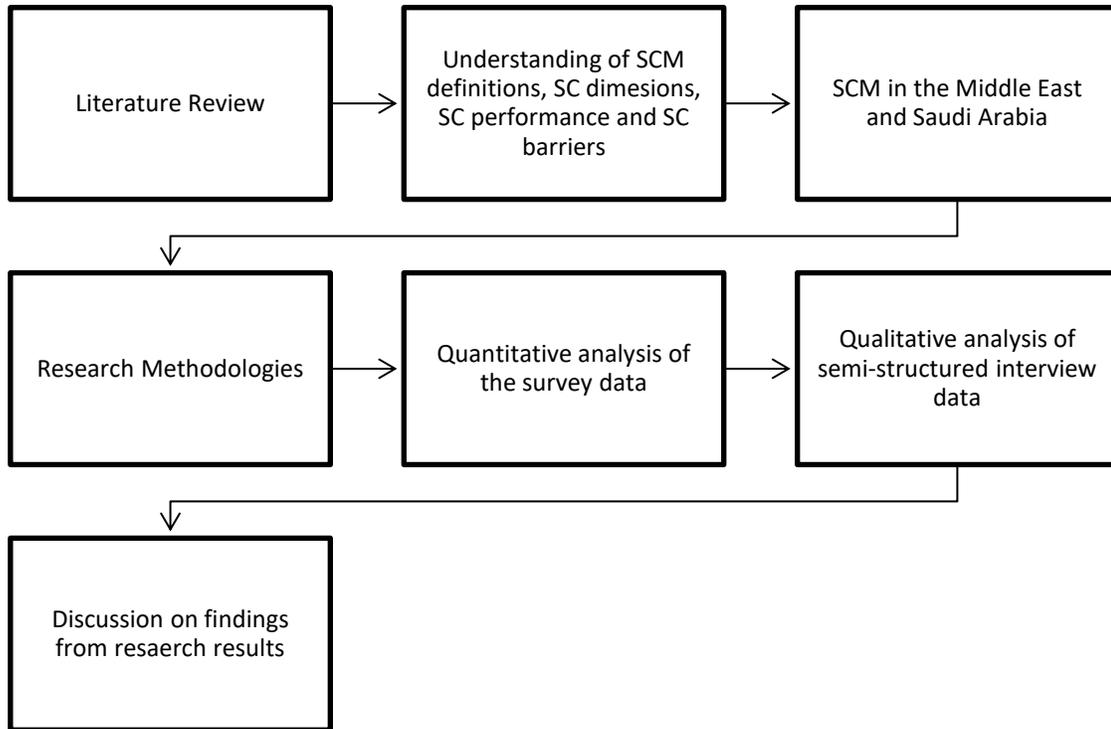
Figure 1. 1 The organisation of the thesis

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

The concept of supply chain management can be traced back to (Forrester, 1958, 1961), who suggested that successful industries are dependent on the interaction between flows of capital equipment, material, manpower, and information. Stevens (1989, P 3) defines the supply chain as a 'connected series of activities which is concerned with planning, coordinating and controlling material, parts and finished goods from suppliers to the customer'. Supply chain management is traditionally defined as 'the management of material and information flows both in and between facilities, such as vendors, manufacturing and assembly plants and distribution centres' (Thomas and Griffin, 1996). Supply chain management is a function that is mainly responsible for connecting business processes and functions within and across firms, to form an interconnected, highly performing business model (CSCMP 2017). Therefore, Heckmann, Comes and Nickel (2015) find that successful management of supply chains relies on three main objectives: functional supply chain operations, availability of resources, and demand satisfaction.

Since the inception of supply chain management, as a domain in the early 1980s, it has been studied by a wide array of researchers. Research in supply chain management has recently increased faster than ever (Soni and Kodali, 2012), with a wide range of studies covering various aspects of supply chain management practices and processes. Traditionally, supply chain management has been a melting pot of various aspects, with influences from logistics and transportation, operations management and materials and distribution management, marketing, as well as purchasing and information technology. Ideally, the all-encompassing philosophy of supply chain management embraces each of these functions to produce an overall supply chain

strategy that ultimately enhances firm performance (Giunipero *et al.*, 2008; Antonio and Borges, 2014; Muysinaliyev and Aktamov, 2014; Singla, 2016). In fact, supply chain management literature is still very fragmented and, despite several attempts to discuss supply chain aspects, the majority of conducted research only explores one linkage of the supply chain, or only focuses on a single component of supply chain performance (Bala, 2014; Oualid *et al.*, 2016).

The perception of supply chain management has moved from focusing on the flow of material and services to improving performance (Thomas and Griffin, 1996; David Simchi-Levi, Kaminsky and Simchi-Levi, 2003). Supply chain performance has gained its importance as a significant aspect of supply chain management because it is a key function in managing supply chains, which is clear from prominent definitions of the term (Walters and Lancaster, 2000; Mentzer *et al.*, 2001; David Simchi-Levi, Kaminsky and Simchi-Levi, 2003). Supply chain performance is embodied in the explored topics and position of supply chain management, which is a field that appears to have been evolving since the turn of the century. Therefore, research around this aspect has explored several dimensions such as organisational performance, culture and performance, managing performance, and performance measurement.

Manufacturers are required to find effective methods for keeping up with consumer expectations while maintaining reasonably low cost levels. With the fierce competition that is led by customer demand, businesses nowadays need to exert increased efforts to maintain competitive advantage (Oettmeier and Hofmann, 2016). This issue represents the rationale behind managing supply chains, as firms have to maintain a balance between interdependency and self-interest in a collective effort to enhance the overall supply chain performance (Yan and Nair, 2016).

Although some drawback effects can result in lower supply chain performance, barriers can be avoided by strategically taking the decision to apply the right organisational structure (Omar *et al.*, 2012). One of the challenges facing firms top management is employing the appropriate supply chain governance system while maintaining sustainable competitive advantage (Richey *et al.*, 2010). Successful businesses know their weakness and turn it into an opportunity, which is an important reason for studying barriers.

Supply chain management has never been as recognised as it is nowadays, where it has become an essential part of modern business (Matsuo, 2015). Successful corporations around the world such as Toyota, Unilever, McDonald's, and Amazon employ and depend on advanced and effective supply chains. Companies are now employing more supply chain managers than they have ever done before, with the number of supply chain managers in top firm offices more than doubling, recently (Roh, Krause and Swink, 2016). In a wider sense, competition has become supply chain to supply chain as opposed to the traditional way of firm to firm competition (Fang and Shou, 2015; Richey and Skinner, 2015).

Promising steps towards improving supply chains were taken by governments, who have been working on facilitating the flow of supply chains by enhancing drivers and eliminating barriers. Distribution systems and cooperatives have been created in countries such as Belgium, The Netherlands, Finland, and Germany. These actions were taken in line with fair trade initiatives to facilitate linking small-scale suppliers in developing countries with markets in developed countries (Vermeulen and Kok, 2012). Governments also intervene in supply chains by passing legislations, offering financial incentives to supply chain members to improve practices (Sheu and Chen, 2012), and by improving the supply chain infrastructure. In line with the global trend towards improving supply chains, the Saudi government has set a plan to

leverage its unique location and work as a regional supply chain and logistics centre (vision2030.gov.sa). This includes improving all supply chain related infrastructure across the country.

Positive involvement and contribution in improving supply chains requires clear identification of supply chain management, its dimensions and the challenges surrounding effective management of its processes. The importance of this study comes from the fact that identifying challenges is a preliminary stage towards eliminating barriers and creating a highly effective supply chain management environment. Therefore, the following section reviews definitions, prominent topics, and barriers to supply chain management.

2.2 SUPPLY CHAIN MANAGEMENT: DEFINITION AND PROMINENT DIMENSIONS

2.2.1 Definitions

Defining supply chain management has been an issue of disagreement between supply chain scholars and practitioners since the inception of the field, which has been represented by the inconsistency in defining what it is (Stock and Boyer, 2009; Naslund and Williamson, 2010; Muysinaliyev and Aktamov, 2014). The disagreement can be seen from the large number of definitions of the domain, and with major differentials between some. Although there have been a number of attempts to produce a comprehensive definition that works for supply chain management scholars and practitioners, it seems that more work needs to be done before a consensus definition for supply chain management will be reached (Giunipero *et al.*, 2008; Janvier-James, 2012).

In order to show that lack of agreement in describing supply chain management, Burgess, Singh and Koroglu, (2006) studied 100 supply chain management literature review papers and found that only one fourth of the papers cited previous definitions from the literature. It was also found that, within the same group, there was no definite agreement on one definition. Giunipero *et al.* (2008) and Ahi and Searcy (2013) further support this notion by highlighting that the supply chain management field is in a continuous redefinition of itself, however as Gibson, Mentzer and Cook (2005) point out, this lack of a supply chain management definition consensus is not surprising, given the age of the discipline. Table 2.1 presents a list of some commonly cited definitions which are extracted from literature review papers with their authorship, year of publication and citation maps.

Table 2.1 Common supply chain management definitions

Author	Year	Definition	Cited by
Walters and Lancaster	2000	The management of the interface relationships among key stakeholders and enterprise functions that occur in the maximization of value creation, which is driven by customer needs satisfaction and facilitated by efficient logistics management	(Stock and Boyer, 2009); (Kushwaha, 2012); (Ahi and Searcy, 2013); (Chetan *et al.*, 2016)
Simchi-Levi, David, Philip Kaminsky, and Edith Simchi-Levi	2000	Methods used to effectively coordinate suppliers, producers, depots, and stores, so that commodity is produced and distributed at the correct quantities, to the correct locations, and at the correct time, in order to reduce system costs while satisfying service level requirements.	(Fawcett and Magnan, 2001); (D Simchi-Levi, Kaminsky and Simchi-Levi, 2003); (Janvier-James, 2012); (Mbang, 2013)

Author	Year	Definition	Cited by
Mentzer, DeWitt, Keebler, Ming, Nix, Smith & Zacharia	2001	Systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain.	(Li, 2004); (Burgess, Singh and Koroglu, 2006); (Mentzer, Stank and Esper, 2008); (Giunipero *et al.*, 2008); (Stock and Boyer, 2009); (Johnson and Templar, 2011); (Chicksand *et al.*, 2012); (Kushwaha, 2012); (Ahi and Searcy, 2013); (Kiessling, 2015); (Nguyen and Nguyen, 2016) (Gurtu, Searcy and Jaber, 2017)
Elmuti	2002	SCM works to bring the supplier, the distributor, and the customer into one cohesive process	(Stock & Boyer 2009); (Gyaneshwar & Kushwaha 2012)
CSCMP Committee	2005	The planning and management of all activities involved in sourcing and procurement, conversion, and all logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners.	(Larson, Poist and Halldósson, 2007); (Mentzer, Stank and Esper, 2008); (CSCMP Committee 2008); (CSCMP Committee

Author	Year	Definition	Cited by
			2009);
			(Stock & Boyer 2009);
			(Awad and Nassar, 2010);
			(Banomyong and Supatn, 2011);
			(Janvier-James, 2012);
			(cscmp.org 2013);
			(Ahi and Searcy, 2013);
			(Shi and Yu, 2013);
			(Shivaditya, Seth and Tyagi, 2016);
			(CSCMP Committee 2017)

Two of the most cited definitions are the one proposed by Mentzer *et al.* (2001), as well as the definition developed by the CSCMP (2005). It is interesting to see these identical definitions reappear in newer publications of the same authors, such as Mentzer, Stank and Esper (2008) and CSCMP Committee (2009; cscmp.org 2013; CSCMP Committee 2017). This suggests that the definitions are still viable in representing the meaning of supply chain management (Stock & Boyer 2009; Gyaneshwar & Kushwaha 2012); although scholars indicate that the process of defining supply chain management is still evolving (Giunipero *et al.*, 2008; Stock and Boyer, 2009), with some sense that repeated use of definitions is an indication of a movement towards some form of consensus.

These popular definitions appear to have diverse core concepts. This can be seen in Table 2.1, where the first and second definitions in the table mark logistics as being the main constituent of the supply chain (Walters and Lancaster, 2000; David Simchi-Levi, Kaminsky and Simchi-Levi, 2003). The third clearly states that all practices are to serve performance at different levels (Mentzer *et al.*, 2001; Muysinaliyev and Aktamov, 2014). The fifth highlights the importance of coordination and collaboration in managing the supply chain (CSCMP Committee 2009). Other definitions focus on different aspects of the process, such as integration, value added, coordination and collaboration (Stock and Boyer, 2009; Janvier-James, 2012; Kushwaha, 2012). These aspects are deemed important performance components which shows a strong interconnection between supply chain management and supply chain performance (Flynn, Huo and Zhao, 2010; Sezhiyan, Page and Iskanius, 2011; Omar *et al.*, 2012; Wu, Chuang and Hsu, 2014).

The close relationship between supply chain performance and supply chain management have recently gained considerable research attention (Kumar and Nambirajan, 2013; Yang, 2013; Qrunfleh and Tarafdar, 2014). Therefore, it is important to state that, where researchers have attempted to define supply chain management, the main component from each of the observed definitions in Table 2.1 is produced through different lenses, often aligned with the researcher's own interests. Although the majority of definitions were developed in a relatively close timeframe, their focus can be seen to be quite diverse.

The goal of managing the supply chain is defined by Mentzer *et al.* (2001) as improving the performance of individual organisations and the whole supply chain in the long run. The main purpose of supply chain management, in the definition by David Simchi-Levi, Kaminsky and Simchi-Levi (2003) focuses on the overall effectiveness of the supply chain. Thus, this

suggests that boundaries to supply chain performance are also barriers to supply chain management.

Consequently, based on this close interconnection, this study examines barriers to highly effective supply chain management. Although supply chain performance is fundamental for examining barriers, other supply chain management dimensions cannot be ignored as it is well recognised that the supply chain is only as strong as its weakest link. The following section presents a discussion on prominent topics of supply chain management, which will support barrier assessment, showing the origins of the field, and it is likely future evolution.

2.2.2 Prominent dimensions

Following presentation of the interconnection between supply chain management and supply chain performance, it is important to examine how supply chain performance is situated within the body of supply chain management literature. In recent years, supply chain has gained increased interest with its evolution most prominent over the last few decades (Giunipero *et al.*, 2008). Increased research has been published on issues such as supply chain integration, supply chain performance, SCM-information technology, collaboration, and e-SCM (Wu and Chang, 2012; Wu, Chuang and Hsu, 2014; Kumar, Mukherjee and Adlakha, 2015; Saldanha, Mello and Knemeyer, 2015; Wang, 2015). In an evaluation of a large body of papers presenting a literature review of supply chain management, table 2.2 provides a snapshot of the most prominent topics studied since 2000.

The analysis of the topics was based on collective literature review papers over the study's timescale. In this time period there are vast quantities of papers covering the breath of topics in supply chain management, so to get a fuller understanding of the domain's evolution,

summary papers have been reviewed. Only topics that appear in three publications or more were considered prominent. The time period was divided into four shorter time buckets for the purpose of identifying the evolutionary path of the varying topics.

Table 2.2 Prominent topics in supply chain management domain

Topics	2000-2004	2005-2008	2009-2012	2013-2016	Frequency
Performance		(Kojima et al. 2008); (Zhu et al. 2005); (Eng 2006); (Hendricks et al. 2007); (Pal & Kumar 2008); (Chang et al. 2008); (Sharma et al. 2008)	(Deshpande 2012); (Janvier-James 2012); (Piriyakul 2011); (Vanichchinchai & Igel 2011); (Wu & Chang 2012); (Sang et al. 2008); (Sun et al. 2009); (Hsu et al. 2011); (Chavez et al. 2012)	(Hsu, Choon Tan and Laosirihongthong, 2014) (Kumar and Nambirajan, 2014) (Shi and Yu, 2013) (Hsu, Choon Tan and Laosirihongthong, 2014)	20
Integration	(Ho et al. 2002); (Svensson 2002); (Ovalle and Marquez, 2003)	(Bose et al. 2008); (Jüttner et al. 2007) (Persona *et al.*, 2007); (Damien Power, 2005)	(Chung et al. 2011); (Madhani 2010); (Talib et al. 2010) (Janvier-James, 2012); (Katunzi and Qin, 2010);	(Madhani, 2013) (Novak and Choi, 2015)	14
SCM-IT	(Damien Power, 2005)	(Blankley, 2008); (Borade and Bansod, 2008); (Lo, Hong and	(Chung et al. 2011); (Daghfous & Barkhi 2009); (Sang et al. 2008); (Su & Yang 2010)	(Hossain, Hasan and Ahmed, 2015)	11

Topics	2000-2004	2005-2008	2009-2012	2013-2016	Frequency
		Jeng, 2008); (Persona *et al.*, 2007); (Sohn and Lim, 2008)			
e-SCM	(Grieger, 2003)	(Bose et al. 2008); (Giménez & Lourenço 2008); (Bayraktar et al. 2008) (Lo, Hong and Jeng, 2008); (Persona *et al.*, 2007); (Wang & Zhang 2005); (Zhang & Li 2006)	(Wu & Chang 2012); (Zhang et al. 2011)	(Hwang and Lu, 2013)	11
SCM education	(Campbell, Goentzel and Savelsbergh, 2000)	(Om, Lee and Chang, 2007) (Om, Lee and Chang, 2007)	(Zeng and Johnson, 2009)	(Fawcett and Waller, 2015) (Carr, 2015) (Waller and Fawcett, 2014) (Rungtusanatham, Miller and Boyer, 2014) (Kaufmann and Saw, 2014) (Liu, Mckinnon and Mckinnon, 2016) (Hohenstein, Feisel and Hartmann, 2014)	11

Topics	2000-2004	2005-2008	2009-2012	2013-2016	Frequency
Sustainability		(Kouvelis, Chambers and Wang, 2006)	(Carter and Easton, 2011); (Gold, Seuring and Beske, 2010); (Seuring, 2011b); (Wittstruck and Teuteberg, 2012)	(Varsei, 2016) (Rose et al., 2016) (Alexander, Walker and Naim, 2014) (PANDEY, 2013)	9
Green SCM		(Srivastava, 2007); (Zhu, Sarkis and Geng, 2005)	(Sarkis, 2012); (Sarkis, Zhu and Lai, 2011)	(Wichmann, Carter and Kaufmann, 2015) (Shadikhodjaev, 2014) (Malviya and Kant, 2015) (Malviya and Kant, 2015) (Rubini, 2015)	9
Collaboration		(Borade and Bansod, 2008); (Won, Kwon and Han, 2007)	(Fayezi et al. 2012); (Gold et al. 2010); (Katunzi and Qin, 2010); (Noor & Pitt 2009); (Piriyakul 2011)		7
Uncertainty		(Chatzidimitriou *et al.*, 2008); (Kwon, Im and Lee, 2007)	(Fayezi, O'Loughlin and Zutshi, 2012); (Sun, Hsu and Hwang, 2009)		4
Coordination		(Eng, 2006); (Kouvelis, Chambers and Wang, 2006); (Lee and Kim, 2008)	(Jayant, Gupta and Garg, 2011)		4

Topics	2000-2004	2005-2008	2009-2012	2013-2016	Frequency
Risk SCM		(Kouvelis, Chambers and Wang, 2006)	(Aloini *et al.*, 2012); (Sharma and Bhat, 2009)		3

It appears, from Table 2.2 that interest over SCM topics has changed throughout the study period. Some new topics have evolved and some older topics have diminished as can be seen in the decreased number of studies. As is to be expected industry and scholarly interests evolve over time, thus prominent supply chain topics would not be expected to remain the same over the studied time period. However, some topics such as supply chain integration, e-SCM and education have been consistently attracting researchers' attention during the entire period of the study, while other topics such as green SCM, SCM-IT, collaboration, and performance have either not gained any interest in the first period or only attracted minimum attention.

Sustainability, risk SCM, uncertainty, coordination, and green SCM appeared in the second period and expanded in the third. Supply chain performance, integration, information technology, e,SCM, sustainability and green SCM continued to gain interest up to the end of the studied time period. This indicates that some topics might have not had enough time for expansion in such a short time and yet they are gaining more interest. Some topics such as collaboration, uncertainty, coordination and risk SCSM only appeared in the second and third periods which can indicate a shorter wave of interest over these topics. Risk SCM is the topic with the least interest, as it has only been discussed in three papers, with one in the second and two in the third periods This can also indicate that it is only appearing and it will witness more attention in the future.

It is interesting to notice that SC performance only appeared in the second time-period but gained much more interest than other topics, which puts it in the lead by a number of publications. Additional investigation of SC performance reveals different dimensions within the topic such as the cultural, the organisational, and the social issues. The following section presents a literary study of supply chain performance issues, which should create the base for measuring SCM barriers.

2.3 SUPPLY CHAIN PERFORMANCE

Supply chain performance refers to the general effectiveness and efficiency of supply chain management (Kumar & Nambirajan, 2013). Recent literature on supply chain performance presents discussions on a number of topics such as performance & culture (Kerstin Alfes *et al.*, 2013), managing performance (Guillaume, Knippenberg and Brodbeck, 2013; Wayne *et al.*, 2014), and measuring performance (Kumar and Nambirajan, 2013; Venkatesh and Ramachandran, 2014).

Due to the specific spectrum of this study, it is concerned with certain aspects of supply chain performance. These areas include culture, performance management, performance measurement and organisational performance (Carriere, 2014; Venkatesh & Ramachandran 2014; Yang 2013; Kumar & Nambirajan 2013). In this matter, the influence of societies, teams and individuals are examined to provide an understanding of their roles over performance (Kerstin Alfes *et al.*, 2013; Mell, Knippenberg and Ginkel, 2013; Peng and Yang, 2013). Managing performance is a vital issue in achieving the desired levels of efficiency in supply chains. The management of performance requires close attention to exterior factors such as the

surrounding environmental and social factors (Govindan *et al.*, 2014; Yawar and Seuring, 2015); and interior factors such as information systems and leadership (Melitski and Manoharan, 2014; Wayne *et al.*, 2014). Measuring performance is influenced by different factors related to the efficiency of the supply chain performance (Tillmann Böhme, 2009; Nudurupati *et al.*, 2011; Sarkis, 2012; Govindan *et al.*, 2014).

From a review of supply chain performance, it is possible to categorise its sub topics under managing performance, performance & culture, measuring performance, and organisational performance. Each of these dimensions will be expanded and presented as subcategories, as shown in figure 2.1.
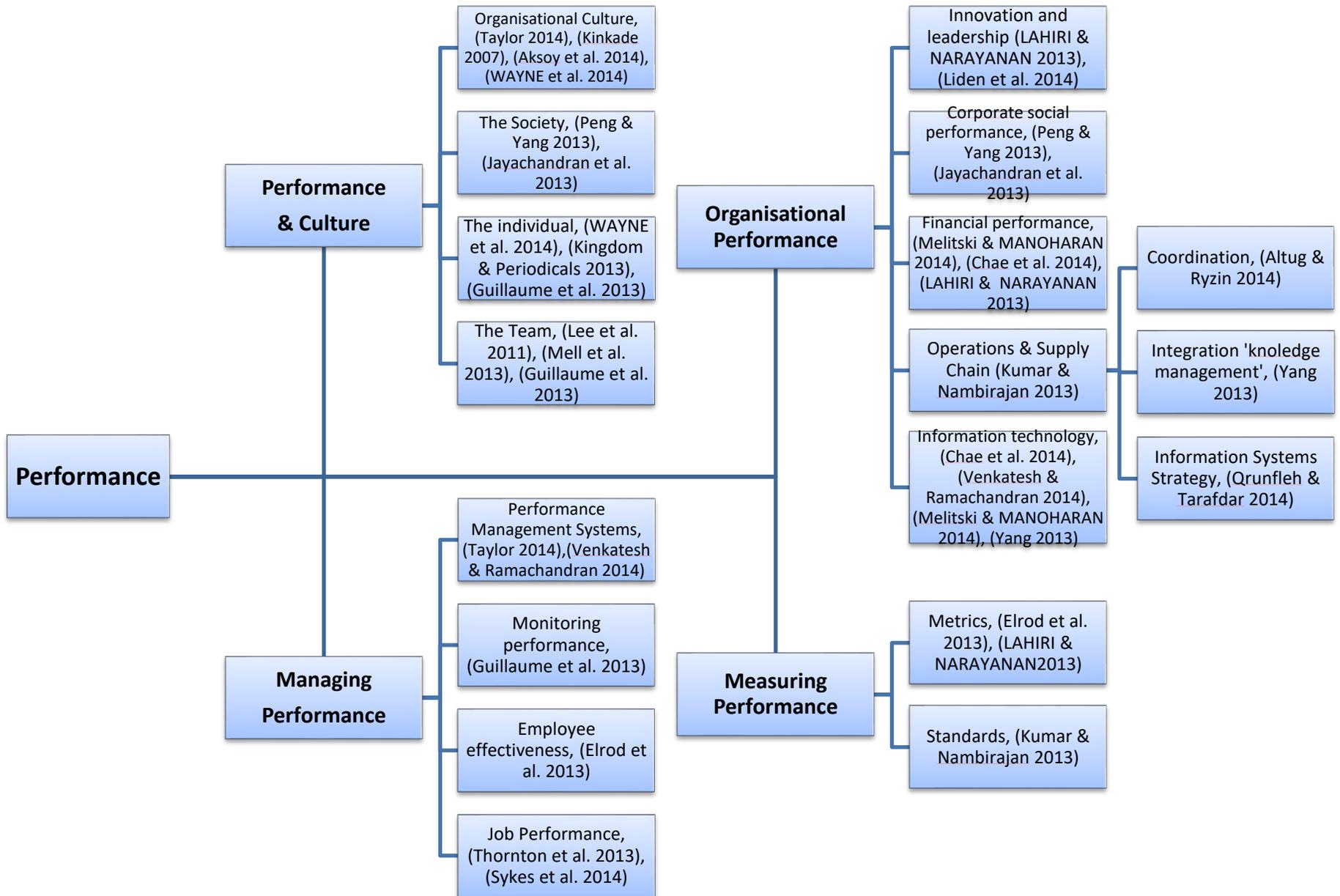
Figure 2.1 Supply chain performance dimensions

2.3.1 Performance and culture

2.3.1.1 Social performance

The influence of social traits, restrictions, behaviours, and beliefs can determine to a certain extent the level of work efficiency (Distelhorst, Hainmueller and Locke, 2014). This is supported by the belief that differences that are influenced by status, such as job, income, education or inheritance can play a recognisable role in determining how employees perform (Gray and Kish-gephart, 2013). It is noted that people of higher social status tend to perform better in teams consisting of individuals who are from similar cultural backgrounds, while the performance of individuals from lower social status do not seem to be affected by being in a team of people from dissimilar cultural backgrounds (Guillaume, Knippenberg and Brodbeck, 2013). In a study on people's performance, Su and Chen (2013) concluded that individuals in collectivist societies perform better in teams because their social values embrace the achievement of the group more than individual success.

2.3.1.2 Team performance

Managing teams can influence the outcomes of their functions. Differences in team management can highlight different cultural perspectives. Teams are managed and influenced differently, depending on where they operate, and the origins of team members. Teams are known as being groups of people that connect various talents and skills to achieve a shared goal or purpose for the organisation for which they work (Lee *et al.*, 2011). Team performance is defined as the level to which the missions or goals of a team are accomplished. The team can be influenced by different practices such as the use of Centralised Transactive Memory System

structures that facilitate team access to relevant information, where integration and information sharing are required (Mell, Knippenberg and Ginkel, 2013).

As a consequence of advanced team performance, it is found that the quality of the service provided is improved, as it is significantly sensitive to team performance (Lee *et al.*, 2011). In an attempt to capture when and how teams of culturally different members may exert performance, Guillaume, Knippenberg and Brodbeck (2013) discuss the influence of cultural differences on team members. The study suggests that individuals of low cultural-status tend to show better performance under performance monitoring controls. This finding suggests that team performance is positively or negatively impacted by its members' level of effectiveness within a culturally dissimilar team.

2.3.1.3 Individual performance

Individual performance is not disconnected from its surrounding factors. More specifically, it is believed that culture affects productivity within the national economy at the individual level, leaving its influence on people's wealth (Jurkiewicz and Giacalone, 2004). Performance of employees in an organisation is affected by a number of different factors such as the culture with which they are associated, the organisational culture and the leadership (Wayne *et al.*, 2014). One of the influential leadership styles is the servant leadership style, which encourages individuals to prioritise organisational or cultural benefits. Individuals are noticed to be positively influenced by such leadership, by being supportive, cooperative, and caring within their teams, which can improve performance (Wayne *et al.*, 2014).

In contrast, individual employees may not be willing to share and exchange information with co-workers. This protective tendency can come from the need to obtain power or position

by safeguarding information (Mell, Knippenberg and Ginkel, 2013). Nevertheless, individuals with higher levels of Meta-knowledge "knowledge of know how" tend to be more willing to encourage information processing and exchange, which improve performance (Mell, Knippenberg and Ginkel, 2013).

As mentioned earlier, team performance is influenced by its members' cultural-status dissimilarity. Individual performance is believed to be the driver for that influence (Guillaume, Knippenberg and Brodbeck, 2013). Team members with lower cultural-status were found to perform better in culturally different teams where, in contrast, individuals within the team with high cultural-status were found to show lower levels of effectiveness (Guillaume, Knippenberg and Brodbeck, 2013). Teams and individuals constitute the social working personnel of the organisation, who interact with the surrounding business environments. Such representation is important to the general performance of the organisation, which will be addressed in the next section.

2.3.2 Organisational performance

Literature on supply chain organisational performance has been reviewed by Kumar and Nambirajan (2013), showing that scholars examined the influence of supply chain management dimensions on its performance and their influence on the overall performance of the firm. Integrating the supply chain is believed to positively influence firm performance, in addition, supply chain strategy is found as having a direct and indirect impact over organisational performance (Kumar and Nambirajan, 2013). Altug and Ryzin (2014) view coordinating the supply chain via revenue sharing as a successful tool to enhancing SC performance under the condition that added value outweighs added cost. Organisational performance measures the

extent to which an organisation accomplishes its financial objectives and the market oriented objectives (Kumar and Nambirajan, 2013).

This section discusses issues including organisational culture, financial performance, corporate social performance, and performance information technology (Giannakis, Doran and Chen, 2012; Jayachandran, Kalaignanam and Eilert, 2013; Chae, Koh and Prybutok, 2014; Melitski and Manoharan, 2014; Wayne *et al.*, 2014). The discussion presents arguments on the effectiveness of each of the variants towards achieving the aims of improving SC performance.

2.3.2.1 Organisational culture

Organisational culture is a system that is socially accepted by members of the organisation and it is the system that governs the behaviours of individuals in relation to a given entity (Aksoy et al. 2014). Such a controlling system determines how members of the organisation interact with other businesses. In similar cultures, issues that influence performance might not arise as repeatedly as in dealing with firms of dissimilar cultural backgrounds (Giannakis, Doran and Chen, 2012).

This affirms that, at the international level, it is crucial for supply chain managers to consider successful business relationships, as they can perpetuate a sustaining atmosphere that enables investing companies to flourish within divergent market environments (Giannakis, Doran and Chen, 2012). Again, this emphasises the importance of relationships and continuous contact with the surrounding cultures. Close business relationships facilitate gathering necessary data, which can help with obtaining superior organisational performance in the global market (Kiessling, 2015). Nonetheless, it is found that organisations with culturally inspiring aims are

more effective and their productivity is superior in the marketplace (Jurkiewicz and Giacalone, 2004).

The achievement of firm performance goals can be facilitated by involving employees who are willing to participate, such as those who are involved in networks where advice is given freely, where they are likely to improve organisational performance (Sykes, Venkatesh and Johnson, 2014). Individuals with the capabilities to link professional practices with experience, in order to improve organisational outcome, can be recognised as drivers of organisational performance (Kerstin Alfes *et al.*, 2013). Organisational leadership plays an important role in creating a positive corporate culture that can improve firm performance. It is believed that servant leadership, which is characterised by having powerful conceptual skills, care for followers, and a strong emphasis on integrity is capable of encouraging followers to attain high levels of the same traits (Wayne *et al.*, 2014). Servant leadership puts the needs of others ahead of personal desires and encourages followers to do the same. Such behaviours are found to be positively influencing corporate performance (Wayne *et al.*, 2014).

2.3.2.2 Financial performance

Organisational financial performance is believed to be positively influenced by supply chain management practices (Kumar and Nambirajan, 2013). For example, the integration of performance data in public agencies financial reports improves public trust, ensures better transparency, and holds public sectors responsible for their actions (Melitski and Manoharan, 2014). It is argued that correlation between alliance portfolio size and the level of innovation reveals improvements in financial performance (Lahiri and Narayanan, 2013). However, companies of high innovation levels are less dependent on alliances for improving financial

performance (Lahiri and Narayanan, 2013). While it was found that financial performance is not necessarily connected to the adoption of advanced capabilities of information technology, it is important to note that leading businesses may have been in the lead prior to applying superior information technologies (Chae, Koh and Prybutok, 2014).

Not only are technology and innovation important but also investment in building buyer-supplier relationships, with improved SCM strategies positively correlated with firm financial performance (Sezhiyan, Page and Iskanius, 2011). This relation asserts that financial performance can be achieved via improving practices and investment techniques. Although its social and environmental returns are obvious, corporate social responsibility has encountered considerable debate over its financial profitability (Jayachandran, Kalaignanam and Eilert, 2013; Peng and Yang, 2013).

2.3.2.3 Corporate social performance

Nowadays, well known and successful international companies pay close attention to social variations and requirements in order to elevate the wellbeing of societies and their surrounding environments (Locke, 2013). The evaluation of companies social responsibility achievements is called corporate social responsibility, which emphasises success in meeting responsibilities towards different groups of a society, such as employees, customers, stakeholders and shareholders (Jayachandran, Kalaignanam and Eilert, 2013). Although there is limited research on the relationship between green supply chains and social economy, social responsibility is an issue that every organisation needs to consider, no matter where it is located within the global supply chain (Azevedo, Carvalho and Cruz Machado, 2011).

Organisations nowadays pay increased attention to their social responsibilities and push hard to improve relationships between societies as buyers, and firms as suppliers (Locke, 2013). One of the most accepted models is the one inspired by production management systems of Japan, which is characterised as being a lean supply model and known for its efficiency in enhancing high performance and supplier affiliation (Giannakis et al. 2012). As part of their social responsibility, some organisations undertake actions to repress or prevent social problems created by the firms operations or by external business factors (Jayachandran, Kalaignanam and Eilert, 2013). Such practices include involvement in the community, ethical marketing practices, and environmentally friendly activities. Peng and Yang (2013) believe that the benefits of taking corporate social responsibility actions, such as heavily investing in pollution control, tend to render greater performance in the long run.

With respect to the environmental component, some argue that corporate social performance is negatively related to financial performance in the short and long run (Peng and Yang, 2013). Although this relationship may not show positivity, it is important to separate corporate social performance from financial performance to be able to understand the intentions behind corporate behaviour. In this context, financial profit might not be the only reason behind the organisation's actions. The definition of corporate social performance can provide an explanation for this complexity. Corporate social performance is an evaluation of the organisational social responsibility behaviours that represent efforts exerted by an organisation in order to prevent, minimise, or rectify, either the undesired externalities of the firm's operations or social complications not necessarily caused by the company's operations (Jayachandran, Kalaignanam and Eilert, 2013).

Contemporary literature provides an insight into how corporate social performance influences the firm's product and the surrounding environment. Some scholars find that environmental social performance does not have an effect on firm performance (Jayachandran, Kalaignanam and Eilert, 2013). This idea does not contradict the findings of Peng and Yang (2013) who show negative correlations between environmental corporate social performance and corporate financial performance. Rather, it might minimize its negativity to a certain extent. What is interesting in this context is the finding of Choi and Hwang (2015), which asserts that green supply chains in South Korea and China still witness improved financial performance, as well as environmental performance. The significant profit made through green supply chains is supported by governmental subsidies provided to companies applying environmental friendly practices in both countries (Choi and Hwang, 2015).

With the increased awareness on green supply chain management practices, findings show that product social performance has significant positive influence on corporate performance, which includes better access to finance, more attraction to talent based employment, improved recommendation from stock analysts and better risk management (Distelhorst, Hainmueller and Locke, 2014). Several multinational organisations have developed their own programs with concern to social performance. Some of these companies such as Nike, Apple, Ikea, and Mattle, which aim at improving their social performance, mainly in developing countries by caring for the environment and labour achieving the goals of healthy production and minimizing reputational risk (Locke, 2013).

2.3.2.4 Performance information technology

Increased capabilities of information technology enable an enterprise to keep up with, or even beat, counter partners (Prajogo and Olhager, 2012). There is a growing belief that businesses with superior capabilities in relation to information technologies show better business performance, compared to their competitors. However, it is argued that even with the advancement, availability, and affordability of information technologies, technical superiority is not guaranteed unless competitors voluntarily choose to stay far behind in adopting modern technologies (Chae, Koh and Prybutok, 2014). In fact, there are businesses that opt not to use performance information systems because they are rarely supported by higher management; they are historical and static; and they lack an integrated MIS infrastructure (Nudurupati *et al.*, 2011).

Organisational adoption of information technologies helps firms connect, analyse and report relevant information that contribute to the measurement of organisational performance (Venkatesh and Ramachandran, 2014). It is essential for decision makers to gain access to accurate, timely and older organisational performance data that are useful for comparisons in order to set well informed plans and strategies (Lahiri and Narayanan, 2013; Yang, 2013; Melitski and Manoharan, 2014). Advancements in applying technologies would, not only help companies compete in the market, but could put these entities on the verge of being in the lead, ahead of other players in the marketplace.

Supply chain learning and process knowledge embedded in the process of knowledge management can contribute to the improvement of organisational performance, as it has been empirically shown that effective knowledge management is linked to effective practices of integrated supply chain processes (Yang, 2013). In addition, it is asserted that knowledge management in supply chains is important, especially for firms operating in developing countries

because organisations in such economies are immensely dependent on effective knowledge management strategies, in obtaining superiority and competitiveness in the international market (Yang, 2013). Qrunfleh and Tarafdar (2014) studied how supply chain strategy and supply chain information systems strategy are connected and how that relationship influences supply chain performance.

Effective utilization of information systems in the supply chain enhances its performance. Qrunfleh and Tarafdar (2014) confirm this connection and go beyond investigating this relationship by emphasizing that some supply chain strategies need application of specific corresponding information systems to leave considerable influence on supply chain performance. The systems alone can't enhance effectiveness if they do not assist responsiveness and agility by being well integrated, accurate, dynamic, visible, and accessible (Nudurupati *et al.*, 2011). Alongside the existence of information systems, there needs to be effective performance management, with a full utilization of its tools.

2.3.3 Managing performance

Managing performance has attracted increased research interest in recent decades (Hood, 2012; Su & Chen, 2013). Organisations pay huge amounts of money buying information systems to enhance performance management. However, these systems are either being ignored or not used to actually manage performance, which indicates that it is not necessarily the unavailability of management systems that hinders enhanced performance (Taylor, 2014). Fundamental steps towards successful improvement of performance management systems are arguably blocked by some cultural attributes. Characteristics pertaining to culture, such as discouraging individuals from taking risks or not encouraging innovation, can act as barriers to managing performance (Venkatesh and Ramachandran, 2014). The actual application of performance systems needs

37

commitment, which can lead to risking personal relations with co-workers, who culturally prioritise personal connections over work performance. Even though performance systems are designed to watch the progress in performance, they still need a lot to actually put them in action, which is another challenge (Jurkiewicz and Giacalone, 2004).

The need to monitor performance comes from the need to manage it, towards achieving organisational goals, which are set in order to meet expectations and meet the standards of a similar organisation (Guillaume, Knippenberg and Brodbeck, 2013). To reach a desired level of performance, the organisation needs to hire highly effective employees who possess skills that meet the requirements of high performance. Elrod, Murray and Bande (2013) believe that labour flexibility enhances employee multitasking abilities, which improves performance management. In markets of very flexible labour, employees are more willing to acquire general knowledge, as opposed to specific knowledge, which enhances their employability (Zhou, Dekker and Kleinknecht, 2011). Additionally, counterproductive job behaviours, such as inadequate job performance, result in poor organisational performance (Thornton, Esper and Morris, 2013). Job performance is influenced by job stress, workers' justice perceptions and job characteristics (Sykes, Venkatesh and Johnson, 2014). Dealing with the complexities arising from the job, the employee, or the culture, can help in monitoring the overall performance of an organisation.

2.3.4 Measuring Performance

Without a clear and standardised vision for measuring effectiveness, it may be difficult to measure supply chain performance. Performance measurements are meant to enable supply chain professionals to gauge the level of performance reached and see how far they are from targets (Melitski and Manoharan, 2014). Supply chain performance is defined as the level of fit between business strategies and perfect profiles of knowledge constituents (Bhattacharya *et al.*, 2014).

Process based systematic perspectives and heterogeneous dimensions were explored, to measure supply chain performance, however, most of the work was focused on using information systems to measure, manage and report performance amongst different tiers of the supply chain (Nudurupati *et al.*, 2011).

Despite the fact that some organisations do not apply any performance measurement system, much more do utilise the systems (Piotrowicz *et al.*, 2015). Companies reported superior use of balance scored (BSC); then, process-based measurement; followed by the SCOR model approaches (Piotrowicz *et al.*, 2015). Measurement tools can provide supply chain managers with specific information on what linkages need more attention, where, in contrast, some professionals argue that applying more performance measures can have negative influences, by increasing bureaucracy (Cadden *et al.*, 2010).

Detailed information on performance helps policy and decision-making. It is hard to make well informed decisions without utilizing information that links organisational performance, organisational decisions, and resource allocation (Melitski and Manoharan, 2014). In an effort to measure performance, (Kumar and Nambirajan, 2013) provide a model to assess supply chain performance and organisational performance through the evaluation of informal connections between the main supply chain constituents. The measurement model was designed to enable organisational management to select the right supply chain linkage that influence the organisation's performance (Kumar and Nambirajan, 2013). Findings show that supply chain management practices are significantly related to performance (Sharma, Sahay and Sardana, 2008; Deshpande, 2012).

Although there is a considerable number of supply chain metrics in use, to evaluate its effectiveness, it is also critical to be able to determine what metric is right for which supply chain (Gunasekaran, Patel and Tirtiroglu, 2001; Olugu, Wong and Shaharoun, 2011; Elrod, Murray and Bande, 2013; Bhattacharya *et al.*, 2014; Piotrowicz *et al.*, 2015). Supply chain performance metrics are based on processes of supply chain management, which are: planning, sourcing, assembly, and delivery (Sillanpaa, 2015). Performance measures also need to consider long and short term goals, leading and lagging indicators, external and internal perspectives, and financial and non-financial metrics (Bhattacharya *et al.*, 2014). Measuring supply chain performance includes metrics of flexibility, time, partnership, quality, cost, and customer responsiveness (Beamon, 1999b; Gunasekaran, Patel and Tirtiroglu, 2001; Elrod, Murray and Bande, 2013).

The large number of supply chain performance metrics can be seen in the following example. Specifically, in green and sustainable supply chain management, where (Ahi and Searcy, 2015) identified 2555 metrics. Five of these were considered popular; quality, air emissions, greenhouse gas emissions, energy use, and energy consumption. These five metrics are the ones that were mentioned more than 20 times in the study sample, which shows how diverse and numerous supply chain performance metrics are. A number of authors have discussed the broader performance measurement of supply chains (Melitski and Manoharan, 2014; Venkatesh and Ramachandran, 2014; Piotrowicz *et al.*, 2015). Discussions included performance reporting, endorsing progress in process understanding, highlighting achievements, monitoring progress, and prioritization (Ahi and Searcy, 2015). In manufacturing, innovation is considered an important metric for performance, where it is broadly accepted as improving performance (Lahiri and Narayanan, 2013).

In an effort to set inclusive characteristics of proper performance metrics, (Akyuz and Erkan, 2010) listed 22 features the metric should have. The eight most important metrics are presented in Table 2.4.

Table 2.3 Features of Performance Metrics

Number	Characteristic
1.	Considers the organisation's objectives and strategy
2.	Maintains a balance among non-financial and financial measures
3.	Relates to performance measures utilised in similar companies
4.	Clearly explains procedures, monitoring mechanisms, purposes, data collection and calculation methods
5.	Avoids overlaps
6.	Meets the needs of people at all levels and agreeable with assessed parties
7.	Allows quick feedback and constant development; and employs a proactive approach
8.	Practical for measuring partnership, collaboration, agility, flexibility and information productivity

Source: (Akyuz and Erkan, 2010)

The authors listed criteria in an attempt to include all relevant characteristics that performance measurements should possess. This encompasses managerial, technical, and process issues, while each characteristic determines a specific criterion of the measure that needs to be addressed. It can be very challenging to have all requirements in a single performance measurement system but measures can be improved by advancing measures of collaboration, agility, partnership, and business excellence requirements (Akyuz and Erkan, 2010). The

conceptualization and implementation of supply chain management metrics enhances the managers' overall ability to see opportunities for the improvement of efficiency and effectiveness of supply chain processes (Elrod, Murray and Bande, 2013).

As important as it is to understand supply chain performance metrics, it is necessary to elaborate on what can negatively influence it. While some researchers are interested in the effects of a single event on firm performance, supply chain research extends to tracing the effect over the whole supply chain (Heckmann, Comes and Nickel, 2015). Because supply chains extend to the international level, what influences the performance of the international supply chains can disturb them at the regional level. Nowadays, large businesses place production lines outside their home countries. Production and manufacturing was largely moved from the industrialised nations to the developing countries; an action that eventually enabled these countries to take part in the production processes and to share the market with the developed nations (Gereffi and Lee, 2012). For such reasons, issues of global concern can be of immense importance to local businesses.

2.4 GLOBAL SUPPLY CHAIN ISSUES

Globalization has changed the way supply chains function in the international market. The removal or reduction of trade barriers between countries is a main driver for easier flow of material, which facilitated a shift in production. According to (Baldwin and Lopez-gonzalez, 2013), neighbouring countries to Germany, Japan, and the US benefited from connecting their supply chains to those of the industrialised countries. This connection was not possible without trade liberalization, which brought together high technologies from the developed countries and

low-wage labour from the developing countries. However, new concerns have emerged with which supply chain managers have to deal with, such as the quality and conditions of employees working overseas where their economic and health wellbeing are placed at risk (Distelhorst, Hainmueller and Locke, 2016).

The availability of talented workers with specialised production skills is another concern. Those who obtain needed professional skills get better chances of employment than those who only have a generic understanding of the production procedures (Casson, 2013). Recently, there is an argument that there are increasing concerns about the economic benefit of engaging in international supply chains. Scholars argue that global supply chains do not necessarily create stable jobs and they are associated with concerns of social deterioration and downgrading of labour conditions (Gereffi and Lee, 2012).

On the other hand, it is believed that the cost of internationalizing a supply chain by integrating its practices pushes firms to increase performance (Danese, Romano and Formentini, 2013). Enhancing performance requires improved responsiveness through fast and reliable flow of communication across the global supply chain (Danese, Romano and Formentini, 2013). In global supply chains, multiple negotiations can occur within tight timing. Coordinating with their partners, supply chain managers need to plan and prioritise negotiations to maximise profit with internal and external partners (Suginouchi *et al.*, 2016). Additionally, international supply chains need strong communication that ensures applying the best governance practices such as modular, relational, captive, and hierarchical governance (Gereffi and Lee, 2012). This emphasises that a successful international supply chain has to maintain strong and sufficient management of its connectedness practices.

In the long run, as Internalization Theory suggests, only the most effective coordination practices will survive. The theory tests the supply chain from a holistic standpoint, where the efficiency within an economic system judges validity of practices (Casson, 2013). Internal and external integration practices enable supply chain management to achieve higher levels of responsiveness. For a global supply chain, the importance of responsiveness comes from the need to maintain high levels of effective flexibility and delivery commitments, which cannot be obtained without making available needed information, spontaneously.

The issues of information availability, sharing data and the flow of needed details with respect to managing the supply chain are essential for international partners. A global supply chain needs a high level of information flow between the different tiers of the chain, to ensure better management at all dimensions, including the sustainability of provided products (Fransson and Molander, 2012). Sharing information is a fundamental part of keeping products secure and safe throughout the entire supply chain.

Risks from not passing relevant details to the relevant partners include loss of products, physical damage, infringement, piracy, and counterfeit of such products or their intellectual property rights (IPR). Although the risks facing products have been traditionally studied from a technical standpoint, there has been an increasing awareness that operations management can play an important role in maintaining the security and safety throughout the supply chain. Supply chain safety and security are essential issues at an international level, as the condition of some items is sensitive to passing accurate information (Marucheck *et al.*, 2011). Collaboration with governmental authorities to set out regulations and mechanisms in that regard can improve global supply chains. Developing management of information flow between supply chain partners, enhancing technologies for product traceability, and strengthening relationships

between partners can also help improve the safety and security of supply chains (Marucheck *et al.*, 2011). Again, momentous information transferability would help strengthen coordination among international supply chains, which is truly needed.

Indeed, there is a need to build advanced coordination between all the supply chain partners in order to avoid hazardous drawbacks at the international level. For this reason, some companies tend to centralise their transportation activities to minimise the number of couriers and ensure better communication and flow of information within their supply chain network. Others focus on the accuracy and the timely manner of shared data (Speier *et al.*, 2011). However, with the advances of information systems and technology, coordination became easier, even if the supply chain management is dealing with a number of couriers.

2.5 BARRIERS TO SUPPLY CHAIN MANAGEMENT

Supply chains are comprised of suppliers, producers, and customers who have different interests, which can result in negative effects on the supply chain. Although improving the supply chain can give partners a greater competitive advantage, partners often refuse change to avoid cost (Frohlich, 2002). Managing supply chains comes with a cost and before engaging in its practices, there is a demanding need to know about expected barriers and their possible influences on the effectiveness of supply chains (Wagner and Bode, 2008). It is specifically important to act when challenges create barriers to the overall performance of the supply chain as a whole. A significant number of studies have explored relationships and influences of supply chain practices and effectiveness (Droge, Vickery and Jacobs, 2012; Wittstruck and Teuteberg, 2012; Aksoy *et al.*, 2014; Govindan *et al.*, 2014; Choi and Hwang, 2015; Sillanpaa, 2015).

However, without the identification of challenges, supply chain managers will struggle in their efforts to boost the effectiveness of supply chains. Research has been carried out to study the influence of challenges over effective supply chains. Supply chain issues are connected to differences in relation to languages, practice, beliefs, and the interpretation of delivered data which can affect the effectiveness of the supply chain (Antonio and Borges, 2014). In fact, supply chains operate in areas with dissimilar ways of doing business requiring adaptation changes in order to manage successful supply chains. It is found that the cultural constituent is closely connected to supply chain barriers (Taylor, 2014; Cadden *et al.*, 2015; Wang, 2015; Yan and Nair, 2016). In addition to the cultural barriers, other barriers can be classified under organisational structure, information sharing, connectedness, and purchase and supply policies. These barriers were found to degrade the effectiveness of supply chains at various levels. Therefore, special attention will be paid to explaining these challenges to show how they can influence supply chain performance.

2.5.1 Culture

The cultural influence on supply chain management cannot be ignored because the human participation in supply chain processes is unavoidable. Cultural aspects such as people's behaviours, perceptions, actions, and reactions can affect managing successful supply chains. Therefore, culture as a concept received a considerable amount of research, which was dedicated to explaining what it means and how culture can affect business practices conducted between or within different societies. Culture is an idea that is extremely hard to define (Ueltschy et al. 2007; Jahoda 2012). People from different countries view culture differently which makes the understanding of the concept even more complicated (Jahoda, 2012). Putting together a standardised explanation to the term has gained a lot of attention in the past and in the current

literature. Early interest in defining culture was clearly shown in (Kroeber *et al.*, 1953; Jahoda, 2012) classic monograph, where 160 definitions were listed. Authors of the study provided a definition of their own. This definition, therefore, reads: 'culture consists of patterns, explicit and implicit, of and for behaviour acquired and transmitted by symbols, constituting the distinctive achievement of human groups, including their embodiments in artefacts' (Kroeber *et al.*, 1953; Jahoda, 2012). Since then, researchers continued the efforts to define culture. Another definition suggests that the word culture is used to refer to a definite way of life that is associated with a period, people or a group (Storey, 2009). A number of the most current definitions of culture, provided in cross-cultural literature, were examined. It is found that there is no consciousness in the provided explanations of the term. Moreover, it is concluded that reaching an agreement in defining culture is unforeseeable (Jahoda, 2012).

Geert Hofsted (2001) proposed the possibility of identifying usable common dimensions of culture for comparing societies alongside a common denominator (Hofstede, 2001; Braun and Genkin, 2013). Extensive research was done in order to put forward a framework that enables understanding human behaviour. Then, Hofsted (2001) proposed mechanisms and processes that govern human behaviour, which can profoundly vary, with respect to four dimensions. These dimensions are as follows:

- Uncertainty avoidance

- Power distance

- Individualism/Collectivism

- Masculinity/Femininity

Researchers consider these dimensions as being of immense importance in the field of cultural studies (Schippers, 2007; Oyserman et al., 2002; Braun & Genkin, 2013; Vorst & Beulens, 2002; Marinescu, 2014). The four dimensions can influence supply chain management practices conducted across cultures. Some of the dimensions may have strong and clear connections to the supply chain, while the relativity of the others may need deeper digging.

Cultural differences can play an important role in obstructing business practices. As part of supply chain managerial complexity, culture may be considered as being a barrier (Fawcett, Magnan and McCarter, 2008). For example, the existence of cultural rules in the Middle East, which are different than those of the Western cultures, can make it hard to integrate supply chains. Cultural differences are considered the most significant boundary to building trust in global supply chains relationships. Lack of trust or low levels of trust can bring about disturbance to the supply chain (Ueltschy et al., 2007; Zhao et al., 2008).

In creating long-term relationships with suppliers, from an individualist culture, buyers prioritise performance over trust, whilst in a collectivist culture it is the opposite. Inter-cultural supply chain managers can encounter less profit from their supply chains by ignoring the relativity of performance and trust across different cultures (Cannon *et al.*, 2010). In addition, power distribution along the supply chain is not the same in all cultures. This may have come from the fact that acceptance of high-power-distance vary from one culture to another (Zhao *et al.*, 2008). Hierarchical differences can determine power distribution in supply chains operating in high-power-distance cultures, while hierarchy can do less in low-power-distance cultures.

As compared to the situation in individualist cultures, in collectivist cultures, the way of dealing with problems shows obvious differences. The incidence of melamine-laced pet food

produced in China is an example where the Chinese initially denied the problem throughout China's General Food Administration of Quality Inspection. Later, when it became evident that the food was contaminated, authorities tried to divert attention off the scandal (Roth, Tsay and Gray, 2007). Lack of acknowledgment of such issues can leave solutions pending or even cause further consequences (Roth, Tsay and Gray, 2007). This way of dealing with mistakes is common in collectivist cultures; people in individualist societies are straightforward in treating emerging issues. Moreover, it is suggested that not being able to align cultures consequently leads to failed organisational relations and works as a significant barrier to successful supply chain management (Fawcett, Magnan and McCarter, 2008; Cadden, Marshall and Cao, 2013).

2.5.2 Organisational Structure

The structure of an organisation affects the flow of its supply chain by having a direct influence on the movement of products, information, and services. Having a similar organisational structure to the structure of supply chain partners facilitates arranging processes and operations among organisations (Ou *et al.*, 2010). The alignment of processes and building trust between organisations is easier, where such employees share similar cultural backgrounds such as religion, language and customs (Wang, 2015). According to organisational structure literature, there are valid reasons to believe that the institutional and cultural environment of businesses can affect the effectiveness of organisational structure (Yan and Nair, 2016).

Organisation related challenges can come from within the organisation or the surrounding environment. Barriers at the organisational level are caused either by the structure of the organisation or by the management of the businesses involved (Fawcett, Magnan and McCarter, 2008). Supply chain managers admit that internal planning and external monitoring failure are the two most critical barriers to their supply chains (Jr *et al.*, 2009). Nevertheless, barriers are not

found exclusively at the internal sphere of organisations (Vaaland & Heide 2007); business practices, (Harland *et al.*, 2007), and the involvement of the cultural norms and practices (Parente *et al.*, 2008).

Organisational barriers fall under the umbrella of two categories: inter-firm rivalry and managerial complexity (Fawcett, Magnan and McCarter, 2008). Inter firm rivalry includes barriers of organisational structure such as motives and behaviours misalignment, turf protection, lack of trust, and weakness of collaboration with supply chain partners which are discussed in section 2.5.4. Managerial complexity includes contradictory organisational structures and cultures; incompatible technologies and information systems; and measurement systems inadequacy (Fawcett, Magnan and McCarter, 2008). Additionally, moving towards more effective and strategic supply chain is hindered by ineffective organisational decisions and practices, such as the lack of strategic visibility, leadership and talent management, models of supply chains, trust and relationships, and the structure of the supply chain (Melnyk *et al.*, 2009).

Power distribution and decision making is influenced by the structure of organisations. Studies have shown that organisational structure in similar organisations can vary in different countries; it is more centralised in China as opposed to the US, for example (Yan and Nair, 2016). Top management takes command on decision making at all levels of the centralised structure, while in less centralised structures the employees follow well defined instructions without the involvement of higher management. It is proposed that the heavy involvement of CEOs in operation decision results in high staff turnover and blurry departmental walls which can act as obstacles to the adoption of advanced supply chain practices (Archer, Wang and Kang, 2008). Some organisations prefer being committed to buying from certain suppliers, which is a behaviour that might affect the performance of their supply chain. This method is not the norm in

Western supply chain practices (Vaaland & Heide, 2007). However, in some supply chains, which require delivery of unique items, managers may have no other option but to deal with a single supplier. This endeavour can be normalised when it comes to buying from larger suppliers or when supplying larger buyers because they usually hold the important resources of the supply chain. Buying from or supplying to one partner happens when the supply chain is structured on interdependence and dominance (Vaaland & Heide, 2007).

Dominant partners can bring about external pressure to supply chains if they use out-dated technologies which are not compatible with technologies their supply chain partners already have. It is possible that some partners might not be ready to adopt the new technologies, either financially or technically. Difficulties and differences in the structure of each organisation are reflected on the supply chain in the form of disturbed supply chain performance.

2.5.3 Data Availability

Sharing information among supply chain partners is influenced by organisational or individual traits, with a strong connection to culture. Although trust is an important factor in facilitating the exchange of data with supply chain partners (Kwon and Suh, 2004), it is also important to know that culture can influence the way shared information is read. (Taylor, 2014) stated that culture affects the way useful or valid information is perceived. In addition, supply chain related information is dynamic, asymmetric, and complex, which can make dealing with it hard work, leading to disputes and miscommunication among partners (Hai *et al.*, 2012). Data complexity can explain some of the reluctance to disclose information because complex data can be more vulnerable to misperceptions.

Information inaccessibility is another imperative contributor to supply chain management barriers. R Glenn Richey *et al.* (2010) find unidirectional flow of information as a main barrier to

supply chains. Basically, information-flow-unidirectional refers to the unwillingness to share necessary information. In such partnering strategies, unidirectional companies take a control and command position utilizing a one-way approach. An enterprise behaving this way does it to minimise its chances of being exposed to risks through a leakage of critical data. Such practices dissatisfy the necessities of integration with supply chain partners. Although, information sharing unidirectional is typically the norm in the production industry, integrated supply chains encompass bidirectional cooperation and information sharing which can enhance supply chain performance (Sillanpaa, 2015).

Furthermore, a large part of the challenge with information inaccessibility is related to technology difficulties. Shortage in sufficient information systems appears to be the main barrier to better coordination of supply chains (Fawcett and Magnan, 2001). Information systems are important in collecting and sharing data with customers, suppliers, service providers, and government authorities. However, there are technical issues that can challenge optimal utilization of the systems (Speier *et al.*, 2011).

This brings about the problem of systems' compatibility within a given supply chain. Even if companies are willing to coordinate in sharing information, they are likely to face the problem of having different, incompatible information systems, where the coding syntax of items are not necessarily identical or compatible (Bouamrane, Tao and Sarkar, 2015). In an effort to solve this complexity, International Business Machines Corporation (IBM) designed a program called IBM Cognos Supply Chain Performance Management (SCPM). This software is intended to eliminate the drawbacks of incomplete data which are caused by using insufficient information systems, inability to predict or identify changes of information, and ambiguity in dealing with saved records (IBM Corporation, 2009). Such information systems provide partners

with sufficient, instant data and analyses that contribute to solving challenge of data inaccessibility that faces the integration of supply chains.

Data collection or availability falls under the umbrella of information systems (Harland *et al.*, 2007). Saving accessible data on both ends of the supply chain is important. Information on suppliers' and customers' trends of pricing, rating and assessment of quality of supply are, unfortunately, either unavailable or poorly recorded (Mwirigi, 2010). Managers need to know their partners' trends in all related aspects of interactions so that they can plan, predict and react should any complication occur. Information systems can also help managers watch the surrounding business environment, with regards to competitors, suppliers and customers which is essential to the strategic decision making processes of the supply chain (Jr *et al.*, 2009). Lack of adequate and reliable information, the movement towards an effective supply chain is not realistic.

Conducting business via electronic media requires extensive information sharing because parties involved do not have physical contact or access to the product. This level of integration is confronted by two main barriers: the absence of knowledge on expected benefits, and the misalignment of information strategies in the supply chain (Harland *et al.*, 2007). The wide corporate acceptance of eBusiness shows that it is a thriving field. Nevertheless, before applying internet based integration, customer and supplier barriers need to be minimised to ensure the effectiveness of e-integration (Frohlich, 2002). Denial of the practicality of e-integration can easily put supply chains in a position where they fall far behind their competitors who apply integrative electronic business practices to their supply chains.

From a supply chain perspective, information systems and technical readiness only account for 50% of the information barrier and may be the easy part. The harder 50% of the issue

is a rigid negative attitude of managers towards sharing data with partners within their own organisations or with external supply chain partners (Fawcett and Magnan, 2001). There is a serious necessity for effective connectivity and willingness to coexist in a supply chain. This brings about the dissimilar relationship between disclosure of sensitive information and the desire to communicate relevant data with supply chain partners. Reluctance in providing partners with necessary information within a supply chain can be caused by a company's internal turf protection and/or from a lack of partner trust (Fawcett, Magnan and McCarter, 2008). When the supply chain relationship is not long or strong enough to build trust, partners may show reluctance in sharing relevant information (Hai *et al.*, 2012). Each reason behind unwillingness to share data can be found in supply chains either standing alone or combined with other reasons making integration even more difficult. With the help of compatible and complete information systems, building trust is faster and easier in eliminating the undesired drawbacks of these obstacles (IBM Corporation, 2009).

In a study by (Seuring and Muller, 2008), practitioners were asked what they thought the top barriers, challenges, or issues facing sustainable supply chain management were. The survey revealed that a lack of supply chain-wide cooperation and communication was considered the biggest challenge. Not communicating relevant information is seen to be a big disturbance to the supply chain. However, no other barrier was thought to be more destructive to supply chains than not actually sharing relevant information. Not willing to communicate and openly pass data will only sub-optimise the returns and profits of supply chains, by delaying or obstructing their integration.

2.5.4 Connectedness and Engagement practices

Effective supply chain management ensures successful interconnection across both ends of the supply chain. The extension of supply chains beyond national borders with the emergence of globalisation and free trade agreements adds more challenges to existing connectedness problems. Successful management of supply chains requires a high levels of interdependence and collaboration in achieving tasks which are not equally achieved across the globe (Yan and Nair, 2016). For example, culture in the U.S values individual gains, while Chinese culture values the success of the group. Therefore, the effectiveness in performing tasks that require interdependence can be greater in collectivist societies as opposed to individualistic societies. Knowing these differences can help managers better interconnect with employees and partners within local or international supply chains.

Supply chain managers who are willing to talk and communicate with partners are more likely to achieve higher levels of profitability out of their supply chains. Being ready to coordinate, cooperate, collaborate, and integrate is a positive trait successful supply chain managers should possess. Supply management integration 'refers to the extent to which separate parties work together in a cooperative manner to arrive at mutually acceptable outcomes' (O'Leary-Kelly and Flores, 2002,). This understanding of integration considers the level to which supply chain partners need to reach on cooperation in order to elevate their supply chain to the next level. The concept of integration opens windows for supply chain managers to communicate and cooperate, to minimise risk and cost.

As it is well known now, supply chains do not work in isolation. Connecting supply chains has become a necessity in the international market. It is also evident that connectedness practices face barriers to supply chain integration because of alignment issues. Incompetent

information systems create the highest barrier to supply chains. Misalignment follows immediately in acting as an obstruction (Fawcett and Magnan, 2001). This indicates the big role misalignment plays as a supply chain barrier. In contrast, incentive alignment is identified as being a vital coordination mode that drives forward the supply chain, each of which has its own importance in the practice of integrating supply chains. Indeed, the absence of any of integration component can negatively affect the best fulfilment of a supply chain's objectives (Simatupang, Wright and Sridharan, 2002).

Poor coordination is a common supply chain operational pitfall, which can lead to minimised output of supply chains, especially when they become internationalised, where the cost of delivery gets higher. Then, the need for tight coordination becomes critical (Lee and Billington, 1992). A good illustration on this can be found in supply chains where suppliers of different segments of a product use expensive-expedited international shipment methods to deliver items to ensure fast delivery. The loss comes when items on which production is dependent are not expected to arrive that soon. In this case, managers could have used cheaper methods for delivery, should they have the proper knowledge on when it is required.

An analysis of supply chain management literature shows increased interest in connectedness issues, such as alignment, collaboration, integration, coordination, and cooperation. As an extension to what has gone before in Table 2.2, additional connectedness papers were included in the following table to show that interest in this direction is still evolving. Table 2.4 shows connectedness dimensions, sorted by topics and citation maps.

Table 2.4 Connectedness dimensions

Topics	Authors
Alignment	(Belaya and Hanf, 2009), (Sun, Hsu and Hwang, 2009), (Wong *et al.*, 2012), (Attia, 2015)
Collaboration	(Kwon, Im and Lee, 2007), (Borade and Bansod, 2008), (Noor and Pitt, 2009), (Gold, Seuring and Beske, 2010), (Katunzi and Qin, 2010), (Piriyakul, 2011), (Fayezi, O'Loughlin and Zutshi, 2012), (Zeng *et al.*, 2012), (Panahifar, Byrne and Heavey, 2014) (Kache and Seuring, 2014), (Panahifar *et al.*, 2015), (Formentini, Romano and Brown, 2016)
Integration	(Ho, Au and Newton, 2002), (Svensson, 2002), (Ovalle and Marquez, 2003), (Gunasekaran and Ngai, 2004), (D Power, 2005), (Jüttner, Christopher and Baker, 2007), (Persona *et al.*, 2007), (Bose, Pal and Ye, 2008),

Topics	Authors
	(Katunzi and Qin, 2010),
	(Madhani, 2010),
	(Talib, Rahman and Qureshi, 2010),
	(Chung, Tang and Ahmad, 2011),
	(Janvier-James, 2012),
	(Näslund and Hulthén, 2012),
	(Winter and Knemeyer, 2013),
	(Alfalla-Luque, Medina-Lopez and Dey, 2013),
	(Kim, 2013),
	(Mustafa Kamal and Irani, 2014),
	(Palma-Mendoza, Neailey and Roy, 2014),
	(Kache and Seuring, 2014),
	(Yu, Xiong and Cao, 2015),
	(Zhang, Gunasekaran and Wang, 2015),
	(Childerhouse *et al.*, 2016)
	(Madhani, 2013)
	(Novak and Choi, 2015)
Coordination	(Eng, 2006),
	(Kouvelis, Chambers and Wang, 2006),
	(Lee and Kim, 2008),
	(Jayant, Gupta and Garg, 2011),
	(Kabra and A., 2015)
Cooperation	(D Power, 2005)

Benefits from combining supply chain practices via connectedness practices create win-win situations at all supply chain tier levels. It is believed that designing a policy, which ensures fair distribution of returns between retailers and manufacturers, can help with reaching a higher coordination level. This can be done in combination with a contract on the wholesale price between the manufacturer and the raw material supplier (He and Zhao, 2012). Additionally, because integration is deemed an essential connectedness practice, it is important to note that supply chains witness greater benefits from integrating their downstream processes, compared to integrating their upstream processes. That emphasises notions of improving customer service performance (Droge, Vickery and Jacobs, 2012).

As a process that enhances cooperation between companies, close collaboration promotes supply chain integration and performance (Formentini, Romano and Brown, 2016). It is clear from Table 2.4 that collaboration has witnessed extensive research interest. In recent years, several collaboration initiatives have been launched, such as quick response, vender-managed inventor, continues replenishment and the planning, forecasting and replenishment approach (Panahifar, Byrne and Heavey, 2014). However, this is not to undermine the importance of coordinating all practices, since a fully integrated supply chain can improve the overall performance and generate greater profit for the organisation.

2.5.5 Purchase and Supply Polices

Issues of purchasing and supply policies have been a core concept of discussion as important supply chain management aspects (Zsidisin, Melnyk and Ragatz, 2005; Lin and Ho, 2009; Chicksand *et al.*, 2012). Transaction based purchasing have been widely researched within supply chain management literature. The intangible elements of purchasing such as relationships, trust, and mutual dependence are also deemed important factors of the process (Cadden *et al.*,

2015). These aspects are heavily influenced by culture which is a key determinant in the selection of suppliers and the supply process (Adebanjo *et al.*, 2013).

However, managers of supply chains often find the failure of sound planning within the organisation as a great challenge, where unsuccessful monitoring of factors beyond the borders of the entity can undermine successful supply chain planning (Jr *et al.*, 2009). Many of the hindrances to supply chains relate in one way or another to both internal and external factors at the same time. Internally, poorly planned purchasing practices are major barriers. Therefore, strategic purchasing is needed to encompass actions of setting plans, implementing them, evaluating results, controlling operational and strategic purchasing in order to serve the organisation's objectives in the long run (Chicksand *et al.*, 2012).

Pitfalls can happen when management does not prepare solid alternative plans on what their best action should be, when an unexpected hazard take place (Mwirigi, 2010). In order to prepare sound plans, managers need to consider challenges from the downstream and upstream operations, which are capable of hindering the flow of the supply chain's supply and demand. Downstream disruptions occur due to insufficient physical distribution of material; uncertainty of demand; and the bullwhip effect (Wagner and Bode, 2008). An example on demand uncertainty is the unexpected warm weather in December 2006 in northern US, resulting in steep demand drop on coats and sweaters, which caused tremendous loss of profit in the outfit industry (Chen and Yano, 2010). On the other hand, they list upstream disruptions including challenges such as restrictions in the supply market; technology and market changes; quality issues; and delivery challenges. Purchasing is also influenced by the economic situation, clients and competitors which are external factors that can't be changed solely by the organisation (Jr *et al.*, 2009).

Moreover, failure within an enterprise can be referred to as the absence of efficient planning mechanisms, which can hinder the integration of all organisational processes (Jr *et al.*, 2009). This kind of managerial behaviour is responsible for undermining supply chains' productivity by increasing its cost and causing delivery delays. Larger supply chain partners usually hold the market power and are capable of controlling the purchasing policies and practices of smaller firms. Whether the larger firm is the supplier or the purchaser, the level of power they attain plays a determinant role in the smaller organisation's purchasing plans (Archer, Wang and Kang, 2008). This can include the company's ability to, match forecasted demand with real demand, deal with demand volatility, and maintain the appropriate level of inventory to keep the flow of material.

2.7 SUMMARY

Researchers and practitioners in the field have identified supply chain barriers that can fit under diverse categories. Some of these barriers are slow growth; demand uncertainty; managers' tendency to overact to changes; high capital cost; and the natural inertia to systems of supply chains (Houlihan, 1985). (Saxena, 2011) points to overlooking incentives during courtship; overemphasis on direct matches in partnership and the fear of failure, considering all main hindrances to the wellness of supply chains. Moreover, (Sanders and Wagner, 2011) believe that the enormous diversity in international markets and variety in consumer expectations, challenges of transport cost and global policies are risks which management of supply chains needs to overcome.

Categorised barriers have different factors which were emphasised by the literature as critical to effective supply chains. Some of these factors include personal contact with partners,

senior management involvement, integration of supply chains, use of information sharing systems, and demand patterns. Other factors can be combined into one factor such as a measurement system's inadequacy and a shortage of information systems. These factors imply one message - not having superior information sharing capabilities. Other factors were not emphasised by the literature. Although they can fit under included categories, they are not of high level classification, such as inter-firm rivalry, managerial complexity, slow growth, natural inertia, and high capital cost.

In the contemporary business world, autonomy in conducting business is no longer the norm. Collateral functionality in the efforts of maximizing gains and eliminating losses stems from the evident profitability of supply chain integration. Yet, challenges appear by way of optimizing benefits. Regional supply chain management differences, organisational structure obstacles, data availability, connectedness practices and purchase and supply polices are the main barriers to supply chain performance (Vaaland and Heide, 2007; Cannon *et al.*, 2010; Chen and Yano, 2010; Mwirigi, 2010; Droge, Vickery and Jacobs, 2012). In general, the concept of "managing" the supply chain was found to be a core barrier raising the question of "who could and should have this responsibility?" (Storey *et al.*, 2006).

CHAPTER THREE: SAUDI SUPPLY CHAINS WITHIN AN INTERNATIONAL SPHERE

3.1 INTRODUCTION

As part of a wider global sphere, supply chain practice in the Middle East (ME) has become more popular. The ME is located in an important part of the world, linking three continents: Asia, Europe, and Africa. This location allows for easy movement of products, goods, and services between the regional businesses and the rest of the world. Its importance to the world of logistics and supply chain comes from its connectivity and its richness of power and energy sources, such as oil and gas. Being in a fast evolving region, Saudi Arabia has formed Governmental policy, specifically targeted at supply chain growth and evolution. This policy will work on improving supply chains in the country and will provide better connectivity for supply chains at regional levels as well.

3.2 SUPPLY CHAIN MANAGEMENT IN SAUDI ARABIA AND THE MIDDLE EAST

Saudi Arabia is a large and important part of the Middle East. The country has a long network of landlines that connect supply chains between the different parts within Saudi borders. Research and studies specific to issues of supply chain management in the Middle East are limited in number and narrow in scope (Julka, Srinivasan and Karimi, 2002; Sohail and Obaid S., 2005; Siddiqui, Khan and Akhtar, 2008; Sundarakani, Tan and Over, 2012). This can be seen from the relatively low number of dedicated and published papers in international journals, and studies published through regional universities or studies. With a close look on the status of supply chain management in the Middle East, it can be seen that the majority of published

research is not specifically related to supply chain management practice in the region. In fact, research explored fragmented dimensions of the supply chain, with a focus on diverse perspectives. Thus, this chapter summarises the most noted literature in the area.

Some of the studies were published by Middle Eastern scholars or institutions discussing topics of current interest but not necessarily specific to the Middle East. For example, issues facing the integration of supply chains, such as the managerial, technical and relationship challenges, were discussed by Middle Eastern researchers (Awad and Nassar, 2010). Additionally, some companies from the region were only mentioned as an example of how quality in business performance and good management can be achieved without significant investment (Mehta, 2004). The paper suggests that such objectives can be achieved by simply following the essential principles and notions of supply chain management and quality management.

As part of supply chain research in the region, three studies shed light on a number of fragmented issues being discussed, specifically in Iran. The first paper highlights the economic aspects of the biodiesel supply chain of Iran (Avami, 2012). The second paper, in an effort to assess the influence of information technology on managing the supply chain, (Aliei, Sazvar and Ashrafi, 2012) investigated the issue, using fuzzy logic. The paper aimed to evaluate and identify the Iranian information technology indexes of supply chains that were hoping to acquire a better position in the international market. The third paper specifically focuses on promoting supplier selection in the pharmaceutical industry (Ghatari *et al.*, 2013).

Unlike other supply chains in the ME, war in Iraq has had an influence on research of supply chain around the country. It is reported that immense challenges faced the assurance of

flow of adequate medical supplies to Iraq, as it was a war zone (DeJohn, 2004). Another issue was the safe delivery of medical supplies in a timely manner. The difficulty included extended time of delivery required by logistic plans (Buck, 2007).

As a country, a small number of academic papers represent Saudi Arabia in a variety of supply chain contexts, some of which are not overly relevant to this thesis but presented for completeness. For example, (Julka, Srinivasan and Karimi, 2002) mentioned the industrial city of Jubail (Saudi Arabia) as an example of petrochemical clusters. The other study is presented by the College of Computer and Information Sciences, King Saud University, Riyadh. The study analyses values and the limitations of supply chain management. It discusses the general understanding of Value Chain Management and its important success factors (Al-Mudimigh, Zairi and Ahmed, 2004). In an effort to boost education by simulation, King Fahd University of Petroleum and Minerals, and the Department of Systems Engineering conducted research on supply chain education through simulation modelling. The study simulated a supply chain, including a network of amenities and distribution systems that were responsible for transformation and procurement of supplies from the producer to the buyer (Siddiqui, Khan and Akhtar, 2008). In a study presented in Arabic, (Al-Hudhaif, 2012) explores the success factors for implementing supply chain management systems and their relationship to customer satisfaction in the public sector in Saudi Arabia. The paper presents the important aspects of the supply chain that are related to implementing a supply chain management system, such as managing information systems, customer relations, inventory, procurement, and logistics.

Generally, supply chain management is now becoming an important component of the business environment in the region. Yet, it is important to highlight some key notes on supply chain management in the Middle East. A potentially positive indicator is the increasing number

of job posts looking to recruit supply chain management employees, which can be regarded as a proxy for an increase in the applications of supply chain practice in the region. It is also noted that Iranians appear to be carrying out more research on supply chain management topics than other countries in the Middle East, which can be seen by the number of studies found and presented earlier in this chapter. In addition, supply chain in Iraq only appeared in the war context, which was generally written within the context of US army related investigations or assessments. It is also important to note that some Arabic translations of the term supply chain are equivalent to "import chain", when translated into English.

Saudi Arabia is an important proponent of supply chain growth and development in the Middle East for a number of reasons, which include its strategic location, size, economy, business environment, and infrastructure. Saudi Arabia has set plans for 2020 and a strategic vision for 2030, with an emphasis on logistics and supply chain management. One of the main objectives of these plans is to decrease dependence on oil revenue by exploiting other advantages the country has to offer. The vision also stresses the importance of localizing jobs to decrease unemployment among Saudi nationals.

3.3 SAUDIZATION AND SUPPLY CHAIN IN SAUDI ARABIA

In a globally open market, and with the emergence of Saudi oil production, followed by an unprecedented development at all national levels, the need for expatriate employees became a necessity, to meet the increasing demand on native workers. The huge projects that were under construction required a large number of workers of different skills and professions. In response to this demand, millions of highly professional experts, specialists, and labourer expatriates have

moved to work in Saudi Arabia. Companies perceive non-national workforces as being more productive because they possess sufficient skills, work hard, and cost less, compared to local employees. In addition, the turnover rate is lower among foreign employees because laws in the country do not allow for easy employment mobility for non-Saudi workers. For such reasons, companies and business holders prefer hiring expatriates.

In contrast to expatriates, nationals are perceived as expecting high salaries, lacking skills, and having low work motivation, which discourage employers from hiring them. Therefore businesses began to doubt the efficiency of efforts to nationalise jobs (Torofdar and Yunggar, 2012). As a result, not preferring local labour and the profitability of hiring expatriates participated in increasing unemployment rates among Saudi nationals. In 1975, the Saudi government started to set rules and regulations in place in order to enhance the nationalization of employment in the Saudi market, which was then called Saudization, considered one of the most important projects the government presented to deal with unemployment (Abouraia, 2014). Saudization means hiring Saudi citizens to do jobs that used to only be performed by expatriates, especially at the lower wage rates, and training locals to hold top management positions in their organisations (Tayeh and Mustafa, 2011). The main objective of Saudization is to replace the foreign workforce with the right national employees. The Ministry of Labor initiated this programme, aiming at a gradual stimulation of employment of citizens.

Job nationalization is one such government incentive for businesses to increase the number of locals in their organisations. In exchange, companies gain increased facilitations and assistance from the government (Al-Mami, 2014). However, training and education programs do not meet the job market expectations. Cultural and personal barriers also slow down this movement towards Saudizing jobs that require technical knowledge and skills because people

67

perceive such work as beneath them, socially. Locals prefer employment in administration positions, expecting low responsibilities and high payments. Authorities are blamed for not seriously enforcing Saudization policies and not providing the sufficient support to small and medium enterprise, in terms of supplying well trained local workers to the market and not providing enough incentives to businesses (Al-Mami, 2014).

The output of public universities is another issue that works as a barrier to Saudization, as the quality of the graduate's shows that they are not competent, either in terms of qualifications or skills. Educational institutions are under pressure to keep up with the rapid change in demand for different sets of skills, especially in the technical work sector. It is suggested that the Ministry of Higher Education should increase actions towards providing continuous, open and distance education, especially in the fields that are continuously changing (Alzu'be, 2012).

One of the most recent ideas in this regard is the Nitaqat scheme. The word Nitaqat is an Arabic word that means, "ranges". This scheme was launched in June 2011 to support the Saudization policy and to increase its efficiency. This ambitious plan aims at nationalizing 400,000 jobs each year and minimizing the number of expatriates employment (Al-Mami, 2014) Basically, Nitaqat classifies private sector organisations depending on the firm's activity and based on the percentage of Saudi employees in the company. Under this scheme, companies have to meet a minimum requirement of 10% Saudi employees. Companies are classified under Red, Yellow, Green, and Premium, depending on their compliance with the scheme's requirement. Companies that are in the Red categorization are the ones with the lowest job nationalization level and they will be sanctioned. The firms in the Yellow category are in the middle and are given time to correct their situation. The organisations that are in the Premium and Green categories are in the safe side, with high levels of Saudization, and are eligible for incentives.

Non-compliant companies are not allowed to employ expatriates, obtain additional work visas, request loans, or take part in tenders offered by the government (Tom and Roy, 2013).

To assess the likeliness of success for this scheme, 392 business people were included in a survey. The majority of participants believe that the application of this scheme will result in decreasing unemployment of Saudi citizens (Sadi, 2013). Apart from being dependent on oil production, the country is trying to diversify its economy and the Nitaqat scheme in the private sector is considered a leap forward towards the nationalization of business ownership in the long run.

Efforts to nationalise jobs in the country are not without a price. Companies will have to bear additional expenses, as the cost of hiring locals is usually higher than employing expatriates. Such a rise in expenses can be reflected on supply chains in the form of higher hiring cost. Not only is the cost affected but supply chains might witness higher probability of delay in lead times, as local workers are less willing to work overtime (Al-Mami, 2014). It is also believed that the nationalization of jobs may have a negative impact on productivity and efficiency of services (Tayeh and Mustafa, 2011).

Although it is believed that Saudization has increased the number of local workers in the private sector in Saudi Arabia, some scholars still think it is just a short-term remedy to high unemployment rates. This policy is not compliant with the modern, open, and globalised market policies, where jobs are openly offered to qualified personnel. Moreover, expatriates are granted citizenship when they prove themselves to be good residents. Doing so, can consequently bring more job opportunities to the country because the successful expatriates will have chances to create businesses and enhance the country's economy (Fakeeh, 2010).

3.3.1 Supply chain and business environment

Due to vast improvements in the Middle Eastern business market, it is not easy to predict its rapid changes. The huge wealth in the Gulf countries that was accumulated through the rise of oil prices, starting from late 1970s, encouraged investments at all levels. This was reflected on what can now be seen as a construction revolution in the oil exporting countries. Saudi Arabia is among these countries that were immensely influenced by the increase of oil prices (Rice, 2004). However, foreign investors in the country face different pitfalls that cause either delay in entering the country or in performing well within its business culture. There used to be a maximum foreign business ownership of 75% but now full foreign ownership is allowed. As part of the National Transformation Plan and the Vision of 2030, the Saudi government announced the approval of issuing licenses, which allow foreign companies in the trading sector to have 100% ownership of the business.

In a study to determine causes of delay in contracted projects in Saudi Arabia, factors such as low contractor performance, weak owner administration, poor planning and design, bureaucratic government regulations, poor environmental conditions, and weak site supervision were found to be the most important reasons behind delays in finishing public projects in the country (Al-Khalil and Al-Ghafly, 1999). In addition, construction projects witness to long delays due to factors related to material, the project, the contractor, the owner and the consultation team (Albogamy *et al.*, 2013). Nonetheless, entities in the country started to find ways around some barriers to high performing supply of material in the country. (Martiradonna, 2014) reports that (KAUST) King Abdullah University of Science and Technology faced delays in supply, where they had to deal with the bureaucratic regulations to get research material

delivered. They dealt with the issue by opening an office connected to the university in the airport. Now they can get deliveries in a reasonably good time.

Saudi Arabia is known for being the largest oil exporter in the region and it has one of the largest economies in the world. Investors who are willing to do business in the country used to find more difficulties in performing and making good profit. However, now, regulations have gradually changed in favour of liberated markets and free trade practices.

3.3.2 Support for private sector

Recently, the private sector in Saudi Arabia has gained the government's attention. It started a number of funding programs to facilitate the development of businesses in main sectors such as industry, agriculture, and construction. The programmes were initiated to be of assistance to the emerging businesses in the market, which are usually small or medium in size. Small and Medium Enterprises (SMEs) are the lifeblood of almost any country's economy. Supported policies, easy access to funding, entrepreneurial training programs, and easy access to business networks can contribute to SMEs growth (Erogul 2014). Well-established companies may not need substantial assistance in that regard but providing such support to new businesses can make a noticeable difference. Table 3.1 shows the support provided to Saudi SMEs, in alignment with developmental policies in the Saudi market.

Table 3.1 Support provided to Saudi SME's

Provided support	Development policies
Funds	- Enhancing the level of coordination between specialised credit funds and the various initiatives related to supporting SMEs. - Directing the support activities of the specialised credit funds towards employment of Saudi citizens in the SMEs.

Provided support	Development policies
	• Encouraging free pioneering businesses, and facilitating their establishment and funding. • Encouraging local banks and financial institutions operating in the Kingdom to expand financing for SMEs, including creation of new financial instruments suited to their special needs • Establishing a detailed comprehensive database on the SME sector in the Kingdom, including indicators, economic and spatial characteristics, which can guide decision-making and formulation of policies to support and develop this sector
Funding projects	• Expanding the scope of technical assistance and advice provided by the Saudi Industrial Development Fund. • Supporting and developing the Kafalah scheme administered by the Saudi Industrial Development Fund. • Expanding lending activities undertaken by the Saudi Credit and Saving Bank, particularly to small and medium enterprises

Source: (Ninth Development Plan, 2010)

Although there are good policies that are focused on providing SMEs with a sufficient credit fund in Saudi Arabia, it is claimed that the lack of financial support and financing programs are among the factors that cause quick SME failure in Saudi Arabia. This is supported by the argument that the lack of focused and sustainable support services and funding programs, which are responsive to the SMEs requirements, have resulted in faster SME failure in the country (SUSRIS.com, 2011). In the Ninth Development Plan (2010), the Saudi government emphasised the importance of providing support to SMEs and removing barriers. In its efforts to present needed support to new business starters, the Saudi government has established and partnered with a number of support programs, such as Kafalah and The Centennial Fund.

The Kafalah scheme, which is managed, by the Saudi Industrial Development Fund, and the Saudi Credit and Saving Bank, is in alignment with the country's policy to support new business starters. As one of the big projects in supporting enterprises in Saudi Arabia, the SME loan guarantee program, Kafalah, was launched in 2006. Its support is provided to new SMEs that submit loan request applications to lenders within a year from the date when they have their license or commercial registration issued (Saudi Industrial Development Fund, 2014). Through Kafalah, the bank supports customers with up to 2 million Saudi Riyals. The program assures 80% of the amount paid by the bank (Sivakumar and Sarkar, 2012).

Table 3. 2 Number of supported enterprise by Kafalah program in 2013-2014

Type of financial support	2013	2014
Number of Paid funds to enterprise	1173	1497
Number of Financial Guarantees	2515	3612

Source: Ministry of Finance; Annual Report for the Fiscal Year 2014

From 2006 to 2014, Kafalah supported 5579 SMEs, with a total of SR5.278 billion. In 2014, the program provided funds to 1,497 enterprises, compared to 1,173 in the previous year, 2013. In addition, Kafalah issued 3,612 guarantees in 2014, while in the previous year it issued 2,515 guarantees. Total funding reached SR10.6 billion in 2014 (Ministry of Finance, 2014). The Kafalah program provides another service for customers. In addition to issuing guarantees, it offers educational training for SME owners and stakeholders (Saudi Industrial Development Fund, 2015).

This program is not the only support program new business owners can use to acquire funds. There are other programs that are focused on either the age of the applicants or their gender, such as the Centennial Fund and Prince Sultan Fund for Supporting women's Projects. The Centennial Fund gives financial support to entrepreneurs who are between 18-35 years of age (Alzalabani, 2015). The amount of support obtainable is up to SR300, 000 (The Centennial Fund, 2015). The Prince Sultan Fund for supporting women's projects was established in 2009 to provide funds to Saudi girls as young as 6 years old, up to 25 years. The maximum fund offered is 300,000 SR. The program also aims at developing leadership skills among girls (Sivakumar and Sarkar, 2012).

Another big project supported by the Saudi Government is the Saudi Credit and Saving Bank (SCSB). The bank offers interest-free loans to support small enterprises. Its capital was increased recently to be SR36 billion (Ministry of Finance, 2015). Although SMEs have a strong base in Saudi Arabia, they make up 90% of businesses in the country and their contribution to the GDP remains low (SUSRIS.com, 2011).

3.3.3 Infrastructure

In its plan to build a diverse economy, the government invested in improving existing infrastructure facilities and developing new ones. There is an optimistic plan to set Saudi Arabia as a strategic hub for logistics and supply chain practices, as it is situated in a very good location that enables easy and economic movement of goods and services between the three continents. With considerations to the location of Saudi Arabia, alongside other economic and social characteristics, the government invested in industrial cities, highways, railways, and ports. The improvement in such infrastructure is expected to make huge changes in the economic diversity, instead of being dependent on the oil industry.

3.3.3.1 Industrial cities

The Saudi Industrial Property Authority (MODON), which was established in 2001, is the developer of industrial cities in Saudi Arabia. MODON was launched to respond to the domestic and international changes in the industrial business. One of its main jobs is to empower the private sector by providing a healthy competitive atmosphere for operations management and management of services and facilities. Additionally, the authority is developed to assist in achieving the government's vision, to lessen its economic dependency on oil industry.

The authority is responsible for the establishment and management of more than 34 cities around the country. These cities are located around different cities, which are Riyadh, Jeddah, Dammam, Makkah, Madina AlMunawwara, AlAhsa, AlKharj, Sdair, Qassim, AlZulfi, Saqraa, Durma, Hail, Tabuk, Arar, AlJouf, Assir, Jazan, Najran, AlBaha, Hafr AlBatin, Rabigh, and Modon Oasis in AlAhsa. Growth in technology is also a responsibility MODON is taking by supervising two technology zones and planning to establish more zones that would attract the latest investments in technology. There are currently six private industrial cities, who apply the highest international standards. They are also supervised by MODON.

The authority also provides incentives and economic advantages to certain types of projects, including industry, services, commercial and residential projects. Some of the offered advantages are discounted rent of industrial land, financing opportunities, export guarantee, and customs exemption on machinery and raw material. On an area that exceeds 182 million square meters, MODON signed rent contracts to provide well-established facilities to more than 6,020 service, industrial, and logistics businesses. MODON also contracted 2,874 producing factories,

providing them with industrial facilities. Current investments are higher than 500 billion Saudi Riyals, providing job opportunities for over 48,0000 employees (www.modon.gov.sa).

3.3.3.2 Highway linkages

The Ministry of Transport (MOT) is the Saudi authority that is responsible for planning, building, and providing maintenance services on roads in the country. The total length of all built roads until 2012 is 60,000 km, which were built in compliance with the latest international measures. These roads link cities from the inside, connect cities, and reach out to neighbouring countries. This connectivity contributes in the vast improvement of the cities around the country. Existing roads were also improved in width to include additional lanes, both ways.

To make movement in main cities easier, the MOT built ring roads around them, which should enable faster movement and ease traffic congestions inside cities. This way passing vehicles will not need to enter the city, which reduces the volume of moving cars inside the cities and decreases pollution. There are a number of these ring roads. The one in the Eastern Region is the longest ring road in the country, which is 108 km. The second longest is the Jeddah's ring road, 103 kilometres. Then, Riyadh's ring road comes next, which is 76 km. These roads were linked to inner city roads with easy access and safe exits. They are also connected to the highways that provide linkages to other cities.

In its efforts to improve the transport infrastructure, the MOT paved highways in various regions. These highways are up to high standards of safety and security measures. They link the main cities of Riyadh, Jeddah, and Dammam to each other and to the rest of the countries smaller cities. The longest highway is the Riyadh/Taief/Makkah, which is 820 kilometres. There are shorter highways such as the one between Madina and Makkah, which is 421 km. The

Qasim/Madina is 448 km long. Linking cities inside the country is very important but the plan is not limited to this goal. The government also worked on linking the country with its neighbours.

Because it is important to facilitate land movement between East Arab countries, and to increase the commercial and touristic exchange between these countries, the Saudi government was keen to effectively enter international treaties, organisations, and agreements. One of these agreements is with the Economic Commission for Western Asia (ECWA), where it included agreements about international land lines. Total length of roads in participating countries is 31,400 km, of which 12,000 exist in Saudi Arabia. Some of the benefits from this agreement directly serve land line accessibility between participating countries, in addition to decreasing cargo cost and increasing traffic efficiency and safety. As part of this agreement, Saudi Arabia worked on linkages with 13 Arab countries, which are UAE, Kuwait, Bahrain, Qatar, Oman, Yemen, Iraq, Jordan, Syria, Lebanon, Palestine, and Egypt (www.mot.gov.sa).

3.3.3.3 Railways

There is a plan and on-going work on improving train linkages between various destinations in Saudi Arabia. Railways are managed by the Saudi Railways Organisation (SRO). The existing network only covers some areas between the East coast and the capital Riyadh. The total length of the network is around 1380 kilometres and extends from Dammam port to the city of Dammam to Riyadh. The network passes through some cities on its way to the capital, such as Abqaiq, Hofuf, Harad, AlTawdhihiah and AlKharj. To support the main lines, some additional extensions were built to connect some agricultural, military, and industrial sites with the ports.

The current railway is divided into three lines that serve different purposes. The cargo line is 556 kilometres and connects Riyadh to King AbdulAziz port in Dammam through

AlHasa, Abqaiq, AlKharj, Haradh, and AlTawadhihiah. The passengers' line connects Riyadh to Dammam passing by AlHasa and Abqaiq. It is 449 kilometres. The third line includes the branch extensions, which connect the other two lines with agriculture production sites, industrial and military areas. The total length of the extensions is 373 kilometres (www.saudirailways.org).

The SRO's fleet includes 2,596 different cargo cars, 75 passenger cars and 102 diesel locomotives. The cargo cars include 858 double stacking cars, 948 regular cars, 60 rock hauling cars, 47 flatbed cars, 135 grain hauling cars and 201 cement transportation cars. There are three classes of passenger cars; 12 Al Rehab, 9 Al Taleaa and 25 Al Qafila, which have capacities of 540 passengers, 652 passengers, and 2,012 passengers, respectively. There are also eight diner cars, two special-class cars, one ambulance car, and twelve luggage and power generation cars (www.saudirailways.org). This is a glimpse into the current, main railway network that was launched in 1951 (www.mot.gov.sa). Since then, it was the only working railway in the country, until the new plans came to light a few years ago.

There are some new projects to extend the railway linkages and to expand the transport options, especially into highly populated areas. Alharamin train has been built and operated to help pilgrims in Makka commute between different places in the holy city. This train also connects the city of Jeddah to Madina via Makka, which is more than 450 kilometres long. This train is intended to provide services for more than 2 million pilgrims in the Hajj season, each year, and much more all year round (www.mot.gov.sa).

There is another project in Riyadh that is in its final stages - Riyadh metro. This is the latest train project in the country, which gained a lot of attention in terms of spending and investment. Work on this project have reached advanced stages and is expected to finish by

2019. The metro has five lanes that connect the main areas in the city, which are rich in population and business activities. There are four main stations that are located on the crossroads of the lanes. All the stations have a unified building style to make it easier for users to identify it (www.riyadh-metro.com).

These projects and more should work together, helping the movement of people, products, and services around the country. The ease and accessibility of transport means can positively impact the supply chain. This massive improvement in the rail industry should provide individuals and businesses with better facilitation of movement that can be reflected in the managing the supply chain.

3.3.3.4 Ports

The country has a good advantage since it is bordered by two seas and connected by land with a number of countries. This strategic location, with high volumes of imports and exports raises the importance of ports to the country's economy. The Ports Authority was established in 1997 to take the responsibilities of managing, operating, and providing maintenance to the Saudi ports. These tasks were transferred to the private sector, which is still supervised by the authority. Services provided by Saudi ports include handling cargo of all types, ship maintenance yards, transit facilities, and passenger services.

There are nine main ports in the country. These ports are located on the coasts of the Arabian Gulf and the Red sea. Ports on the Arabian Gulf side are King Abdulaziz Port Dammam, Kind Gahad Industrial Port Jubail, Jubail Commercial Port, and Ras Al-Khair Port. The other five ports are located on the coast of the Red Sea. These ports are Jeddah Islamic Port, King

Fahad Industrial Port Yanbu, Yanbu, Commercial Port, Jizan Port and Dhiba Port. Most Saudi exports and imports go through the nine seaports. According to the Ports Authority, 95% of imports and exports are moved via these ports with 55% of handled cargo in the export side. The number of ships that visit the ports reaches 11,000 each year. As part of the government's plan to nationalise jobs, 97% of the staff working in these facilities are Saudi nationals (www.ports.gov.sa).

Saudi Arabia and other Gulf countries built trade areas, deployed open market trade policies, reduced bureaucracy in customs, and empowered measures of anticorruption. All transport activities were put in consideration for improvement including railways, airways, and sea transportation. The strong economy enabled the Saudi government to spend a large amount on infrastructure. Most of the expenditure goes to developing oil and gas infrastructure in Saudi Arabia and other neighbouring countries. In its strategic vision, the country is planning to privatise some of the logistics and transport sectors and regulate them according to best practices, which would make Saudi Arabia as an international hub for services and cargo (Alexander, 2016).

3.4 SUMMARY

The application of supply chain management practices in the ME has become wider than ever. Governments and organisations in the region have started to work towards utilising the advantages given by the strategic location and the strong economies to benefit from supply chains. Plans were set to limit dependency on oil and gas production and gain competitive advantage, at the same time. The Saudi government has recently given this issue greater attention in order to advance supply chains, by developing and implementing a transformation plan. Some

of the strategic movements include encouraging job nationalisation, supporting local businesses, improving supply chain, and logistics infrastructure. One of the main objectives of the plan is to offer better connectivity for supply chains in the ME. This official attention to supply chains can offer a leap forward to managing supply chains by enhancing supply chain performance through enforcing drivers and eliminating barriers.

CHAPTER FOUR: CONCEPTUAL FRAMEWORK DEVELOPMENT

4.1 INTRODUCTION

Researchers have studied different variables influencing supply chains, which can act as barriers to the successful management of its processes and practices. Such factors include those in relation to the culture, work environment, information, and interconnections with partners and policies. The human constituent of the process have gained considerable research attention which is clearly represented in the cultural influence over supply chains. Studies emphasised the influence of national culture on supply chain productivity in different parts of the world (Omar *et al.*, 2012; Govindan *et al.*, 2014). As an important part of the Middle East, Saudi Arabia is a large player in the world economy, with a proposal of a transformation plan to diversify the economy and decrease dependency on oil. This study tries to investigate the challenges to the implementation of such a plan by hypothesising supply chain interrelationships to see if they would apply to the context of Saudi Arabia.

4.2 RESEARCH GAP

A review of the literature reveals an increasing interest in the study of supply chain performance, which was demonstrated, by the high number of designated studies to performance and it being the most studied topic in relation to supply chain management. A survey of the literature also shows that there has been very little research into the barriers to managing effective supply chains. However, scholarly studies have focused on the rationale for supply chain management and paid less attention to barriers that are liable to prevent enterprises from managing effective supply chains (Moberg, Speh and Freese, 2003). In addition, papers from the literature review show a considerable number of calls to fill gaps in supply chain performance,

effectiveness and efficiency, whilst dedicated research to examining barriers to highly effective supply chain management is scarce (Luthra *et al.*, 2011; Kabra and A., 2015).

It is seldom to find a paper similar to the study of (Sarkis, 2012), which was designated to studying barriers to green supply chain management. The author identified proximal, organisational, informational, cultural, and legal barriers. Wagner and Bode (2008) identified sources of risks to supply chain management and studied the link between risk sources and supply chain performance. Risk sources were classified into five categories: supply side; demand side; infrastructure; catastrophic; and regulatory. The study findings showed a low impact of supply chain risk sources on the performance of supply chains in Germany (Wagner and Bode, 2008). In a broader search on barriers to supply chain management, it appears that there is very limited research that connects barriers to supply chain performance (Frohlich, 2002; Fawcett, Magnan and McCarter, 2008). Nevertheless, there is fragmented work on barriers to green supply chain management, supply chain integration and coordination (Harland *et al.*, 2007; McCormick and Kaberger, 2007; Luthra *et al.*, 2011; Govindan *et al.*, 2014).

For this study Saudi Arabia has been selected as the context of this research, for two primary reasons: 1) Saudi Arabia is part of an evolving region that is only newly adopting modern supply chain management, and 2) the country has a Government policy specifically targeting supply chain growth and evolution (Vision, 2016).

As has been presented in chapter two, published supply chain studies are broad and vast. However, given this position there has been a limited focus on the relationship between supply chain management barriers to supply chain performance in general. Where studies have been focused on these areas the basis of the analyses has typically been on established supply chain regions such as in Western economies. In addressing this gap, this research focuses on the

83

development of an understanding of the factors that have an impact on supply chain management processes and implementation, which, in turn, have an impact on supply chain performance. From this understanding, the Saudi Arabian context is analysed, with a particular focus on the areas of differential and contrasting barriers that may exist in this newly evolving supply chain region.

4.3 RESEARCH PROBLEM

Studies have focused on the rationale for supply chain management, paying less attention to barriers that prevent enterprises from managing effective supply chains (Moberg, Speh and Freese, 2003). There is an implicit expectation that those consuming current research are already based in a supportive supply chain management ecosystem with limited or no focus on those attempting to break into this ecosystem in the first instance. Thus, while there is a considerable amount of research on supply chain performance, effectiveness and efficiency, research dedicated to examining barriers to highly effective supply chain management is scarce (Luthra *et al.*, 2011; Kabra and A., 2015). In relation to supply chain management barriers related research has been completed with respect to barriers to green supply chain management, and supply chain integration and coordination (Harland *et al.*, 2007; McCormick and Kaberger, 2007; Luthra *et al.*, 2011; Govindan *et al.*, 2014), and some studies have explored the link between risk sources and supply chain performance. However, the literature, overall, is limited with regards to examining barriers to highly effective supply chain management in its own right (Frohlich, 2002; Fawcett, Magnan and McCarter, 2008). Furthermore, Saudi Arabia is a major player in the world market which has set a policy for economic growth and evolution with its main declared focus on enhancing supply chain efficacy. Such improvement for supply chains in the country require an

identification and clear understanding of the challenges which can potentially obstruct this evolutionary plan. Despite the complexity and challenges associated with managing supply chains, limited attention has been given to barriers to effective supply chain management in emerging supply chain markets such as Saudi Arabia.

This thesis intends to fill, and bridge, this gap and therefore two research questions are proposed for this thesis. Firstly, what barriers obstruct supply chains operating in Saudi Arabia? Secondly, how do barriers to supply chain management link to supply chain performance in the country? These questions will be answered by reviewing potential barriers and examining the data through a mixed methods approach - qualitative and quantitative.

4.4 RESEARCH HYPOTHESES

Considering the discussions in chapter two, it was found that there are five main issues being discussed in the literature as barriers to supply chain performance. The challenges are related to practices of connection to culture, organisational structure, information sharing, connectedness practices, and purchase & supply. Each of the barriers have a number of factors which were identified as supply chain challenges different contexts, with no relation to a specific region. This research investigates whether they influence supply chain performance in Saudi Arabia. Hypotheses were developed with consideration to the discussions on each of the barriers in the literature review chapter. Additional hypotheses will be examined as per the developed framework.

All hypotheses are formulated in the context of Saudi Arabia. They are written from a negative standpoint for a number of reasons. First, hypotheses in this research examine barriers

to effective supply chain management. Supply chain barriers are naturally negative. All included factors have been identified as having negative influence on different supply chain contexts (Seuring and Muller, 2008; Mwirigi, 2010; Richey *et al.*, 2010).

The second reason is that respondents were allowed to accept or reject the hypotheses by choosing their position, ranging from strong disagreement to strong agreement to each statement. This can remove any possible bias or misleading effects. Disagreement with the statements indicates that a respondent doesn't see a challenge in the statement. An agreement indicates the existence of that challenge in the context of this research.

A third reason is that not including the word negative in the hypotheses statements will make them very general. The acceptance or rejection of the hypotheses cannot lead to identifying challenges. An example of a neutral statement is as follows: culture has an influence on supply chain performance. In this case, two main forms of Likert scale can be used. One of the forms ranges from a strong agreement to a strong disagreement. The other form of Likert scales ranges from choosing a strong negative influence to a strong positive influence. The two scales are not suitable for identifying challenges. This is because the first option leaves out questions such as what kind of influence the respondent refers to. Is it a good or bad influence? The agreement or disagreement to this statement doesn't lead to identifying challenges because it is not clear as to what kind of influence the respondent refers to. The other form can also cause a diversion of focus on the barriers. This is because responses indicating a negative influence can lead to identifying barriers while, on the other hand, responses with a positive influence can lead to identifying drivers of the supply chain which are not the focus of this research. In line with these arguments, hypotheses have been formulated to test the negative influences of the challenges on effective supply chain management.

It is important to study cultural differences and their consequences on supply chain management because they leave direct influence on business practices (Fawcett, Magnan and McCarter, 2008). Transactions are handled differently in different parts of the world. Issues of trust, connections and power distribution are managed in dissimilar ways with regards to the culture in which each issue arises (Cannon et al. 2010; Su & Zhang 2008; Cadden et al. 2013). These differences place extra burden on supply chain managers and leave them with no choice but to deal with the cases, separately. These issues can cause disturbances to the flow of their supply chains. Therefore, the following hypothesis tests the influence of Saudi national culture over supply chain performance.

H 1: Culture has a negative influence on supply chain performance.

The way an organisation is structured is believed to have a considerable influence on its practices and processes (Jr *et al.*, 2009). A protective managerial formation of firms obstructs easy movement of needed material, authorities and information which can delay the accomplishment of assigned tasks (Melnyk *et al.*, 2009). Supply chains can witness barriers caused by complex managerial structures, heavy involvement of top management and having to deal with suppliers who may not be well suited to meet professional standards (Vaaland and Heide, 2007).

H 2: Organisational structure has a negative influence on supply chain performance.

Integrating information systems can participate largely in the efforts of making data available to supply chain partners. Data availability may be obtained through safe methods, as partners tend to be reluctant to share information or reveal strategies to untrustworthy partners (Hai *et al.*, 2012). Not willing to provide needed information to external or internal supply chain partners leads to complicated processes and increased errors, which can create delays or result in an increased cost of managing the supply chain (IBM Corporation, 2009).

H 3: Information sharing practices and capabilities have a negative influence on supply chain performance.

The importance of connectedness practices appears to have increased attention recently, with a focus on practices such as integration, collaboration, and coordination (Jayant, Gupta and Garg, 2011; Fayezi, O'Loughlin and Zutshi, 2012; Janvier-James, 2012). Not willing to cooperate with relevant partners can cause delays and disturbances to the supply of products and services. Enhanced connectedness practices help ensure adequate delivery, pricing and fairer profit sharing between supply chain partners, as opposed to abstaining from integrating practices by cooperation and coordination (He and Zhao, 2012).

H 4: Supply chain connectedness practices influence supply chain performance negatively.

Planning purchasing and supply processes is fundamental to successful supply chains. The planning process needs to take in consideration the internal and the external factors that might create disturbances to purchasing policies (Jr *et al.*, 2009). Previously prepared alternative

purchasing plans work as a backup, should any disturbance occurs (Mwirigi, 2010). Barriers can arise from not supplying the right items in the right time to the right place, which can be caused by poor purchasing policies (Chen and Yano, 2010).

H 5: Purchasing and supply policies have negative influence on supply chain performance.

As with the previous five hypotheses, all remaining additional hypothesis, are also formulated in the context of Saudi Arabia.

4.4.1 Additional hypothesis:

Interconnection between supply chain management variables have been tested previously in different contexts (Katunzi and Qin, 2010; Sezhiyan and Nambirajan, 2010; Aliei, Sazvar and Ashrafi, 2012; Kushwaha, 2012). Eleven additional interrelated variables are analysed in this study using collected data. Before moving to the actual hypothesis, it is important to briefly visit some of what has gone before in this regard, where (Lambert and Cooper, 2000) looked at issues of culture and organisational structure. The impact of cultural aspects, such as relationships and trust on connectedness practices such as integration, was studied by (Ueltschy, Ueltschy and Fachinelli, 2007; Zhao *et al.*, 2008). Wu, Chuang and Hsu (2014) explored the interrelationship between sharing information and the collaborative culture, with guidance from the social exchange theory to help understand interactional behaviours on supply chain performance. The effect of information technology and sharing on supply chain integration was explored in a study by (Prajogo and Olhager, 2012). Interrelation between purchasing policies and relational contracts, as informal agreements, was tested against a wide range of parameters (Taylor and

Plambeck, 2007). The interconnection between variables in these studies shows insight into relations presented in the additional hypotheses.

Culture is closely related to the structure of organisations which can be seen in organisations with people from similar languages, religion, customs (Wang, 2015). Actions and reactions of people that constitute the organisation influence the movement of information, services and products among supply chains (Hung. Y, et al 2010).

H 6: Culture has a negative influence on organisational structure in relation to supply chain management.

H 7: Supply chain connectedness practices are negatively related to culture.

H 8: Culture is negatively related to sharing information in supply chains.

H 9: Purchasing and supply policies are negatively related to culture.

Hypotheses 6 to 9 test relationships between the cultural variable with other supply chain management variables. Studying the interconnection between all variables can contribute in clearing any ambiguity around the influences of each variable, which will help the process of identifying supply chain management barriers. The cultural influence on supply chain management aspects is inevitable because supply chain management practices are closely related to the people and their ways of doing business (Fawcett, Magnan and McCarter, 2008). The three hypotheses test interrelations of connectedness practices, information sharing and purchasing & supply policies, with respect to the cultural factor. Part of these relations have been explored in

different contexts (Zhao *et al.*, 2008; Lin and Ho, 2009; Taylor, 2014). However, this research is extended to investigate supply chain management and its effectiveness in Saudi Arabia.

H 10: Sharing information between supply chains is negatively related to organisational structure.

H 11: Sharing information between supply chains is negatively related to connectedness practices.

H 12: Purchasing and supply policies are negatively related to sharing information.

Hypotheses 10 to 12 are focused on interconnections between information sharing and other supply chain management variables. This interconnection is examined in the study to help identifying barriers to see how each variable influences other aspects of the supply chain. The three hypotheses test the interrelationships between organisational structure, connectedness practices, and purchase & supply policies with information sharing. These relationships have been discussed in previous research in different settings (Yang, 2013; Taylor, 2014; Panahifar *et al.*, 2015). The proposed hypotheses investigate the relationships between included aspects in Saudi supply chains.

H 13: Connectedness practices are negatively related to organisational structure in relation to supply chain management.

H 14: Organisational structure is negatively related to supply chain purchase and supply policies.

H 15: Purchasing and supply policies are negatively related to supply chain connectedness practices.

Hypotheses 13, 14, and 15 test the relationships between organisational structure, connectedness practices, and purchase & supply policies. These interrelationships have been discussed in the literature (Eng, 2006; Omar *et al.*, 2012). This research is extended to investigate the interconnections within the context of Saudi supply chains. The final hypothesis tests the collective influence of the variables in terms of how they affect supply chain performance.

H 16: The collective influence of supply chain barriers is negatively related to supply chain performance.

The relationships between supply chain management variables in this study are examined in relation to supply chain management in Saudi Arabia. Although testing the variables against performance shows whether these variables act as barriers to supply chain performance, it is important to explore how each variable influences the other variables. Furthermore, the main hypotheses test the interrelation between each barrier and performance, individually, while the additional hypotheses try to examine the relationship from a different perspective. Table 4.1 presents the research hypotheses with consideration to main hypotheses and additional hypotheses.

Table 4.1 Research Hypotheses

Main Hypotheses		
	1	Culture has a negative influence on supply chain performance.
	2	Organisational structure has a negative influence on supply chain performance.
	3	Information sharing practices and capabilities have a negative influence on supply chain performance.
	4	Supply chain connectedness practices influence supply chain performance negatively.
	5	Purchasing and supply policies have negative influence on supply chain performance.
Additional Hypotheses		
	6	Culture has a negative influence on organisational structure in relation to supply chain management.
	7	Supply chain connectedness practices are negatively related to culture.
	8	Culture is negatively related to sharing information in supply chains.
	9	Purchasing and supply policies are negatively related to culture.
	10	Sharing information between supply chains is negatively related to organisational structure.
	11	Sharing information between supply chains is negatively related to connectedness practices.
	12	Purchasing and supply policies are negatively related to sharing information.
	13	Connectedness practices are negatively related to organisational structure in relation to supply chain management.
	14	Organisational structure is negatively related to supply chain purchase and supply policies.
	15	Purchasing and supply policies are negatively related to supply chain connectedness practices.
	16	The collective influence of supply chain barriers is negatively related to supply chain performance.

All hypotheses from table 4.1 are presented in the framework as in figure 4.1 below. The hypotheses test relationships between all included constructs which are represented in figure 4.1 by the hypothesis numbers from table 4.1. Hypothesis 16 tests the collective influence of the five included factors over supply chain performance.
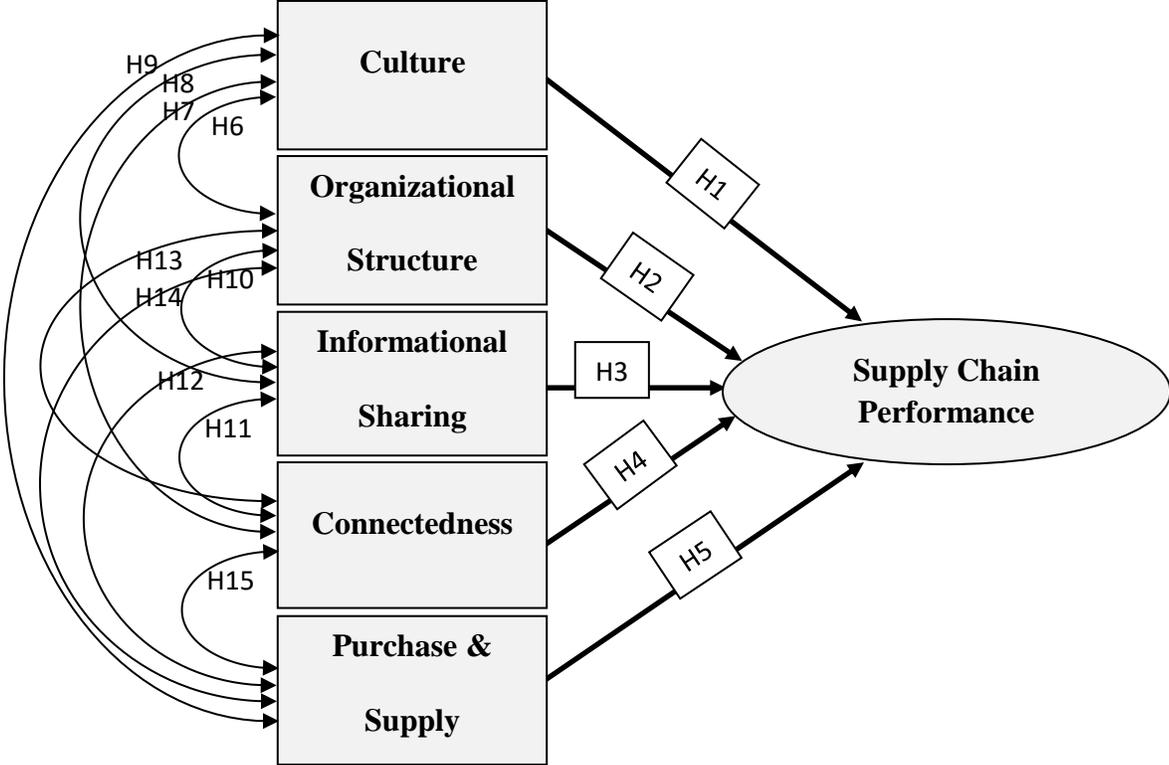
Figure 4.1 Hypotheses relations

CHAPTER FIVE: RESEARCH METHODS

5.1 INTRODUCTION

This chapter provides detailed information on how this study was conducted. It encompasses how the research was designed, planned, sampled, and analysed. It also provides details on the utilised measurement tools and the research execution processes. The study engaged supply chain management practitioners and professionals throughout Saudi Arabia to investigate and obtain perceptions of barriers to supply chain management and its performance. A mixed method approach was used which consisted of surveys and interviews to achieve the stated research aims. As part of creating a thorough understanding of supply chain management and possible barriers, an extensive literature review was conducted and reported on in the preceding chapters. The philosophical stance was selected, with insights from previous research studies and an assessment of suitability to this research. The different research philosophies are presented in the Research Onion, Figure 5.1, which maps available selections where a researcher can follow and decide which methods suit depending on the specific research aims.
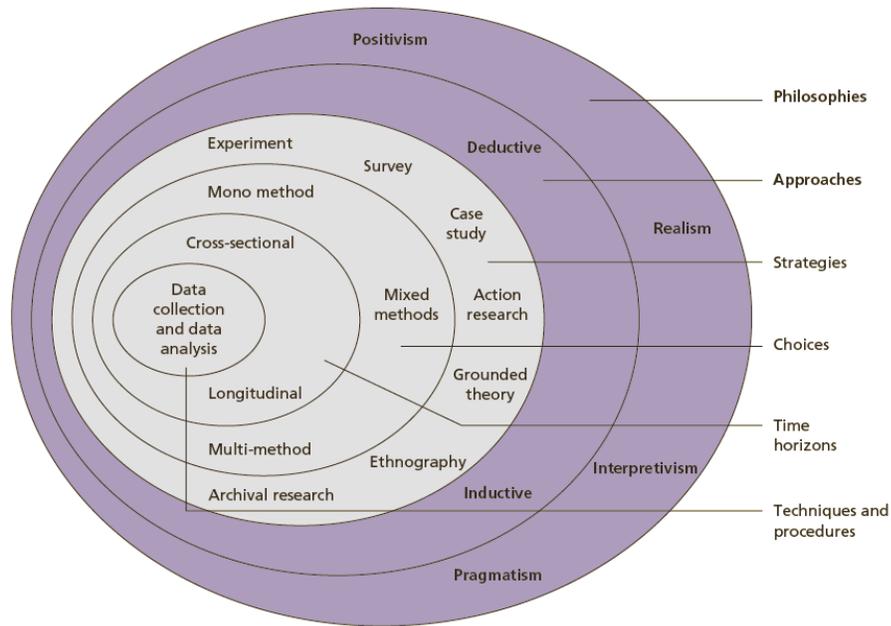
Figure 5.1 The Research Onion. Source: Research Methods for Business Students (Saunders, Lewis and Thornhill, 2009)

The Onion can work as a guideline to determine the research methods for achieving the objectives of research studies, which were utilised in this research.

5.2 RESEARCH PHILOSOPHY

It has been argued that research does not necessarily require extensive philosophical information but researchers should be able to reflect upon philosophical choices and defend them against alternative philosophical choices (Saunders, Lewis and Thornhill, 2009). The majority of research questions can be investigated using qualitative, quantitative, or mixed methods. Therefore, choosing the appropriate paradigm is primary in relation to selecting research methods.

The research paradigm refers to a shared research practice within a research community, carrying with it common characteristics and it addresses a specific problem or a group of problems which are considered important in the development of knowledge (Sommer Harrits, 2011). In practice, it is rare that a research question can be examined with consideration of only one philosophical domain (Saunders, Lewis and Thornhill, 2009).

The selection of research philosophy is also dependent on the type of research question under investigation. The main philosophies used in management include interpretivism, positivism, realism, and pragmatism (Saunders, Lewis and Thornhill, 2009). It is easy to be tricked by the assumption that a research philosophy is better than another while different philosophies are suitable to measure dissimilar things (Saunders, Lewis and Thornhill, 2009). In the context of this research, the choice of philosophy considers how the relationships between supply chain barriers and supply chain performance are viewed in Saudi Arabia.

There are two main dimensions associated with the research paradigm, namely, ontology and epistemology and both have fundamental differences which affect the way research processes are conceptualised (Saunders, Lewis and Thornhill, 2009). Ontology and epistemology are closely related to the philosophical assumption that correlates with the paradigms of positivism and realism (McLaughlin, 2006; Grubic and Fan, 2010;Sommer Harrits, 2011).

5.2.1 Ontology

There are two commonly discussed features of ontology, which are arguably believed to produce informed, reliable, and valid knowledge. These are subjectivism and objectivism (Creswell, 2003; Collis and Hussey, 2010). The difference between the two is that in the subjective view, the existence of social structures is compliant with social actors, whilst in the

objective view, social entities exist independent from social actors (Collis and Hussey, 2010). In general, ontology is known to deal with the nature of reality, where its focus is on the way the researcher sees the world and how it works (Saunders, Lewis and Thornhill, 2009). In objective ontology, it is assumed that the existence of reality is independent from the personal perception of it (Maclntosh and O'Gorman, 2015). In contrast, the interpretive paradigm assumes that reality is subjective and that the comprehension of the social world is not separate from its human actors (Saunders, Lewis and Thornhill, 2009).

5.2.2 Epistemology

The term is used to represent the different conceptions on what could be viewed as "adequate knowledge" in any area of research (Saunders, Lewis and Thornhill, 2009). It examines approaches adopted in natural science and studies their suitability for application in social science. There are three main stances of epistemology, which are positivist, realist, and interpretivist, which can be used to measure or explain different assumptions (Saunders, Lewis and Thornhill, 2009).

The positivist approach can be used to explain interactions and realities (Maclntosh and O'Gorman, 2015). This stance can work with the elimination of researcher biases, if it is analysed statistically or mathematically. Using this method, the researcher assesses hypotheses, leading to modification, rejection, or acceptance depending on the findings of the conducted quantitative analysis (Tillmann Böhme, 2009).

Because the positivist approach does not suit all constructs of realities, the interpretivist approach is used as an alternative (Saunders, Lewis and Thornhill, 2009). Due to the fact that people conceptualise and deal with information differently, scholars argue that the interpretivist

approach can suit social science studies in management. This is because management is dissimilar to other social fields in its operations, approaches, and management (Saunders, Lewis and Thornhill, 2009).

5.2.3 Philosophical approach adopted in this research

This research takes a realism approach that covers the shortcomings arising from interpretivism and positivism. Realism can be divided into critical and direct realism (Saunders, Lewis and Thornhill, 2009; Luke, Kearins and Verreynne, 2011). It is argued that, in critical realism, the researchers' experiences are not from the actual business world but from their perception of it. It integrates features emphasised by the emancipatory approach such as highlighting social justice and promoting personal perspectives. In direct realism, researchers directly grasp the accurate context using the sense they acquire from experience (Saunders, Lewis and Thornhill, 2009; Robson and McCartan, 2016). Realism also suggests that the existence of reality is independent from what is observed (Grubic and Fan, 2010). Ontological and epistemological assumptions are taken from realism, where the quantitative and qualitative methods are not expected to encounter problems complementing each other (Sommer Harrits, 2011), which is fundamental in selecting this approach in conducting this research.

In addition, realism as a methodological orientation is rooted in philosophy and has applications in various fields such as psychology, sociology and economics (Pare *et al.*, 2015). It has been used widely as a philosophical approach in social science for more than three decades and it has currently attracted increased interest as an alternative to other philosophical stances, such as constructivism and positivism (Grubic and Fan, 2010; Maxwell and Object, 2011; Sommer Harrits, 2011; Adamides, Papachristos and Pomonis, 2012; Golicic and Davis, 2012; Rotaru, Churilov and Flitman, 2014; Pare *et al.*, 2015). Realism has also been deemed a suitable

philosophical approach to support methodological and theoretical development in different domains closely connected to operations and supply chain management (Rotaru, Churilov and Flitman, 2014). Realism has no preference towards quantitative or qualitative approaches. It is more focused on the exploratory sides of phenomena and therefore suitable for mixed method investigation and evidence (Pare *et al.*, 2015).

Furthermore, realism helps when looking at supply chains from several perspectives, to acquire a clearer understanding on related phenomena. This can be done through the application of methods that fit different research paradigms (Adamides, Papachristos and Pomonis, 2012). In their examination on suitability of realism for supply chain research, (Adamides, Papachristos and Pomonis, 2012) concluded that realism can be very promising as a philosophical approach. This is because it can give descriptions to the origin of important phenomena, which can neither be explained nor treated by applying nominalistic or positivistic methods. Supply chain performance has to do with people's practices, values, and attitudes, which, to a large extent, can be invisible to decision makers in supply chain management. Without proper understanding and explanation of social practices and structures that hinder supply chains, overcoming the barriers will remain insufficient.

An understanding of research philosophies creates the base on which researchers build research approaches. The necessity of understanding these philosophies comes from the need to know why they have been chosen in conducting any research (Saunders, Lewis and Thornhill, 2009).

5.3 RESEARCH APPROACH

The approach any research takes is the general plan of research activities that aim at answering the questions of that research (Saunders, Lewis and Thornhill, 2009; Easterby-Smith, Thrope and Jackson, 2012). These activities need to include clear research objectives, methods of data collection, research limitations and the related ethical issues (Easterby-Smith, Thrope and Jackson, 2012). Designing a research approach starts with the allocation of the proposed research work within a certain research paradigm. Particular data collection and analysis methods usually follow specific research paradigms; for example, in selecting philosophies, it is essential for a researcher to be able to justify choosing a specific pathway for their research approach (Maclntosh and O'Gorman, 2015).

There are two main methods for data collection - quantitative and qualitative. The term quantitative is used to refer to numeric data that can be collected via research instruments such as survey questionnaires, while the term qualitative refers to non-numeric data collected via techniques such as semi-structured interviews (Saunders, Lewis and Thornhill, 2009). Analysing qualitative data includes data categorization. The analysis of quantitative information utilises statistics and graphs to make sense of collected data. Both approaches were used in this study for data collection, and to help answer the research question.

Although, there are a number of quantitative data collection techniques, such as big data, experiments, surveys and ethnography (Maclntosh & O'Gorman 2015), the survey technique was chosen for this study. The selection of this particular technique is mainly influenced by its suitability for collecting quantitatively measurable and suitable data and because surveys are commonly used in supply chain management research (Cao and Zhang, 2010; Tang and

Nurmaya Musa, 2011; Williams *et al.*, 2013; Dubey, Gunasekaran and Samar, 2014; Choi and Hwang, 2015; Piotrowicz *et al.*, 2015).

This research employs a mixed methods approach in order to acquire a better understanding of the studied phenomena and to see if collected data from the other research methods would confirm findings from analysing the survey data. Semi-structured interviews were conducted with a number of supply chain management employees working in Saudi Arabia. Further explanation, on how the research used quantitative and qualitative methodologies to collect data will be provided later. A deductive data analysis approach was conducted on the survey data utilising factor analysis, regression, mediation, and Structural Equation Modelling. Thematic analysis was then conducted on the semi-structured interview data.

Mixing qualitative and quantitative methods is typically not a natural choice in social science. Recognizing and delineating the purpose of mixed-method approach can assist the reader in conceptualizing the aims and the findings of mixed-methods research. In addition, a clear understanding of the aims behind a mixed-methods approach facilitates the making of well informed decisions about the analysis and design of the research (Venkatesh, Brown and Bala, 2013).

What is significant in employing mixed-methods research in this study is that the semi-structured interviews provide confirmatory and supportive data to that of the survey questionnaire. Interviewing experts and practitioners in the field was used to clarify any ambiguity that was caused by the quantitative analysis of the survey data. The qualitative data analysis provided additional data, which helped present an inclusive understanding of barriers to supply chain management in Saudi Arabia. Figure 5.2 shows possible research pathways, with

different sets of choices that are suitable for the research paradigm, data gathering and data analysis.
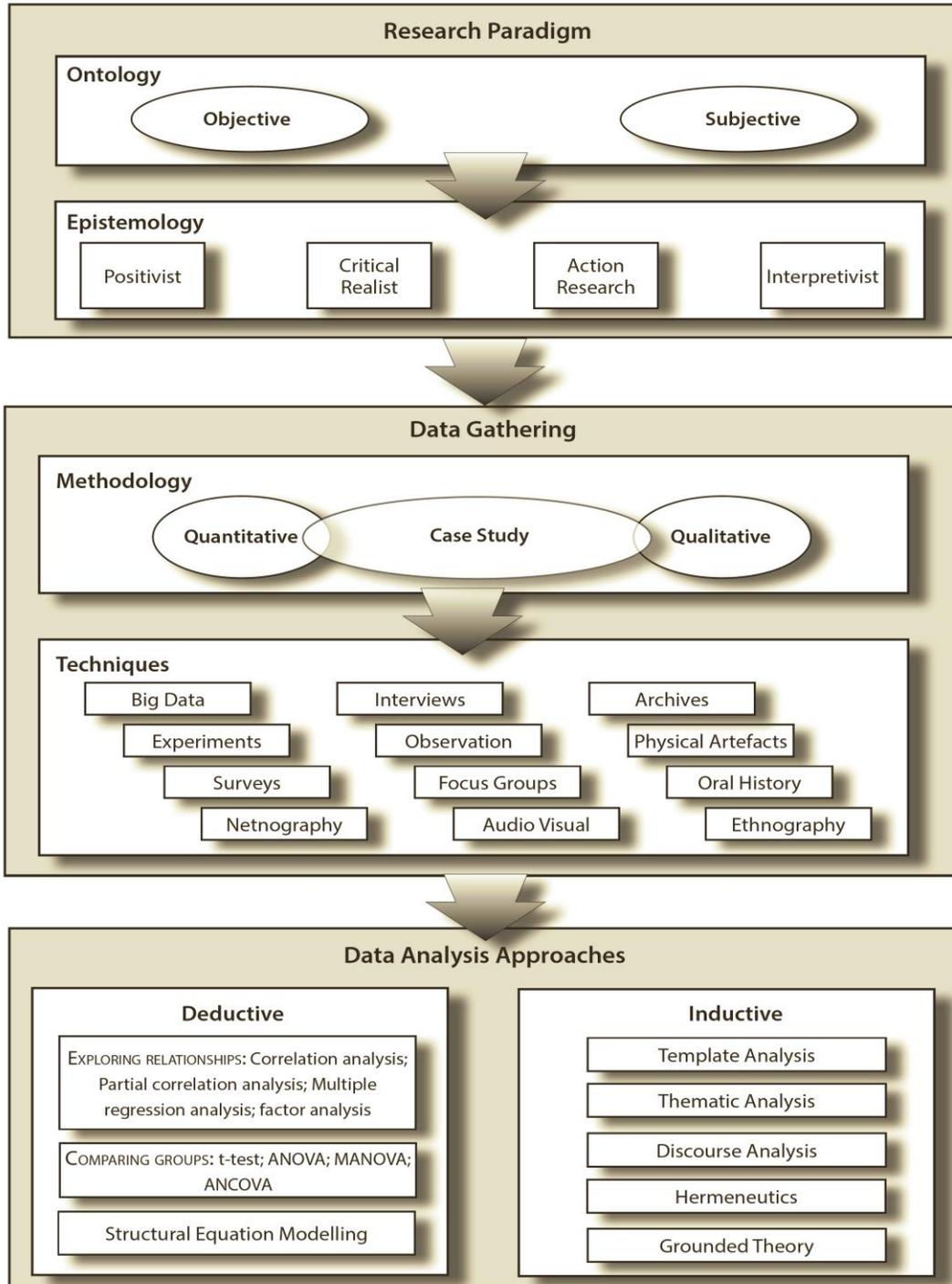
Figure 5.2 Research pathways. Source: Mapping Research Methods. P.51 (MacIntosh and O'Gorman, 2015)

Mixed-methods research can be conducted under three different strategies - sequential procedures, concurrent procedures, and transformative procedures (Creswell, 2003). In the sequential procedure, each method seeks to expand or elaborate on the other. They can be done in two sequences where the qualitative method precedes the quantitative method or vice versa. In the latter, the quantitative method comes first and the qualitative method is used to provide a detailed exploration of the matter using additional information collected from a few individuals or cases. Figure 5.3 depicts the research process that has been followed in this thesis.
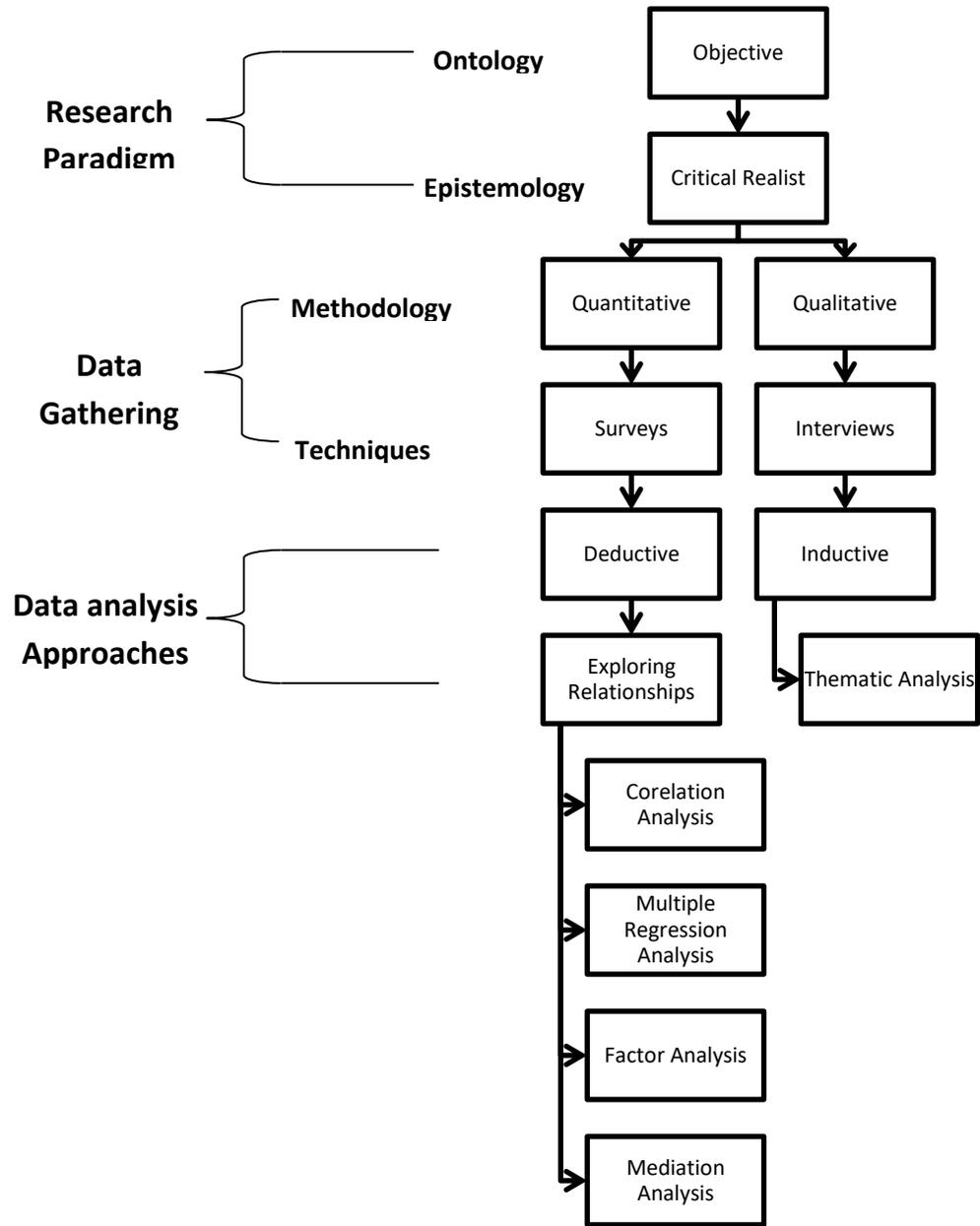
Figure 5.3 Research process

In the concurrent procedure, the researcher employs qualitative and quantitative methods in parallel to each other. In this type of data collection, the investigator collects quantitative and qualitative data, at the same time. Researchers usually need to collect a large number of data for the exploration of their research problem. The third type is the transformative procedure, where qualitative and quantitative data are collected using a theoretical lens. Methods of collecting the data can be concurrent or sequential (Creswell, 2003).

While mixed methods research employs quantitative and qualitative methods of data collection, "Multiple methods" are identified as an approach to combine quantitative and qualitative procedures and techniques. Employing a "multiple method" of the same type can also refer to multiple methods (Saunders, Lewis and Thornhill, 2009). Mixed methods research is utilised in this study based on the advantages and characteristics of research choices presented in Table 5.1.

Table 5.1 Mixed and multiple methods

Research choices	Characteristics	Advantages
Multi-method qualitative study	Combination of more than one quantitative data collection technique, with associated non-numerical (qualitative) analysis.	Different methods can be used for different purposes in a study.
Multi-method quantitative study	Combination of more than one qualitative data collection technique, with associated statistical (quantitative) analysis.	Different methods can be used for different purposes in a study.
Mixed-methods research	Both qualitative and quantitative data collection techniques and analysis procedures are used, either at the same time (in parallel) or one after the other (sequential) but are not combined.	Enables triangulation (corroboration), facilitation (aiding) or complementarily (dovetailing).

Mixed-model research	Combining qualitative and quantitative data collection techniques and analysis procedures are mixed within or across the stages of the research.	Increases confidence and credibility of results. Can uncover deviant dimensions.

Sources: (Saunders, Lewis and Thornhill, 2009; Easterby-Smith, Thrope and Jackson, 2012)

Because mixed methods are known for their greater generalisability and better justification of approach selection (Saunders, Lewis and Thornhill, 2009; Seuring, 2011a; Sommer Harrits, 2011; Golicic and Davis, 2012; Venkatesh, Brown and Bala, 2013), they were employed in this study. The purposes of mixed-methods research were presented by (Venkatesh, Brown and Bala, 2013), as seen in Table 5.2.

Table 5.2 Purposes of mixed-methods research

Method	Description
Complementary	Mixed-methods are employed to get complementary ideas about one relationship phenomenon.
Completeness	Mixed-methods are used in order to ensure having a complete overview of phenomenon.
Developmental	(Sequential mixed-methods) take questions from the interfaces of previous research strand; or hypothesis under investigation are provided by a previous strand.
Expansion	Mixed-methods are utilised to expand or explain the findings gained from an earlier strand.
Corroboration/ confirmation	Mixed-methods are employed to evaluate the credibility of interfaces found in a previous strand.
Compensation	Mixed-method is used to compensate for weakness of one research approach by using another.
Diversity	Mixed-methods are utilised in order to acquire different ideas on the same phenomenon.

(Venkatesh, Brown and Bala, 2013)

It is important to note that the weight of each method in a mixed-methods approach is not necessarily equally distributed. Collected qualitative and quantitative data can vary in size and depth of investigation of the research problem. Figure 5.3 shows how the weight and timing of mixed-methods approaches may vary (Golicic and Davis, 2012).
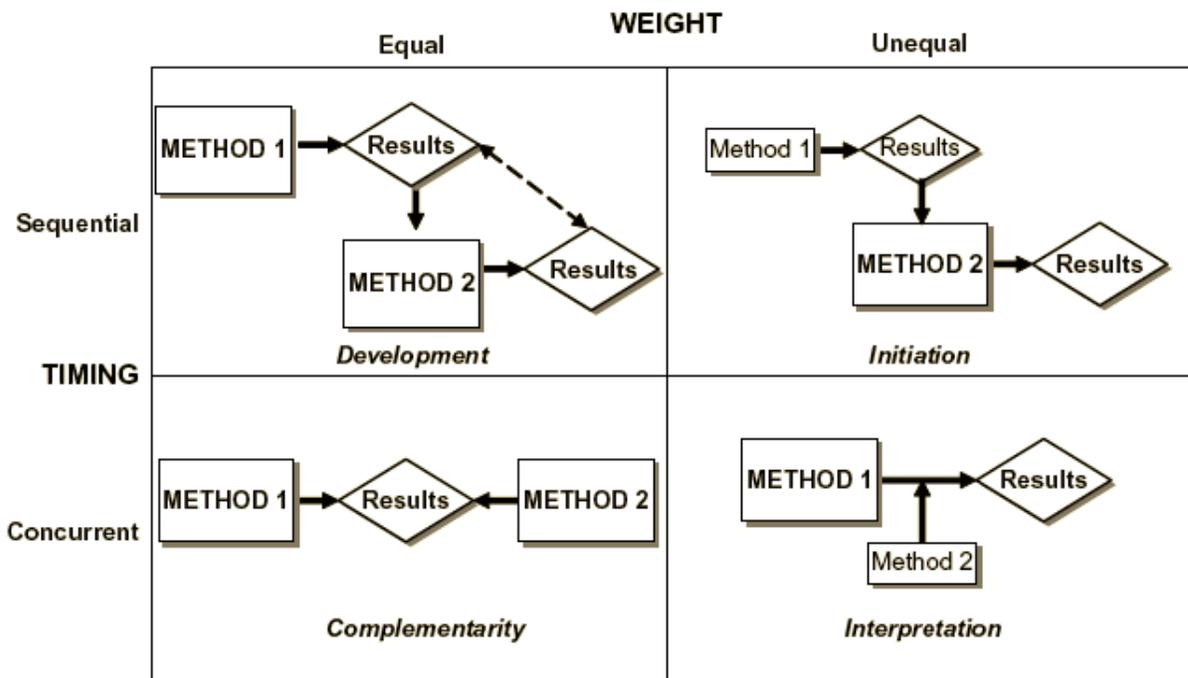
Figure 5.3 Mixed-methods weight and timing. Source: (Golicic and Davis, 2012)

The research presented in this thesis takes a slightly different approach to the ones presented in Figure 5.3, where the first method (method 1) was developed based on wide literature. The second method (method 2) was developed based on the same literature, with insights from the analysis of collected data from (method 1). This approach was taken to support

the collected data for method 1. The relationship between method 1 and method 2, in this research, is more complex in the sense that method 2 was also developed depending on the same sources of previous findings, and not solely dependent on findings from method 1. A similar mixed method approach was previously followed to study supply chain issues (Fawcett *et al.*, 2007). The Initiation method is close to the mixed-method employed in this study. It suggests that method 2 is developed based only on the findings of a previous research strand (method 1), which is not the case in this research. Figure 5.4 presents the mixed-methods approach of this research.
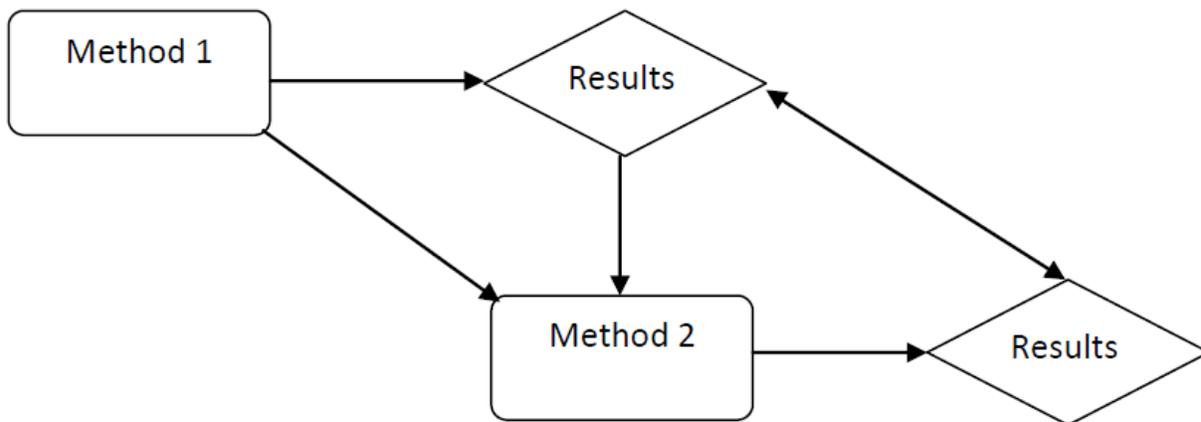
Figure 5.4 Mixed-methods plan

This research is composed of three main phases: 1) Developing a conceptual model based on literature; 2) factor exploration using a self-completing survey; 3) and factor confirmation, employing semi-structured interviews. Figure 5.5, below, shows the methodology used in this study.
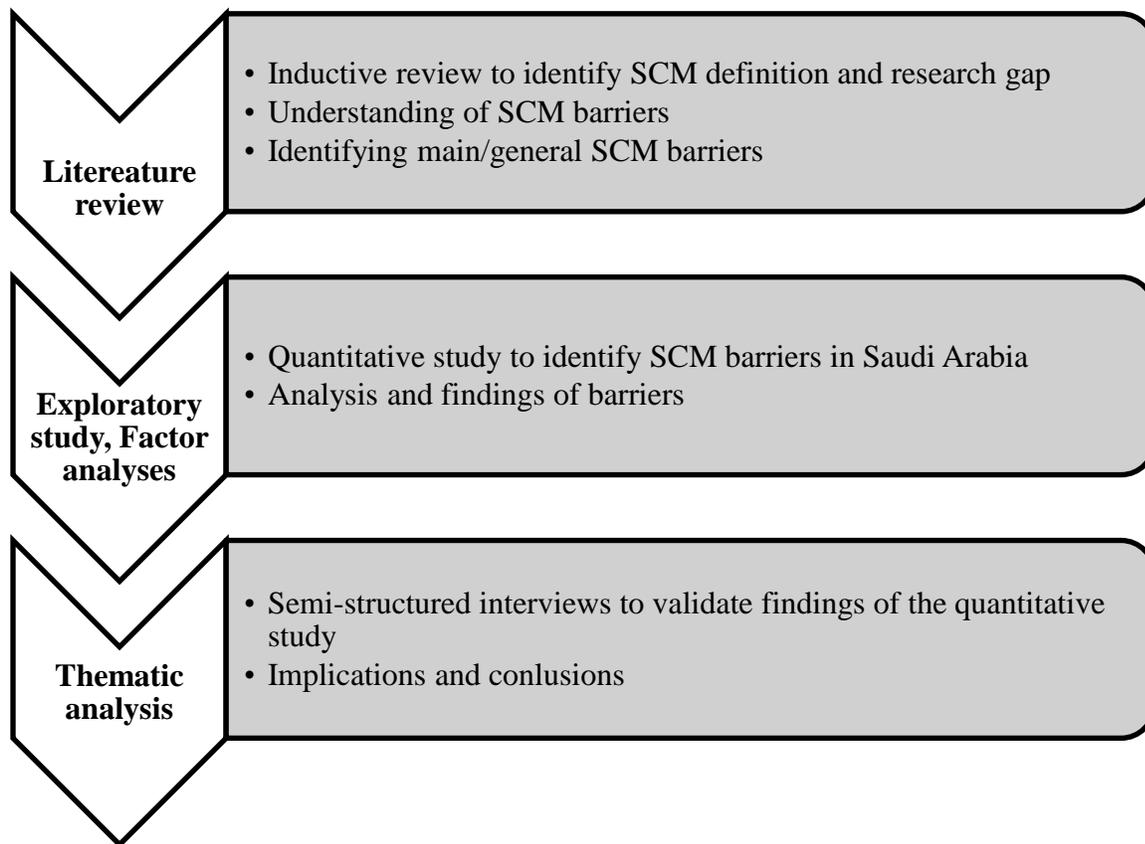
Figure 5.5 Research methodology

5.3.1 Literature review method:

In addition to the importance of literature reviews in presenting previous knowledge in the field, they provide the researcher with assistance at different stages of the study. They help in identifying the path that the researcher will take; selecting the research method; and discussing collected data. The contribution of literature at every stage of research is displayed in Table 5.3.

Table 5.3 Literature contribution

Question	It helps identify research topic, question and hypothesis
Contribution	It helps identify the literature where the study is going to leave a contribution

	It provides contextual placement of the study within the body of literature
Conceptualization	It helps understanding theoretical concepts and terminology
Bibliography	It facilitates building a list of used sources
Methodology	Literature provides suggestions on useful research methods
Analysis	Literature helps analysing and interpreting research results

Source: (Rowley and Slack, 2004)

As commonly and recently used in supply chain literature (Golicic and Davis, 2012; Seuring and Gold, 2012; Shi *et al.*, 2012), an inductive methodology was followed in conducting the literature review for this study. Literary data collection methods were also carefully selected and used to gather needed information on variables, which were analysed to provide a clear understanding of the main factors and concepts. As this research employs mixed methods, the collection of quantitative and qualitative data went through carefully selected methods that fit the objectives of this research.

5.3.2 Quantitative method

The first phase of data collection started with quantitative data collection, through a self-completion survey. The survey was developed by the researcher based on existing literature around barriers to supply chain management. Survey items were collected, treated for repetition, and clustered under constructs. Included factors were either results from published research or conclusions from discussions of the domain. The survey was sent to a wide range of supply chain management organisations for response collection. It targeted a wide array of Saudi Arabian private and public sector organisations, aimed at collecting responses from employees who have knowledge and expertise on supply chain processes and practices. The study sample represented

companies of small, medium, and large sizes. Companies of different activities such as production, manufacturing, distribution, and services embody a good sample for the purpose of this study. Afterwards, statistical data analysis techniques were utilised to evaluate collected data from the survey.

5.3.2.1 Survey sampling

The primary goal of the survey is to collect and analyse data on supply chain management barriers in Saudi Arabia and test the research hypothesis. Invitations were sent to 1300 organisations. The list of 1300 contacts was self-developed. Contacts of respondents were collected from two main sources. The first is a commercial directory, which is produced by the Ministry of Commerce and Industry in Saudi Arabia. This directory lists only registered companies, but only contains contact information in some cases. 415 suitable organisations with relevant contact details were extracted from this directory following which invitations were sent to these potential respondents.

Several steps were taken to collect contact information of the listed companies that had no contact details listed in this directory. The names of these companies were identified and searched for using Google search. Company names were shortened or corrected, where needed, in order to reveal results. Following this, the websites of the companies were explored. In many cases, listed companies did not have email address contacts on their web pages or they did not have a web page at all. There was a major issue with this directory in the way that companies on it are digitally stored and sorted; the directory lists random company names that may reappear in the following pages if the web page is reopened. Therefore, every time a page with the exact

number was visited, the list of companies was not the same. Due to this idiosyncrasy much time was devoted to extracting the 415 relevant contacts from this list.

To extend the target population, a second source of contacts was extracted from an additional Saudi Arabian commercial directory (Daleeli), which provides the names of companies, their phone numbers, fax numbers, and their web page links. This directory was better in the way it was sorted. Contacts were collected from the directory by visiting all its pages, which were categorised regarding the activity of each company. Then, website links were followed to find the email contacts on the web page of each company. On some occasions, the directory listed the email addresses of the company. This directory has 51 online pages. Each page has 26 categories. Under each category, there was a list of companies. Sometimes, there was no name for companies under a specific category, while in other cases there were more than a thousand companies listed.

The collection of contact information from this directory again took a significant amount of time and effort. This is because 51 pages were explored, 1300 categories were followed, and tens of thousands of listings were reviewed. The difficulty with the collection of this data included the fact that a significant number of the listed companies did not have websites and, even if some companies have pages, they did not necessarily list an email contact. Therefore, companies were reviewed one by one to collect needed information via online means. The result of this led to the collection of contact details for an additional 716 Saudi companies, who were all invited to respond to the survey questionnaire. In many cases, there was more than one email address for a single organisation, which increases the probability of receiving a response. The target of this survey is to reach respondents such as supply chain managers, procurement managers, inventory managers, sales managers, logistics managers and supply chain and logistics

academics. In addition, 169 invitations to complete the survey were sent to additional Saudi supply chain management professionals through other means, such as personal contacts, LinkedIn, Facebook, Twitter, and text messages.

5.3.2.2 Quantitative questionnaire design and data collection

This research investigated literature on barriers to supply chain management, with barriers identified and classified under larger categories. Initially, there were eight sections in the survey. Six were designed to investigate barriers; one was aimed at collecting demographic information about the respondents; the final section aimed at gathering contact data from the respondents. The survey questionnaire was sent to ten employees at different organisations for the purpose of pilot testing. Their recommendations were taken into consideration, which led to some amendments to the completed questionnaire. In alignment with the pilot study recommendations, long surveys may result in less respondent engagement and boredom, which leads to what is known as 'respondent fatigue' in self-completed surveys (Hess, Hensher and Daly, 2012).

Therefore, the survey was summarised into 26 Likert scale questions, under five main sections. To reduce the number of questions, inclusive statements were developed to encompass factors that can fall under one statement. The sixth section collected demographic data and it was optional. Questions in this questionnaire have two main goals, where the first is to measure identified barriers and the second is to measure performance. All items in the first five sections were measured on 5-point Likert scales. Likert scales were previously used in supply chain management research to collect measurable data (Couper, Traugott and Lamias, 2001; Bagchi *et al.*, 2005; Juttner, 2005; Wolfe, Phillips and Asperin, 2014).

The survey was first written in English and then translated into Arabic in order to avoid misunderstanding and to get accurate responses, as most, if not all, respondents are Arabic speakers. As suggested by (Mitchell and Jolley, 2012), to get the most out of the survey, questionnaire design criteria in Figure 5.6 were followed.

Questions were specific and short.

Questions were classified into five groups corresponding to factors in order to look professional and to eliminate participants' likelihood to misunderstand questions.

Information about the questionnaire was presented to respondents in advance to their actual response.

Explanation to response scale and objectives of each section was provided.

Clear directions on how to respond were provided.

Section of demographic questions was at the end.

Responses of the survey were formatted in a way that allows them be imported directly into quantitative data analysis software.

Figure 5.6 Questionnaire design criteria

The five sections of the survey were organised in the following order: culture, organisational structure, information sharing, connectedness practices, and purchase and supply. To eliminate random selection of answers, a selection of questions set the first position (on the Likert scale) to indicate the lowest level of perception and the fifth to indicate the highest. An example of this is asking participants to select an answer from the following options: not at all

influential, slightly influential, somewhat influential, very influential, and extremely influential

The remaining questions simply flipped these positions with the first position indicating the highest level of perception and the fifth to indicate the lowest. For example, respondents were requested to select one of the following Likert scale options: strongly agree, somewhat agree, unsure, somewhat disagree, and strongly disagree. These were reversed during the analysis to maintain consistency of direction from low to high perception for all survey questions.

In addition to reduce respondent perception and potential bias, questions on performance were embedded within the survey sections and not all presented in one section of their own. Following survey completions, these performance related questions were extracted from their original position within the survey and added to a separate performance section during the analyses. The entire survey was designed to be completed within 10 to 15 minutes. A brief explanation for each section was provided, before respondents were asked to provide their answers. Questions of the survey were derived from literature discussions. The tables 5.4 to 5.9 show particular sources for each of the survey questions. Details of the questionnaire sections and their contributing literature sources are as follows:

A. Culture: this section aims to identify the influence of cultural aspects as barriers to supply chain management and its performance. There are six questions under this section. Respondents were asked to select the most relevant answer from the following 5-point Likert scale options: not at all influential, slightly influential, somewhat influential, very influential, and extremely influential.

Table 5.4 Culture questions

Q	Statement	Source
1	In our culture, power and relationship influence commitment between supply chain partners and customers	(Zhao *et al.*, 2008)
2	Unwritten rules, practices and customs influence our supply chain	(Roth, Tsay and Gray, 2007)
3	In our culture, trust (internally) between leaders and subordinates influences our supply chain	(Cannon *et al.*, 2010)
4	In our culture, trust (externally) between supply chain partners influences our supply chain	(Cannon *et al.*, 2010)
5	In our culture, personal communication such as 'telephone calls and visits' influence supply chain performance	(Ueltschy, Ueltschy and Fachinelli, 2007)
6	In our culture, frequent personal contact influences supply chain performance	(Ueltschy, Ueltschy and Fachinelli, 2007)

B. Organisational structure: this section identifies the influence of organisational structure as a barrier to supply chain management and its performance. There are five questions under this section. Respondents were asked to select the most relevant answer from the following five-point Likert scale options: no effect, minor effect, neutral, moderate effect, and major effect.

Table 5.5 Organisational structure questions

Q	Statement	Source
1	Employees of the organisation affect our supply chain performance	(Fawcett, Magnan and McCarter, 2008)
2	Senior management involvement in operational decisions affects our supply chain	(Archer, Wang and Kang, 2008)
3	Organisational structure where I work influences communication and, consequently, our supply chain	(Fawcett, Magnan and McCarter, 2008)

| 4 | Larger buyers (customers) affect our supply chain | (Vaaland and Heide, 2007) |

C. Information sharing: this section identifies the influence of information sharing as a barrier to supply chain management and its performance. There are five questions under this section. Respondents were asked to select the most relevant answer from the following five-point Likert scale options: strongly agree, somewhat agree, unsure, somewhat disagree, and strongly disagree.

Table 5.6 Information sharing questions

Q	Statement	Source
1	Data availability improves our supply chain performance	(Mwirigi, 2010)
2	Compatibility of information systems improves our supply chain performance	(IBM Corporation, 2009)
3	Willingness to share information externally/ internally in the organisation improves our supply chain	(Fawcett and Magnan, 2001; Richey *et al.*, 2010)
4	Superior information sharing capabilities enable better operational performance of our supply chain	(Harland *et al.*, 2007)
5	Advances in information systems' security improves our supply chain	(Zhang and Li, 2006)

D. Connectedness: this section identifies the effects of connectedness practices as barriers to supply chain management and its performance. There are five questions under this section. Respondents were asked to select the most relevant answer from the following five-point Likert scale options: no effect, minor effect, neutral, moderate effect, and major effect.

118

Table 5.7 Connectedness questions

Q	Statement	Source
1	Cooperation and communication affect our supply chain performance	(Seuring and Muller, 2008)
2	Supply chain integration affects our supply chain cost	(Frohlich, 2002)
3	Supply chain collaboration affects competitive advantage of our supply chain	(Tillmann Böhme, 2009)
4	Integration of departments affects our supply chain performance	(Archer, Wang and Kang, 2008)
5	Our customers' willingness to embrace change affects supply chain integration	(Frohlich, 2002)

E. Purchase and supply: this section identifies the effects of purchase and supply practices as barriers to supply chain management and its performance. There are five questions under this section. Respondents were asked to select the most relevant answer from the following five-point Likert scale options: strongly agree, somewhat agree, unsure, somewhat disagree, and strongly disagree.

Table 5.8 Purchase and supply questions

Q	Statement	Source
1	Our organisation's real demand closely matches forecasted demand	(Archer, Wang and Kang, 2008)
2	Our supply chain experiences volatile demand patterns	(Archer, Wang and Kang, 2008)
3	Having supplier companies of different trade orientations affects integration of our supply chain	(Hai *et al.*, 2012)
4	Our organisation pursues low level of inventory	(Vaaland and Heide,

		2007)

F. Supply chain performance: As described earlier the questions presented in this section have been extracted from across the five different sections in the survey, as supply chain performance related questions were embedded throughout. This was conducted in this fashion to ensure accuracy of response in a general sense, without being overtly focused on the term "supply chain performance" and to reduce potential respondent bias. There were eight questions in this regard, as presented in Table 5.9.

Table 5.9 Performance questions

Q	Statement	Source
1	In our culture, personal communication such as 'telephone calls and visits' influence supply chain performance	(Ueltschy, Ueltschy and Fachinelli, 2007)
2	In our culture, frequent personal contact influences supply chain performance	(Ueltschy, Ueltschy and Fachinelli, 2007)
3	Employees of the organisation affect our supply chain performance	(Fawcett, Magnan and McCarter, 2008)
4	Larger buyers (customers) affect our supply chain	(Vaaland and Heide, 2007)
5	Compatibility of information systems improves our supply chain performance	(IBM Corporation, 2009)
6	Advances in information-systems'-security improves our supply chain	(Zhang and Li, 2006)
7	Cooperation and communication affect our supply chain performance	(Seuring and Muller, 2008)

The following section of the survey provided demographic information about the participants to give a contextual framework for the survey. Collected data included level of respondents within their organisations, group or profession of respondents, qualifications, number of supervised employees, and contact information. This final section was left optional, as requiring personal information can deter respondents.

5.3.2.4 Contact and Distribution Strategy:

The main distribution media was electronic invitations. Contacts of companies were collected from the directory produced by the Ministry of Commerce & Industry and the Daleeli directory. A cover letter was attached, including the surveyor information, contact details, and the purpose of the survey. This aimed at helping respondents understand why they were targeted. The letter included a statement, assuring respondents of the confidentiality of their identities and their responses. It also included the expected time needed to complete the survey, which is 10-15 minutes. The population of the survey included personnel of different levels in their organisations, including owners, senior management, middle management, and staff members. Specifically, supply chain, procurement, inventory, purchasing, expediting, import/export, operations, and logistics managers of organisations were sampled in the study.

Survey Monkey is an online survey tool that is widely used to send surveys to groups of respondents all over the world. It was utilised to collect responses. A link of the survey was distributed to respondents via email, text messages, and social media. This method helps eliminate the complications of negligence and spam issues that may arise from attaching the survey to an email message. This strategy helped having respondents fill the survey online,

which is easier, faster, and cost effective. Respondents were sent a survey reminder asking for them to complete the survey during a second round follow up and a 'thank you' message was sent to those who finished the survey.

5.3.2.5 Quantitative data analysis: Factor, regression and mediation

Researchers use factor analysis to study and constitute the correlational structure between variables under investigation (Tinsley and Tinsley, 1987; Field, 2009). Factor analysis is mainly used to interpret the structure of a group of constructs; to measure a latent variable by constructing a questionnaire; and to reduce the collected information into a scale that is workable without losing the input created by the original data (Field, 2009). The study also employs regression analysis. This type of analysis can be divided into simple regression and multiple regressions. Multiple regression tests the scores of included variables. This type of analysis is employed when there are multiple predictors but only one criterion. Scoring weights are developed to reduce predictors to a single criterion (Tinsley and Tinsley, 1987).

In multiple regressions, variables are classified into constructs to determine which variables effectively create barriers. The classification includes variables of culture, organisational structure, information sharing, connectedness practices, purchase and supply polices and supply chain performance. The regression method is used to establish factor scores for each variable. In the last step, the factor scores from variables are used to assess the relationships between the barriers and supply chain performance.

Mediation analysis is also employed in this research to test the influence of culture on the relationship between independent variables and performance. In this analysis, the mediating variable is culture, and the independent variables are organisational structure, information

sharing, connectedness, and purchase & supply. In addition, Structural Equation Modeling has been conducted on the collected data. This analysis tests the model fit for running the analysis on the data. It examines the relationships between all included items in the model and shows outliers and errors in relationships.

Although, the survey method alone has limitations in conducting supply chain management research (Cadden, Marshall and Cao, 2013), this survey is a good tool in the investigation of barriers to supply chain management. When a lack of previous academic studies arises, surveys are helpful in generating ideas about the studied problems. Hence, this survey presents a solid foundation for the conducting of further research on barriers to supply chain management in Saudi Arabia, both in the remainder of this thesis, and beyond. The survey is inclusive of supply chain personnel from diverse organisations and at multiple organisational levels, giving a comprehensive understanding of the challenges facing supply chain management in the region.

Because of the limitations from only conducting a quantitative method, in carrying out supply chain management research (Cadden, Marshall and Cao, 2013), the semi-structured interviews were deployed to compensate for these limitations and to provide supportive data to the survey study. The interviews can help better understanding and deeper insights of research issues as candidates answer the questions in much more detail. This method can also help testing issues from the quantitative study with more understanding and exploration. In addition, semi-structured interviews are conducted in an informal atmosphere which can encourage participants to be more open and expansive. More valid understanding of the respondents' attitude, values and opinion about the researched issue can be obtained via the interview method.

5.3.3 Qualitative method

The second phase of data collection continued with the qualitative data collection, employing semi-structured interviews. The interviews have been conducted with supply chain management employees of a number of Saudi organisations. Interviewees represent managers and experts who have knowledge and experience of supply chain practices in Saudi Arabia. Targeted managers were employed by organisations' in different supply chain domains, such as production, manufacturing, distribution, and services were included in the sample of this study. Qualitative data analysis techniques were utilised to evaluate collected data from the interviews.

5.3.3.1 Sampling

Semi-structured interviews, as a qualitative method, were mainly focused at looking at supply chain management barriers from a practical point of view. Since the survey questionnaire was drawn from the literature, the qualitative interviews allowed more space for practitioners to add what might be specific to the context of Saudi Arabia in the study of barriers. Fifteen interviews were conducted with supply chain management candidates. Respondents from the survey questionnaire who provided their contact information were invited for interview. Two of the original survey respondents responded in the affirmative and were thus interviewed. The remaining 13 respondents were invited to take part in an interview via email messages and through LinkedIn. They were contacted through personal contacts, LinkedIn searches, and recommendations from other candidates.

5.3.3.2 Qualitative data collection

Researchers who employ semi-structured interviews need to consider some interviewing techniques, one of which requires that questions need to be understood clearly by the

interviewees. Additionally, the interviewer needs to make sure the interview questionnaire presents questions that are reliable as indicators to the research objectives. (Luke, Kearins and Verreynne, 2011) provide a guideline of nine suggestions an interviewer needs to consider in conducting semi-structured interviews. These suggestions are as follows:

1. Set a plan for the interviews, prepare typed topics and questions, and think of different orders for arranging the questionnaire.

2. In the beginning of the interview, explain the purpose of the interview, and how the interview data will be used. Assure interviewees that confidentiality and anonymity are protected. Ask for permission to record the interview or to take notes.

3. Start the interview with general background questions that should represent important information.

4. Make sure the questions under investigation are broad and open-ended. For example, 'Tell me the story of …'

5. Avoid asking leading questions. If following up on an observed behaviour you might ask 'What did you mean when you said . . .?' but not 'When you said . . . did you mean . . .?'

6. To get further and deeper answers, be careful in using probes. For example, ask 'Can you give me an example of that?'

7. Staying silent can encourage the interviewee to continue.

8. In approaching the end of the conversation ask further questions such as 'Is there anything further you would like to add?'

9. Check the tapped recording and fill-in gaps in notes. Conclude with recording impressions on the interview (Luke, Kearins and Verreynne, 2011)

With consideration to the provided suggestions, the interview questionnaire was planned, typed up and arranged in a way that allows enough freedom in discussing its issues. An introductory question was developed to warm up the discussion and let respondents provide important information. Additional questions were prepared in case the respondent is not sure what was meant by questions or if they fall short in answering a particular question. Permission to record and take notes was always obtained prior to the interview. The interviewer asked respondents to comment on identified topics from the literature and the survey to provide supportive data to what was found using the quantitative research method.

5.3.3.3 Qualitative data analysis: Thematic analysis

Collected data from the semi-structured interviews was then tested thematically. Thematic analysis refers to the identification and analysis of patterns of meaning found in a specific set of data (Joffe, 2011). Specifically, it is a method used to identify, analyse and report patterns in the collected data, which helps provide organised, descriptive and rich interpretation of data (Braun and Clarke, 2006). In order to be able to correctly identify themes, the analyst needs to understand what counts as one. Themes grasp important aspects about the data set that have connection to the research question, representing a level of pattern or concept that is found in the analysed data (Braun & Clarke 2006).

This research employs thematic analysis primarily for identifying, interpreting, and explaining the different aspects in relation to the research topic. The adoption of this method in the research comes from its suitability to analyse collected data, with respect to the research objectives. In addition to other advantages, thematic analysis is also an appropriate match to the research paradigm. To ensure a thorough analysis, the six steps proposed (Braun and Clarke, 2006) were followed. The steps are familiarisation with data, generation of initial codes, search

for themes, revision of themes, definition and naming of themes and, finally, production of the report. The report shows connections of qualitative data in answering the research question.

The research gap was identified based on a literature review of barriers to performance of supply chain management in Saudi Arabia. All identified items of the survey questionnaire and the semi-structured interviews were aimed at answering the research questions. Two research questions are proposed for this thesis, based on the foregoing research background:

1. What barriers obstruct supply chains operating in Saudi Arabia?
2. How do barriers to supply chain management link to supply chain performance in the country?

5.4 RESEARCH TERMINOLOGY

Terms used in this research have been used in different contexts. This can cause different perceptions of what they might mean to the reader. Terms such as supply chain management, supply chain performance, and their associated meanings, are issues of discussion in various literature publications (Stock and Boyer, 2009; Forslund, 2012; Janvier-James, 2012). To avoid complications and to provide clear understanding of what is being investigated in this study, the adopted definitions of the main terminology are listed in Table 5.10.

Table 5.10 Adopted definitions

Term	Definition	Source
Supply chain management	SCM is managing the upstream and downstream operations of the supply chain by coordinating activities and sharing information, to ensure the flow of goods and services at the quantity required and to fully	(Alhashim, Kumar and Byrne, 2014)

	meet demand, leading to performance optimization, long term profit maximization and cost reduction.	
Supply chain performance	The general effectiveness and efficiency of supply chain management.	(Kumar & Nambirajan, 2013)
Culture	Culture is inclusive of all the social habits, skills, customs, laws, art, information, ethics, and beliefs, which are introduced to the individual.	(Aksoy *et al.*, 2014)
Organisational structure	The set of group structures expressing the design of a multi-agent organisation scheme.	(Ferber and Gutknecht, 1998)
Information sharing	A set of three or more entities (organisations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer.	(Bagchi *et al.*, 2005; Kembro and Naslund, 2014)
Connectedness practices	The dependence among different individuals, departments, or organisations on each other for assistance, information, commitment, or other coordination activities.	(Cheng, Lee and Chen, 2014)
Purchase and supply	Actions of setting plans, implementing them, evaluating results, and controlling operational and strategic purchasing in order to serve the organisation's objectives in the long run.	(Chicksand *et al.*, 2012)

5.5 RESEARCH ETHICS

In this research, the ethical issues were considered during all phases. This study was conducted with informed consent from participants. They were fully informed about the nature, use, and purpose of the study to be conducted and their role within the research. All participants were volunteers and they were provided with relevant information before taking part in the research. This included clarification on why they were chosen to participate and why their input is considered valuable. In addition, participants were provided with information about the types

of data to be collected, and how it would be utilised to perform this study. In conducting the surveys and the semi-structured interviews, data protection issues were considered. Names of respondents and their companies were removed from the collected data during the process of analysing the data. Under the ethical guidelines of Dublin City University, for data confidentiality in conducting social science research, interviewees were asked in advance for permission to electronically record the interviews.

5.6 SUMMARY

This chapter provided details on the methodological aspects, research approaches, and analytical pathways of this study. The extensive investigation of literature and past research led to the gap that this research aimed to address. Quantitative and qualitative approaches were employed in this research, involving a survey and semi-structured interviews, respectively. Following data collection, quantitative data was analysed, using factor, regression and mediation analysis techniques, while the quantitative data was analysed utilizing a thematic analysis approach.

CHAPTER SIX: QUANTITATIVE DATA ANALYSES

6.1 INTRODUCTION

This chapter presents the results of the survey that was conducted to assess supply chain management barriers in Saudi Arabia. In this chapter, a number of statistical analyses were performed, which include factor analysis, reliability analysis, regression, and mediation analysis. The model that was developed for this study has six constructs: supply chain performance, culture, organisational structure, information sharing, connectedness, and purchase & supply. The first form of analysis is dimension reduction analysis (factor analysis), which aims to test the constructs to see if the data is good for factor analysis. Next, regression analysis is conducted to study the influence that supply chain barriers have on supply chain performance. Finally, because culture is a key element in this study, it was used as a mediator in mediation analysis to test its influence on the effectiveness of supply chain management in Saudi Arabia, which concludes the quantitative analysis part of the study.

6.2 QUANTITATIVE DATA: DESCRIPTIVE ANALYSIS

The collection of data resulted in 371 survey responses, with an overall response rate of 28.5%. This collected data was then reviewed, cleaned and tested for validity. Special care was taken to select all representative cases and a number of steps were taken to select the best data set for running the analyses. Missing values were treated by adding the means of collected data for each question in the survey. In the process of cleaning the data, cases were tested by running the analyses on data sets with 2,3,4,5 and 6 missing values. A comparison of the results from running the analyses on all data sets led to the selection of 181 cases for the analyses. With only

four no response to variables, the maximum missing data in a singular case is 16%, which is within the acceptable rate. Usable responses accounted for 13.9% of sent invitations.

Response rate was influenced by the fact that supply chain management is new to Saudi Arabia, thus, the survey was directed only to employees with a special interest in supply chain management and conservative business culture, where organisations restrict participation in surveys. Some organisations only allow participation in research within the entity and any outside research activity has to be processed through their research and development department which leads to complications and a slowing down of the process. Encountering a similar response rate is not new in studies relating to supply chain management (Bagchi *et al.*, 2005; Juttner, 2005; El-Miligy, 2013; Wu, Chuang and Hsu, 2014). Respondents came from various organisational levels and backgrounds, which ensures good representation across the varying supply chain management domains within the survey sample. Despite the relatively low response rate, the survey results can provide valuable insights as to what are barriers to supply chain management in Saudi Arabia.

6.2.1 Respondent groups

Participants were requested to provide demographic information on their jobs, positions, and number of subordinates. Not all respondents completed the section on demographic information, as it was left optional. Of the 181 respondents 66 did not provide their specific job function. However, in contrast 165 gave the level within which they are operating within their organisation. In additional to the obvious influence of an optional addition, a further potential explanation for respondents leaving the job function blank could be related to the conservative and protective business culture in Saudi Arabia. Table 6.1 presents statistics on respondents, with regards to their job function, level within the organisation, and number of supervised employees.

Table 6.1 Demographic statistics

Characteristic	Number of respondents	Percentage
Job function		
Owner	5	2.76%
Supply chain management	23	12.71%
Logistics	9	4.97%
Sales and marketing	12	6.61%
Finance and accounting	9	4.97%
Executive management	19	10.50%
Engineering	13	7.18%
Planning	8	4.42%
Other	17	9.39%
No response	66	36.46%
Total	181	100%
Level within organisation		
Senior Management	27	14.92%
Middle Management	38	20.99%
Supervisor	28	15.47%
Frontline Staff	31	17.13%
Other	41	22.65%
No response	16	8.84%
Total	181	100%

Characteristic	Number of respondents	Percentage
Number of supervised employees		
Less than 25	74	40.88%
25 to 50	11	6.08%
More than 50	34	18.78%
No response	62	34.25%
Total	181	100%
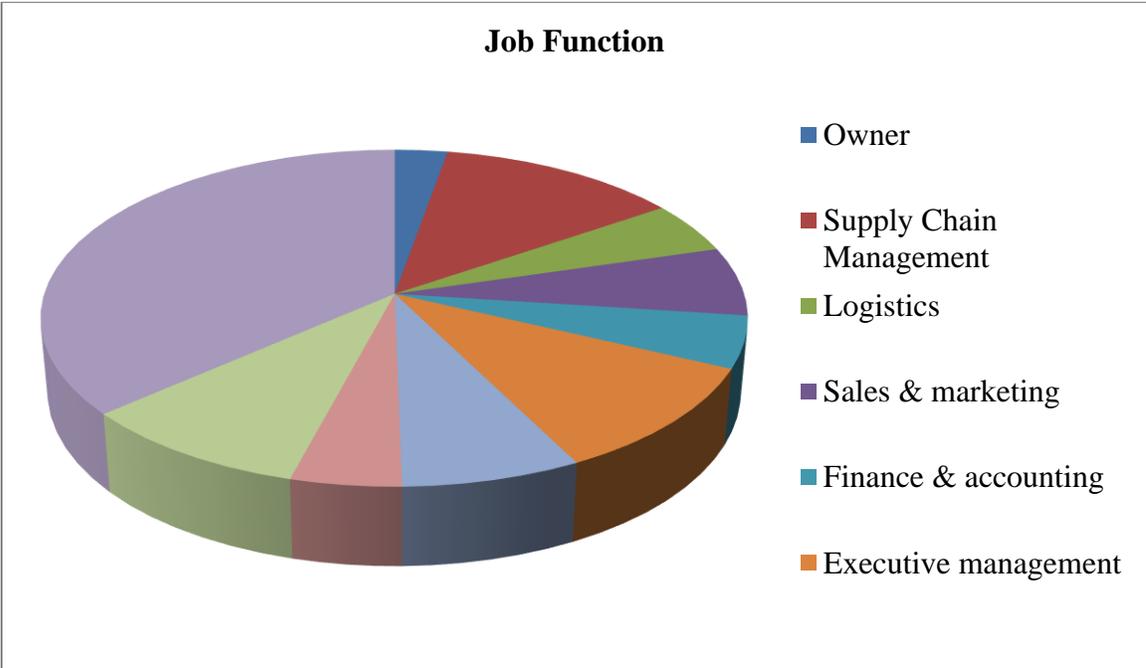
Figure 6.1 Job function

Under job function, there are a variety of jobs held by the respondents. The number of respondents who work under the category of supply chain management ranks first, representing 12.71%. Among the respondents, 10.50% of the employees work in unspecified executive management positions. Engineer respondents who were involved in the survey account for 7.18% of the respondents. Respondents with diverse job functions were combined under "other" and included job functions such as information technology, lecturing and contracting they represent 9.39 percent of the study population.

Respondents were asked about their level within the organisation and 165 individuals responded to this particular question. Respondents were asked to select whether they are senior managers, middle managers, supervisors, frontline staff, or if they hold other positions. Figure 6.2 presents the size of each group, with regards to their level in organisations.
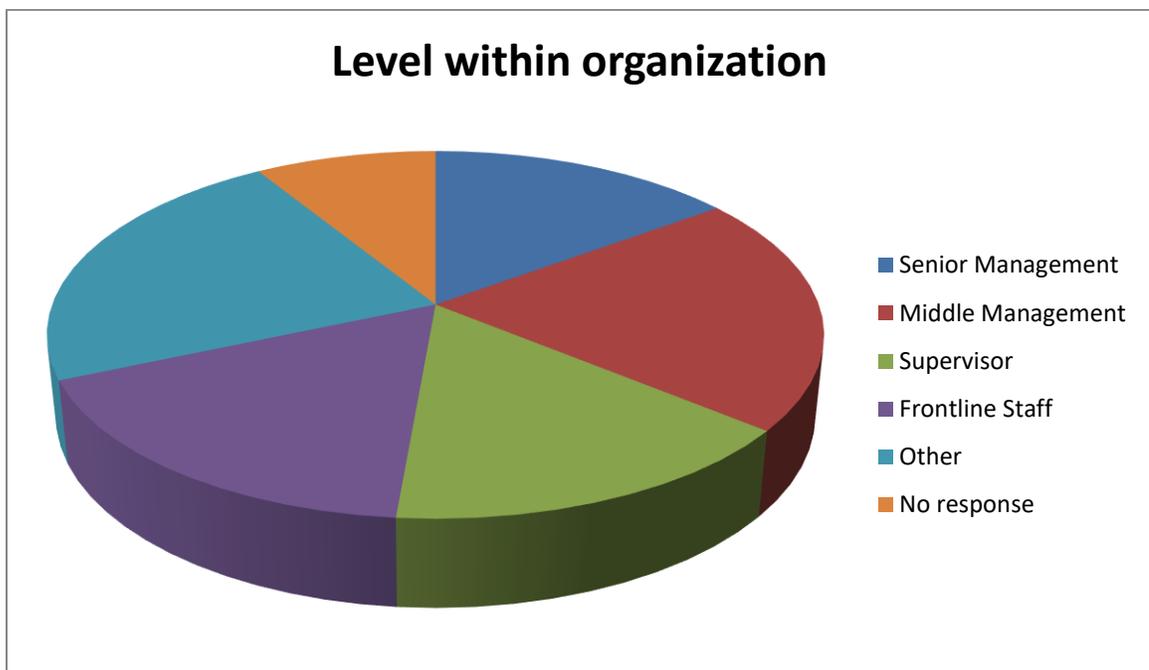
Figure 6.2 Level within organisation

From the total responses, 14.92% were senior managers. Middle management respondents accounted for 20.99% of the population. Supervisors and frontline staff who indicated their level in the organisation accounted for 15.47% and 17.13% of the responses. The largest percentage of responses went to those who choose "other" as their level in the organisation. They accounted for 22.65% of respondents.

The other question under demographic characteristic requested that respondents provide the number of their supervised employees. The characteristic was divided into three categories: less than 25, 25 to 50, and more than 50. Figure 6.3 shows the size of each group of respondents, with regards to the number of supervised employees.
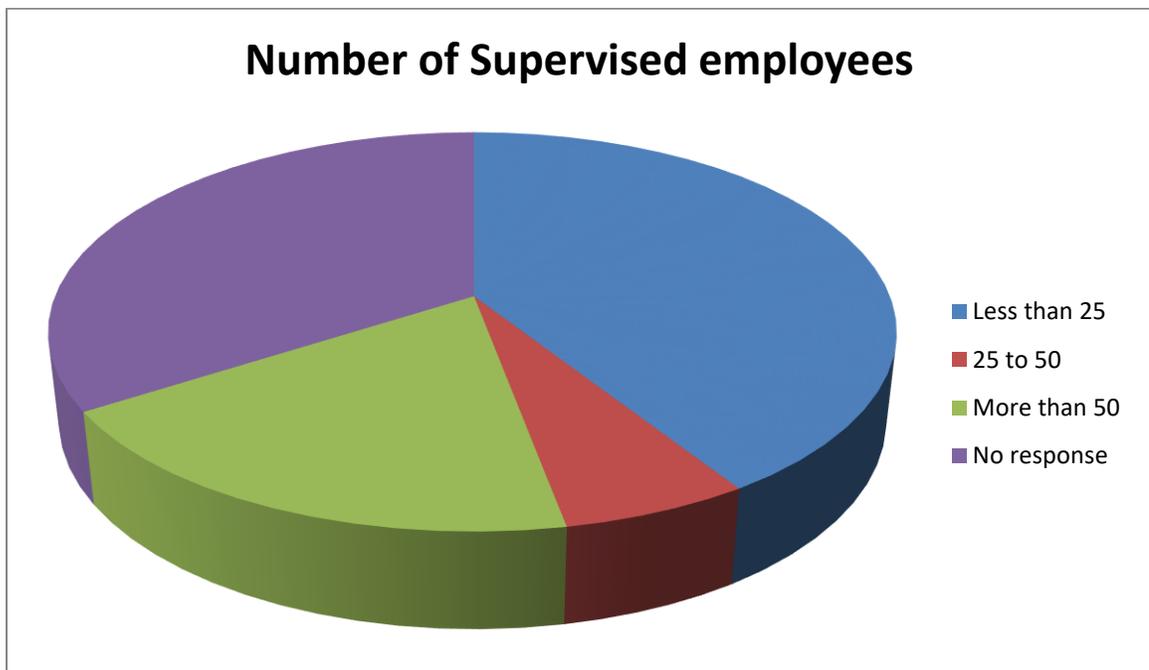
Figure 6.3 Level within organisation

The number of respondents who indicated having less than 25 employees under their supervision account for 40.88% of respondents. Only 6.08% of respondents reported supervising

between 25 and 50 employees. The number of those who supervise more than 50 employees was represented by 18.78 percent of the total respondents.

This discussion gives a general overview of who participated in the survey, showing their jobs, positions, and number of supervised staff. The following analysis of collected data includes factor analysis, reliability, regressions and mediation analysis, which will be presented accordingly.

6.3 FACTOR ANALYSIS

Researchers use factor analysis to study and constitute the correlational structure between variables under investigation (Tinsley and Tinsley, 1987; Field, 2009). Factor analysis is mainly used to interpret the structure of a group of constructs; to measure a latent variable by constructing a questionnaire; and to reduce the collected information into a scale that is workable without losing the input created by the original data (Field, 2009). This analysis is a dimension reduction technique that is used to reduce the number of variables and group them under factors or components. To apply this technique, sample size needs to exceed 150 responses, correlations should present $r = 0.3$ or more, Barlett's test of sphericity needs to be significant at $p < 0.05$, and the Kaiser-Meyer-Olkin value should not be less than 0.06 (Pallant and Julie, 2013). Sample size in this study exceeds the minimum requirement for factor analysis, accounting for 181 cases with 25 variables. In the following presentation of factor analysis, the remaining requirements will be examined and presented accordingly.

The aim of factor analysis in this study is to help reduce observed variables into a smaller number of latent variables, which can help easier measurement of the new constructs on highly

performing supply chain management. Variables are classified into constructs to determine which variables effectively create barriers. The classification includes Supply Chain performance, culture, organisational structure, information sharing, connectedness practices and purchase and supply polices. Factor analysis was run using IBM SPSS Statistics 21. Results of the analysis will be discussed in the following sections.

6.3.1 Supply Chain Performance variables

This section presents statistical results of factor analysis that were conducted on supply chain Performance variables. Statistics include descriptive statistics, correlations, communalities, and variances. They are presented and explained accordingly. Table 6.2 presents statements which were used during the course of the analyses.

Table 6.2 Survey statements on Supply Chain Performance

Abbreviation	Survey statement
Performance1	In our culture, personal communication such as 'telephone calls and visits' influence supply chain performance.
Performance2	In our culture, frequent personal contact influences supply chain performance.
Performance3	Integration of departments affects our supply chain performance
Performance4	Larger buyers (customers) affect our supply.
Performance5	Compatibility of information systems improves our supply chain performance.
Performance6	Advances in information-systems'- security improves our supply chain.
Performance7	Cooperation and communication affect our supply chain performance.

The analysis starts with descriptive statistics to present preliminary information about the included data.

Table 6.3 Descriptive Statistics

	Mean	Std. Deviation	Analysis N
Performance1	4.3477	.83933	181
Performance2	4.2522	1.01683	181
Performance3	4.0055	1.06717	181
Performance4	4.2028	1.03551	181
Performance5	4.0851	1.33135	181
Performance6	3.8896	1.35405	181
Performance7	4.4621	.96260	181

Seven Performance variables were examined in the study. These variables represented the questions Performance1, Performance2, Performance3, Performance4, Performance5, Performance6 and Performance7. As shown in Table 6.3, the mean score ranges from 3.8896 to 4.4621. Table 6.4 shows the correlation matrix of supply chain performance variables.

Table 6.4 correlation matrix

		Performance1	Performance2	Performance3	Performance4	Performance5	Performance6	Performance7
Performance1	Pearson Correlation	1	.500**	.242**	.108	.146*	.249**	.197**
	Sig. (2-tailed)		.000	.001	.149	.050	.001	.008

	N	181	181	181	181	181	181	181
Performance2	Pearson Correlation	.500**	1	.214**	.271**	.132	.259**	.395**
	Sig. (2-tailed)	.000		.004	.000	.077	.000	.000
	N	181	181	181	181	181	181	181
Performance3	Pearson Correlation	.242**	.214**	1	.225**	.045	.063	.236**
	Sig. (2-tailed)	.001	.004		.002	.547	.399	.001
	N	181	181	181	181	181	181	181
Performance4	Pearson Correlation	.108	.271**	.225**	1	.031	.119	.244**
	Sig. (2-tailed)	.149	.000	.002		.675	.110	.001
	N	181	181	181	181	181	181	181
Performance5	Pearson Correlation	.146*	.132	.045	.031	1	.513**	.063
	Sig. (2-tailed)	.050	.077	.547	.675		.000	.403
	N	181	181	181	181	181	181	181
Performance6	Pearson Correlation	.249**	.259**	.063	.119	.513**	1	.023
	Sig. (2-tailed)	.001	.000	.399	.110	.000		.759
	N	181	181	181	181	181	181	181
Performa	Pearson	.197**	.395**	.236**	.244**	.063	.023	1

nce7	Correlation							
	Sig. (2-tailed)	.008	.000	.001	.001	.403	.759	
	N	181	181	181	181	181	181	181

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

This correlation matrix of supply chain Performance variables, as seen in Table 6.4, shows how each of the seven variables is correlated with the other six variables. It is required that at least the two variables show correlations of 0.3 or above to be eligible for factor analysis (Pallant and Julie, 2013). This requirement is met here between Performance2 and Performance1 at 0.500. Performance7 and Performance2 correlate at 0.395. In addition, Performance6 correlates with Performance5 at 0.513. Strong correlations indicate that variables might fit in one factor. Performance variables were tested for sampling adequacy. Results are presented in Table 6.5.

Table 6.5 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.635
Bartlett's Test of Sphericity	**Approx. Chi-Square**	195.335
	Df	21
	Sig.	0

This table shows the KMO measure of sampling adequacy. Results of the KMO measurement fall between 0 and 1. To show that a data set is suitable for factor analysis, KMO

needs to be 0.6 or higher and Bartlett's Test of Sphericity needs to be significant, at a value of 0.05 or less (Pallant and Julie, 2013). In this section, the KMO value is 0.635, which meets the suitability criteria, while Barlett's test of sphericity value is $P = 0.000$, which is significant at a value below 0.001. These readings indicate that the correlations between included items are sufficiently large for factor analysis. In testing factors, SPSS generates common variances, which are presented by communalities. Table 6.6 presents communality readings for Performance variables.

Table 6.6 Communalities. Extraction Method: Principal Component Analysis

	Initial	Extraction
Performance1	1	0.452
Performance2	1	0.615
Performance3	1	0.35
Performance4	1	0.32
Performance5	1	0.696
Performance6	1	0.743
Performance7	1	0.48

The communality table provides information on the proportion of common variance. If the communality values are lower than 0.3, then there is a high probability that the variable would not fit sufficiently with the rest of the variables in the factor (Pallant and Julie, 2013). Using principle component analysis, the observed data can be transformed into part of linear components in order to reduce dimensions of the variables. Initially, it is assumed that each variable has a common variance of 1. Then, variables are grouped into factors and the common variance will be measured for individual variables. A communality of 1 means that the variable is dedicated to the factors. Table 6.7 shows communalities of variables after running the

extraction method of principal component analysis. Communality also calculates the proportion of variance explained by the extracted factors.

Table 6.7 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Extraction Sums of Squared Loadings	Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
Performance1	2.276	32.514	32.514	2.276	32.514	32.514	2.086
Performance2	1.381	19.722	52.236	1.381	19.722	52.236	1.69
Performance3	0.912	13.03	65.266				
Performance4	0.813	11.611	76.877				
Performance5	0.741	10.581	87.457				
Performance6	0.465	6.636	94.093				
Performance7	0.413	5.907	100				

a. Extraction Method: Principal Component Analysis.
b. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Total variance of the variables constitutes of two components: unique variance that is specific to the variable, and common variance that is shared with other variables (Field, 2013). SPSS extracted two factors, and the cumulative percentage is 52.26. So, the two components explain the 52.236 of the variance. The extraction method of principal component analysis gives the eigenvalue readings, extraction sums of squared loadings and extraction sums of squared loadings for each variable. One common approach in deciding on the number of factors to include in factor analysis is using factors predicted by theory (Gorsuch, 2015). Literature suggests that all factors can work as barriers to effective supply chain management. Therefore, under this section, all factors are included. This will apply to the remaining constructs too. The component matrix Table 6.8 shows loadings of variables with regards to their components.

Performance2, Performance7, Performance3, Performance4 and Performance1 are five variables loaded onto the first component. Performance6 and Performance5 are the variables loaded onto the second component.

Table 6.8 Component Matrix.

	Component	
	1	2
Performance2	0.769	
Performance1	0.672	
Performance7	0.552	-0.419
Performance3	0.483	-0.341
Performance4	0.471	-0.313
Performance5	0.429	0.716
Performance6	0.538	0.674

Extraction Method: Principal Component Analysis

a. 2 components extracted.

6.3.1.1 Reliability

The reliability test examines if items have an acceptable internal consistency. The acceptance of internal consistency comes with conditions such as having good validity test results, having theoretical/practical justification of the scale, and having a short scale of less than 10 items (Loewenthal 2001). However, absolute values of 0.8, 0.7 or 0.6 are taken as acceptable (Loewenthal & Lewis 2015).

Table 6.9 Reliability Statistics

Cronbach's Alpha	N of Items
0.626	7

Table 6.9 presents the alpha coefficient for the seven Performance items. At 0.626, the items have an acceptable internal consistency.

In this section, statistical results of the factor analysis on Performance variables were presented and explained. Statistics included descriptive analysis, correlations, communalities, variances, and reliability tests. It was found that Performance variables fit for factor analysis and thus can be reduced into factors. The next step will be testing the Culture variables and their suitability for dimension reduction analyses.

6.3.2 Culture variables

This section presents statistical results of factor analysis that were conducted on the Culture variables. Statistics include descriptive statistics, correlations, communalities, variances, and reliability. They are presented and explained accordingly. It has been indicated earlier that supply chain performance variables were embedded in all constructs. They have been separated in the analyses stage which caused reduction to the number of included variables in each construct. Table 6.10 presents explanations for the abbreviations used in the analysis.

Table 6.10 Survey statements on Culture variables

Abbreviation	Survey statement
Culture1	In our culture, power and relationship influence commitment between supply chain partners and customers.

Culture2	Unwritten rules, practices, and customs influence our supply chain.
Culture3	In our culture, trust (internally) between leaders and subordinates influences our supply chain.
Culture4	In our culture, trust (externally) between supply chain partners influences our supply chain.

The analysis starts with descriptive statistics, to present preliminary information about the included data.

Table 6.11 Descriptive Statistics

	Mean	**Std. Deviation**	**Analysis N**
Culture1	4.1059	1.02469	181
Culture2	3.8508	1.05138	181
Culture3	3.9775	1.13017	181
Culture4	3.9324	1.04679	181

Four Culture variables were examined in the study. These variables represented questions on culture 1, culture 2, culture 3, and culture 4. As shown in the descriptive statistics Table 6.11 the mean score ranges from 3.8508 to 4.1059. SPSS also creates correlations Table 6.12 to show relations between variables, which are presented below.

Table 6.12 Correlation Matrix

		Culture1	Culture2	Culture3	Culture4
Culture1	Pearson Correlation	1	.506**	.377**	.328**
	Sig. (2-tailed)		.000	.000	.000

	N	181	181	181	181
Culture2	Pearson Correlation	.506**	1	.278**	.334**
	Sig. (2-tailed)	.000		.000	.000
	N	181	181	181	181
Culture3	Pearson Correlation	.377**	.278**	1	.520**
	Sig. (2-tailed)	.000	.000		.000
	N	181	181	181	181
Culture4	Pearson Correlation	.328**	.334**	.520**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	181	181	181	181

**. Correlation is significant at the 0.01 level (2-tailed).

The goal is to test the relationship between variables in order to see if they belong to one dimension. Therefore, they were tested using correlation and factor analysis. This correlation matrix shows how each of the four Culture variables are significantly correlated with the other 3 variables at over 0.3, which shows their eligibility for factor analysis. Culture variables were also tested for sampling adequacy. Results are presented below, in Table 6.13.

Table 6.13 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.674
Bartlett's Test of Sphericity	Approx. Chi-Square	148.635
	Df	6
	Sig.	0

Table 6.13 shows results from the KMO test, which is the Kaiser-Meyer-Olkin Measure of Sampling Adequacy. In this section, the KMO value is 0.674, which meets the suitability criteria. The Barlett's test of sphericity value is P = 0.000, which is also significant. These readings indicate that the correlations between included items are sufficiently large for factor analysis. The next results presented by SPSS in factor analysis are the communalities, which are shown in Table 6.14.

Table 6.14 Communalities.

	Initial	Extraction
Culture1	1	0.567
Culture2	1	0.507
Culture3	1	0.548
Culture4	1	0.551

Extraction Method: Principal Component Analysis.

Table 6.14 provides the communality of each item after being extracted by the factor analysis extraction method. As mentioned earlier, values lower than 0.3 suggest that the variable does not fit sufficiently with the reset of variables in its factor (Pallant and Julie, 2013). Communalities for the Culture components show higher values than 0.3, which is an indication of fit for factor analysis. Factor loadings are tested results and are presented in Table 6.15.

Table 6.15 Total Variance Explained.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		Extraction Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Culture1	2.172	54.295	54.295	2.172	54.295	54.295

Culture2	0.858	21.438	75.733			
Culture3	0.538	13.45	89.183			
Culture4	0.433	10.817	100			

Extraction Method: Principal Component Analysis

Table 6.15 shows total variance explained for each of the Culture variables. The extraction method of principal component analysis gives the eigenvalue readings, extraction sums of squared loadings and extraction sums of squared loadings for each variable. Literature suggests that all factors under Culture can work as barriers to effective supply chain management. Therefore, under this section, all factors are included.

6.3.2.1 Reliability

Table 6.16 presents alpha coefficient for the four items is 0.718, which suggests that the items have relatively high internal consistency.

Table 6.16 Reliability Statistics

Cronbach's Alpha	N of Items
0.718	4

Findings from factor analysis on Culture variables were presented and explained in this section. Statistics included descriptive analysis, correlations, communalities, variances, and reliability tests. Results revealed that Culture variables fit for factor analysis and they can be reduced into one factor. In the next section, we will be testing the Organisation Structure variables and their suitability for dimension reduction analyses.

6.3.3 Organisational Structure variables

This section presents statistical results of factor analysis that were conducted on Organisational Structure variables. Descriptive statistics, correlations, communalities, variances, and reliability tests were run and presented in this section. As stated earlier, some of the variables were moved to supply chain construct. Table 6.17 presents explanations for the abbreviations used in the analysis.

Table 6.17 Survey statements on Organisational Structure variables

Abbreviation	Survey statement
OrgStructure1	Employees of the organisation affect our supply chain performance
OrgStructure2	Senior management involvement in operational decisions affects our supply chain
OrgStructure3	Organisational structure where I work influences communication and, consequently, our supply chain

Table 6.18 gives descriptive statistics of the Organisational Structure variables.

Table 6.18 Descriptive Statistics

	Mean	Std. Deviation	Analysis N
OrgStructure1	4.201	1.01861	181
OrgStructure2	4.5016	0.85476	181
OrgStructure3	4.1129	0.96482	181

Three Organisational Structure variables were included in the study. They represented questions on OrgStructure1, OrgStructure2, and OrgStructure3. The highest mean is 4.1129,

while the lowest is 4.5016, as shown in Table 6.18. SPSS generated a correlations table to show the relations between variables, which is presented in Table 6.19.

Table 6.19 Correlation Matrix

		OrgStructure1	OrgStructure2	OrgStructure3
OrgStructure1	Pearson Correlation	1	.467**	.334**
	Sig. (2-tailed)		.000	.000
	N	181	181	181
OrgStructure2	Pearson Correlation	.467**	1	.480**
	Sig. (2-tailed)	.000		.000
	N	181	181	181
OrgStructure3	Pearson Correlation	.334**	.480**	1
	Sig. (2-tailed)	.000	.000	
	N	181	181	181

**. Correlation is significant at the 0.01 level (2-tailed).

Correlation and dimension reduction analysis were deployed to see if Organisational Structure variables could be reduced into one factor. Table 6.19 presents the Pearson's correlation coefficients of each of the 3 variables with the other two variables. The requirement of a minimum correlation of 0.3 is met and, therefore, these factors are eligible for factor analysis. High correlations indicate that the highly correlated variables might fit in one factor. Sampling adequacy tests were run during factor analysis. Table 6.20 shows results from KMO and Bartlett's tests.

Table 6.20 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.645
Bartlett's Test of Sphericity	Approx. Chi-Square	94.016
	Df	3
	Sig.	0

The KMO value for Organisational Structure variables is 0.645, which shows eligible adequacy of sampling. The Barlett's test of sphericity value is P = 0.000, which meets the suitability criteria. These readings indicate that the correlations between included items are sufficiently large for factor analysis. Factor analysis also includes communality analysis, which is presented in Table 6.21, below.

Table 6.21 Communalities.

	Initial	Extraction
OrgStructure1	1	0.57
OrgStructure2	1	0.704
OrgStructure3	1	0.583

Extraction Method: Principal Component Analysis.

Table 6.21 gives communalities for all items after being extracted by the factor analysis extraction method. Communalities for the Organisational Structure components show higher values than 0.3, which is an indication of fit for factor analysis. Factor loadings are tested during factor analysis and the results are presented in Table 6.22.

Table 6.22 Total Variance Explained.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		Extraction Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
OrgStructure1	1.86	61.898	61.898	1.857	62	61.898
OrgStructure2	0.67	22.201	84.099			
OrgStructure3	0.48	15.901	100			

Extraction Method: Principal Component Analysis

Table 6.22 shows that Organisational Structure variables can be clustered into one factor, as presented by the eigenvalue readings. The table also shows total variance explained for each of the Organisational Structure variables. The extraction method of principal component analysis gives the eigenvalue readings, extraction sums of squared loadings and extraction sums of squared loadings for each variable. Literature suggests that all factors under Organisational Structure can work as barriers to effective supply chain management. Therefore, under this section, all factors are included.

6.3.3.1 Reliability

As shown in Table 6.23, the alpha coefficient for the three items is 0.684, suggesting that included variables have an acceptable internal consistency. The value of 0.6 or above in Cronbach's Alpha is normally an indicator for acceptable reading (Loewenthal and Lewis, 2015).

Table 6.23 Reliability Statistics

Cronbach's Alpha	N of Items
0.684	3

This section presents and explains dimension reduction analysis or Organisational Structure variables. Results indicate that variables fit for factor analysis. They can be reduced into one factor. The following section tests Information Sharing variables for factor analysis.

6.3.4 Information Sharing variables

In this section, statistical results of factor analysis were conducted on Information Sharing variables. Statistics include descriptive statistics, correlations, communalities, and variances. It has been indicated earlier that some of the variables in each construct were supply chain performance which were moved to that section. Table 6.24 presents explanations for the abbreviations used in the analysis.

Table 6.24 Survey statements on Information Sharing variables

Abbreviation	Survey statement
InfoSharing1	Data availability improves our supply chain performance.
InfoSharing3	Willingness to share information externally/ internally in the organisation improves our supply chain
InfoSharing4	Superior information sharing capabilities enable better operational performance of our supply chain

Table 6.25 shows descriptive statistics on Information Sharing variables.

Table 6.25 Descriptive Statistics

	Mean	Std. Deviation	Analysis N
InfoSharing1	4.1083	1.38198	181
InfoSharing3	3.9391	1.22227	181
InfoSharing4	4.0087	1.30652	181

Under Information Sharing, three variables were proposed and measured: InfoSharing1, InfoSharing2, and InfoSharing3. Participants responded indicating the level of influence each of the variables has over supply chain management. As shown in Table 6.25, the mean scores range between 3.9391 and 4.1083. In order to show relations between variables, a correlation matrix is created by SPSS, as shown in Table 6.26.

Table 6.26 Correlation Matrix

		InfoSharing1	InfoSharing3	InfoSharing4
InfoSharing1	Pearson Correlation	1	.586**	.581**
	Sig. (2-tailed)		.000	.000
	N	181	181	181
InfoSharing3	Pearson Correlation	.586**	1	.725**
	Sig. (2-tailed)	.000		.000
	N	181	181	181
InfoSharing4	Pearson Correlation	.581**	.725**	1
	Sig. (2-tailed)	.000	.000	
	N	181	181	181

**. Correlation is significant at the 0.01 level (2-tailed).

Correlation and dimension reduction analysis were deployed to see if Information sharing variables could be reduced into one dimension. This table presents the Pearson's correlation coefficients of each of the 3 variables with the other 2 variables. As all variables show correlations of 0.3 or above they are eligible for factor analysis. High correlations indicate that the highly correlated variables might fit in one factor. Sampling adequacy tests were run during factor analysis. Table 6.27 shows the results from KMO and Bartlett's tests.

Table 6.27 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.705
Bartlett's Test of Sphericity	Approx. Chi-Square	222.498
	df	3
	Sig.	0

In this section, the KMO value is 0.705 which is sufficient, and Barlett's test of sphericity value is P = 0.000, which is significant. These readings indicate that the correlations between included items are sufficiently large for factor analysis. During factor analysis, communality analysis was executed and presented in Table 6.28.

Table 6.28 Communalities

	Initial	Extraction
InfoSharing1	1	0.677
InfoSharing3	1	0.796
InfoSharing4	1	0.792

Extraction Method: Principal Component Analysis.

Table 6.28 provides communalities of all items after being extracted by the factor analysis extraction method. Communalities for the Information Sharing components show higher values than 0.3, which is an indication of fit for factor analysis. Table 6.29 presents factor loadings, which were generated by SPSS during factor analysis.

Table 6.29 Total Variance Explained.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		Extraction Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
InfoSharing1	2.264	75.47	75.47	2.264	75.47	75.47
InfoSharing3	0.461	15.374	90.844			
InfoSharing4	0.275	9.156	100			

Extraction Method: Principal Component Analysis

According to the listed eigenvalues, readings from Table 6.29 show that Information Sharing variables can be combined into one single component. The extraction method of principal component analysis gives the eigenvalue readings, extraction sums of squared loadings and extraction sums of squared loadings for each variable. Literature suggests that all factors under Information Sharing can work as barriers to effective supply chain management. Therefore, under this section, all factors are included.

6.3.4.1 Reliability

As seen in Table 6.30, the alpha coefficient for the three items is 0.834. This suggests that the items have a relatively high internal consistency. The value of 0.8 or above in Cronbach's Alpha is normally an indicator of an acceptable reading (Loewenthal and Lewis, 2015).

Table 6.30 Reliability Statistics

Cronbach's Alpha	N of Items
0.834	3

This section highlighted important results of factor analysis. The findings show that Information Sharing variables are a fit for factor analysis, which can be reduced into one factor. In the following section, we will be testing the Connectedness variables and their suitability for dimension reduction analyses.

6.3.5 Connectedness variables

This section presents statistical results of factor analysis that were conducted on Connectedness variables. Statistics include descriptive statistics, correlations, communalities, variances, and reliability. As mentioned earlier, some of the variables were moved to supply chain performance. Table 6.31 presents explanations of the abbreviations used in the analysis.

Table 6.31 Survey statements on Connectedness variables

Abbreviation	Survey statement
Connectedness1	Supply chain integration affects our supply chain cost
Connectedness2	Supply chain collaboration affects competitive advantage of our supply chain
Connectedness3	Having supplier companies of different trade orientations affects integration of our supply chain.
Connectedness4	Our customers' willingness to embrace change affects supply chain integration

Table 6.32 shows descriptive statistics on Connectedness variables.

Table 6.32 Descriptive Statistics

	Mean	Std. Deviation	Analysis N
Connectedness1	3.9923	1.02718	181
Connectedness2	3.9835	1.04062	181

		3.8997	1.05552	181
Connectedness3		3.8997	1.05552	181
Connectedness4		3.89	1.01162	181

Respondents were asked to evaluate four variables under Connectedness. The included variables are Connectedness1, Connectedness2, Connectedness3, and Connectedness4. The table shows means ranging from 3.89 to 3.99. SPSS creates correlation matrix during the factor analysis, which is presented in the Table 6.33.

Table 6.33 Correlation Matrix

		Connectedness1	Connectedness2	Connectedness3	Connectedness4
Connectedness1	Pearson Correlation	1	.425[**]	.375[**]	.199[**]
	Sig. (2-tailed)		.000	.000	.007
	N	181	181	181	181
Connectedness2	Pearson Correlation	.425[**]	1	.316[**]	.286[**]
	Sig. (2-tailed)	.000		.000	.000
	N	181	181	181	181
Connectedness3	Pearson Correlation	.375[**]	.316[**]	1	.343[**]
	Sig. (2-tailed)	.000	.000		.000
	N	181	181	181	181
Connectedness4	Pearson Correlation	.199[**]	.286[**]	.343[**]	1
	Sig. (2-tailed)	.007	.000	.000	
	N	181	181	181	181

**. Correlation is significant at the 0.01 level (2-tailed).

In order to see if Connectedness variables can be reduced into one dimension correlation and dimension reduction analysis were deployed. Table 6.33 presents the Pearson's correlation coefficients of each of the 4 variables with the other 3 variables. The requirement that at least some of the variables should show correlations of 0.3 or above to be eligible for factor analysis is satisfied, as most of the correlations are above this threshold. Data was tested for sampling adequacy during factor analysis. Results from KMO and Bartlett's tests are presented in Table 6.34 below.

Table 6.34 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.682
Bartlett's Test of Sphericity	**Approx. Chi-Square**	98.202
	df	6
	Sig.	0

To show that a data set is suitable for factor analysis, the KMO needs to be 0.6 or higher, and Bartlett's Test of Sphericity needs to be significant, at a value of 0.05 or less (Pallant and Julie, 2013). In Table 6.34, the KMO value is 0.682, which is eligible for factor analysis. Barlett's test of sphericity value is $P = 0.000$, which meets the suitability criteria. These readings indicate that correlations between included items are sufficiently large for factor analysis. Communalities were calculated during factor analysis. They are presented in Table 6.35.

Table 6.35 Communalities.

	Initial	Extraction
Connectedness1	1	0.525
Connectedness2	1	0.535

| Connectedness3 | 1 | 0.535 |
| Connectedness4 | 1 | 0.382 |

Extraction Method: Principal Component Analysis.

Table 6.35 provides a communality of each item after being extracted by the factor analysis extraction method. As indicated above, variables should show correlations of 0.3 or higher to be eligible for factor analysis (Pallant and Julie, 2013). Communalities for the Connectedness components show higher values than 0.3, which is an indication of a fit for factor analysis. Table 6.36 presents factor loadings, which were generated by SPSS during factor analysis.

Table 6.36 Total Variance Explained.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		Extraction Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Connectedness1	1.978	49.439	49.439	1.978	49.439	49.439
Connectedness2	0.83	20.747	70.186			
Connectedness3	0.665	16.634	86.82			
Connectedness4	0.527	13.18	100			

Extraction Method: Principal Component Analysis.

Table 6.36 gives the total variance explained for each of the Connectedness variables. This table shows that Connectedness variables can be clustered into one factor, as presented by the eigenvalue readings. However, literature suggests that all factors under Connectedness can

work as barriers to effective supply chain management. Therefore, under this section, all factors are included.

6.3.5.1 Reliability

Table 6.37 presents the alpha coefficient for the four items is 0.658. This suggests that the items have an acceptable internal consistency. The value of 0.6 or above in Cronbach's Alpha is normally an indicator for an acceptable reading (Loewenthal and Lewis, 2015).

Table 6.37 Reliability Statistics

Cronbach's Alpha	N of Items
0.658	4

In this section, the important results of factor analysis were highlighted. Findings show that Connectedness variables are a fit for factor analysis, which can be reduced into one factor. In the following section, we will be testing the Purchase and Supply variables and their suitability for dimension reduction analyses.

6.3.6 Purchase and Supply variables

This section presents statistical results of factor analysis that were conducted on Purchase and Supply variables. It contains descriptive statistics, correlations, communalities, variances, and reliability statistics. One of the variables under this construct was moved the construct of supply chain performance. Table 6.38 presents explanations of the abbreviations used in the analysis.

Table 6.38 Survey statements on Purchase and Supply variables

Abbreviation	Survey statement
Purchase&Supply1	Our organisation's real demand closely matches forecasted demand.
Purchase&Supply2	Our supply chain experiences volatile demand patterns.
Purchase&Supply3	Our organization's supply chain policy favours buying from large suppliers.
Purchase&Supply4	Our organisation pursues low level of inventory.

Table 6.39 gives descriptive statistics of the Purchase and Supply variables.

Table 6.39 Descriptive Statistics

	Mean	Std. Deviation	Analysis N
Purchase&Supply1	3.6007	1.35431	181
Purchase&Supply2	3.5156	1.15624	181
Purchase&Supply3	3.774	1.15812	181
Purchase&Supply4	3.3636	1.38936	181

Four Purchase and Supply variables were identified in the study. These are Purchase&Supply1, Purchase&Supply2, Purchase&Supply3, and Purchase&Supply4. Responses showed the extent to which these variables were perceived as being impediments to supply chain management. The highest mean is 3.7740, while the lowest is 3.3636, as presented in Table 6.39. The software produced correlation matrix during the factor analysis is presented in Table 6.40.

Table 6.40 Correlation Matrix

		Purchase & Supply1	Purchase & Supply2	Purchase & Supply3	Purchase & Supply4
Purchase & Supply1	Pearson Correlation	1	.384**	.274**	.150*
	Sig. (2-tailed)		.000	.000	.044
	N	181	181	181	181
Purchase & Supply2	Pearson Correlation	.384**	1	.215**	.173*
	Sig. (2-tailed)	.000		.004	.020
	N	181	181	181	181
Purchase & Supply3	Pearson Correlation	.274**	.215**	1	.199**
	Sig. (2-tailed)	.000	.004		.007
	N	181	181	181	181
Purchase & Supply4	Pearson Correlation	.150*	.173*	.199**	1
	Sig. (2-tailed)	.044	.020	.007	
	N	181	181	181	181

**. Correlation is significant at the 0.01 level (2-tailed).

To see if Purchase & Supply variables can be reduced into one, dimension correlation and dimension reduction analysis were deployed. Table 6.40 presents the Pearson's correlation coefficients of each of the 4 variables with the other 3 variables. There is only one correlation between Purchase&Supply2 and Purchase&Supply1 that meet the minimum requirement of

correlation at 0.3. They correlate at 0.384. The data was tested for sampling adequacy during factor analysis. Results from KMO and Bartlett's tests are presented in Table 6.41.

Table 6.41 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.639
Bartlett's Test of Sphericity	**Approx. Chi-Square**	56.127
	df	6
	Sig.	0

To show that a data set is suitable for factor analysis, the KMO needs to be 0.6 or higher and Bartlett's Test of Sphericity needs to be significant, at a value of 0.05 or less (Pallant and Julie, 2013). As in Table 6.42, the KMO value is 0.639, which is eligible for factor analysis. Barlett's test of sphericity value is P = 0.000, which meets the suitability criteria. These readings indicate that the correlations between included items are sufficiently large for factor analysis. During factor analysis, communalities were calculated. They are presented in Table 6.42.

Table 6.42 Communalities.

	Initial	Extraction
Purchase&Supply1	1	.541
Purchase&Supply2	1	.507
Purchase&Supply3	1	.408
Purchase&Supply4	1	.256

Extraction Method: Principal Component Analysis

Table 6.42 gives communality of each item after being extracted by the factor analysis extraction method. Values above 0.3 indicate suitability for factor analysis (Pallant and Julie, 2013). Communalities for the Purchase & Supply components show higher values than 0.3, which is an indication of fit for factor analysis. Table 6.43 presents factor loadings that were generated by SPSS during factor analysis.

Table 6.43 Factor loadings

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		Extraction Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Purchase & Supply1	1.713	42.821	42.821	1.713	42.821	42.821
Purchase & Supply2	0.901	22.517	65.339			
Purchase & Supply3	0.782	19.54	84.879			
Purchase & Supply4	0.605	15.121	100			

Extraction Method: Principal Component Analysis.

Table 6.43 shows that Purchase and Supply variables can be clustered into one factor, as presented by the eigenvalue readings. However, literature suggests that all factors under Purchase & Supply can work as barriers to effective supply chain management. Therefore, under this section, all factors are included.

6.3.6.1 Reliability

As seen in Table 5.44 the alpha coefficient for the four items is 0.541. This suggests that the items have relatively low internal consistency.

Table 6.44 Reliability Statistics

Cronbach's Alpha	N of Items
0.541	4

The analysis of this section revealed the important results of factor analysis. The findings show that Purchase & Supply variables do not necessarily provide a fit for factor analysis to be reduced into one factor. This is because of a reliability issue, where the KMO value did not reach 0.6. However, other readings from factor analysis showed reasonable results. In the next section, regression analysis will be applied to examine the impact of supply chain management barriers on supply chain performance.

6.4 REGRESSION ANALYSIS

Regression analysis is a type of the General Linear Model that helps with testing hypotheses on a causality basis (Field, 2009). This means that it assumes that an independent item is partially, if not fully, a cause of a dependent item. Regression analysis can be divided into simple regression and multiple regressions. Simple regression is used to predict an outcome (dependent) variable out of a single predictor (independent) variable (Field, 2009). This type of analysis is employed when there are multiple predictors but only one criterion. Scoring weights are developed to reduce predictors to a single criterion (Tinsley and Tinsley, 1987; Acton *et al.*, 2009). The multiple regressions analysis employed in this study extends to testing more than one

independent variable against a single dependent variable. Figure 6.4 presents the conceptual model, which shows directions in the multiple regressions analysis.
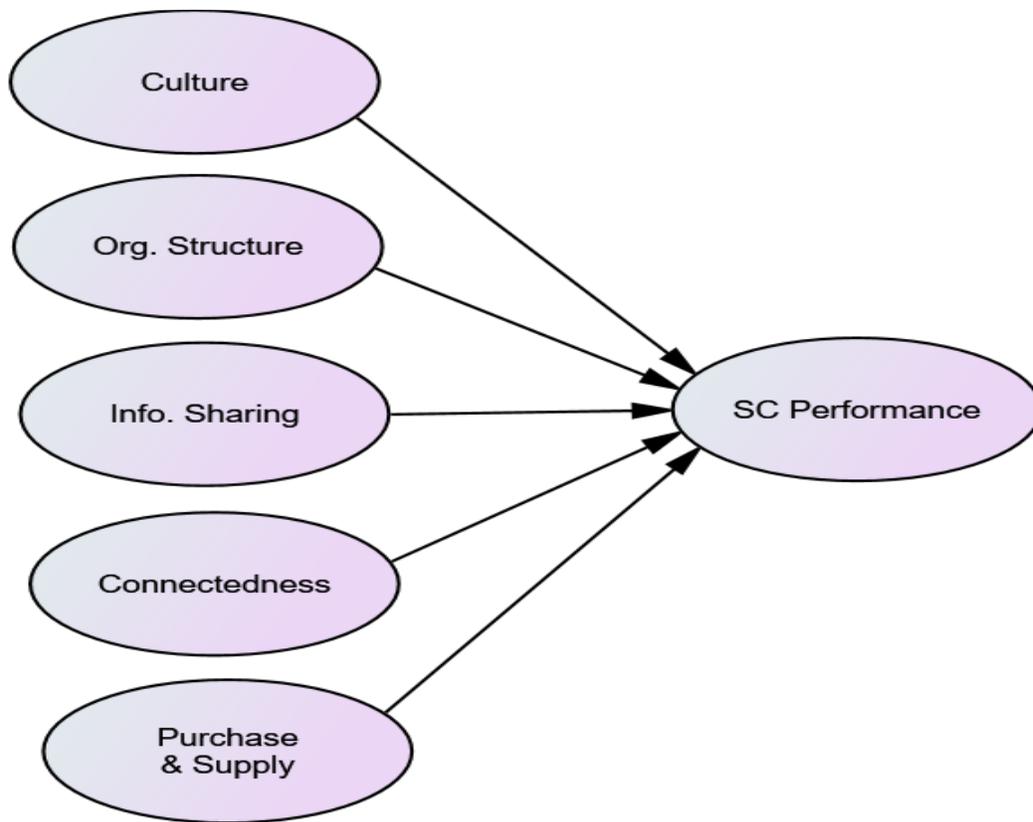
Figure 6.4 Multiple regressions model

A number of predictors will be exposed to multiple regression tests to measure their interdependence with Performance. The predictors are Culture, Organisational Structure, Information Sharing, Connectedness, and Purchase & Supply. Regression analysis has a number of techniques including standard, hierarchical and stepwise multiple regression (Pallant and Julie, 2013). This analysis also explores the relationship between a continuous dependent variable and a set of independent variables. Sample size requirement for this analysis is $N > 50 + 8m$ (where m equals the number of included independent variables) (Pallant and Julie, 2013).

Five independent variables are included in this analysis and the sample size meets the requirement. Minimum requirement is $50 + (8×5) = 90$, while sample size is 181 cases. The analysis was run using IBM SPSS 21. The results show how each item of the model influences supply chain performance, which will be explained.

6.4.1 The impact of supply chain management barriers on supply chain performance

It is proposed in the research hypotheses that five main constructs of the research model influence supply chain performance. These constructs are Culture, Organisational Structure, Information Sharing, Connectedness, and Supply & Purchase. In regression analysis, multiple item constructs need reduction. One way to convert multiple item constructs into a single item is adding up means of all included items which has been done in running this analysis. The noticeable variation of the means in table 6.45 comes from adding up means of different numbers of items under each construct. For example, Performance has seven included items. Means of Performance items are 4.347, 4.252, 4.005, 4.202, 4.085, 3.889 and 4.462. On the other hand, Information sharing has only three items. Means of Information sharing items are 4.108, 3.939 and 4.008. The results of the analysis are shown in the following tables and they include descriptive statistics, removed/entered variables, model summary, ANOVA, coefficients, and collinearity diagnostics.

Table 6.45 Descriptive Statistics

	Mean	Std. Deviation	N
PerformanceV	29.245	4.27978	181
CultureV	15.8667	3.13369	181
OrgStructureV	12.8155	2.22711	181
InfoSharingV	12.0561	3.39196	181

ConnectednessV		15.7655		2.90495		181	
PurchaseSupplyV		14.2538		3.2927		181	

Table 6.46 Correlations

		Performa nceV	Cultur eV	OrgStruct ureV	InfoShari ngV	Connectedn essV	PurchaseSu pplyV
Performance V	**Pearson Correlation**	1	.497**	.540**	.611**	.407**	.249**
	Sig. (2-tailed)		0	0	0	0	0.001
	N	181	181	181	181	181	181
CultureV	**Pearson Correlation**	.497**	1	.374**	.192**	.351**	0.093
	Sig. (2-tailed)	0		0	0.01	0	0.211
	N	181	181	181	181	181	181
OrgStructur eV	**Pearson Correlation**	.540**	.374**	1	.258**	.368**	0.072
	Sig. (2-tailed)	0	0		0	0	0.337
	N	181	181	181	181	181	181
InfoSharing V	**Pearson Correlation**	.611**	.192**	.258**	1	0.066	.428**
	Sig. (2-tailed)	0	0.01	0		0.376	0
	N	181	181	181	181	181	181
Connectedne ssV	**Pearson Correlation**	.407**	.351**	.368**	0.066	1	-0.019
	Sig. (2-tailed)	0	0	0	0.376		0.799
	N	181	181	181	181	181	181
PurchaseSu pplyV	**Pearson Correlation**	.249**	0.093	0.072	.428**	-0.019	1
	Sig. (2-tailed)	0.001	0.211	0.337	0	0.799	
	N	181	181	181	181	181	181

**. Correlation is significant at the 0.01 level (2-tailed)

Correlations Table 6.46 shows adequate relationships for regressions analysis between the dependent and the independent variables. It is preferable that the dependent variable has relations with the independent variables at 0.3 or higher and it is not recommended to have correlations of 0.7 or higher in one analysis (Pallant and Julie, 2013). In this analysis, all correlations are more than 0.3 and less than 0.7, which is adequate for conducting multiple

regression analysis. Performance has correlations with Culture, Organisational Structure, Information Sharing, Connectedness and Purchase & Supply, of .497, .540, .611, .407, and .249, respectively.

Table 6.47 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.796[a]	0.633	0.623	2.62796	1.963

a. Predictors: (Constant), PurchaseSupplyV, ConnectednessV, CultureV, OrgStructureV, InfoSharingV

b. Dependent Variable: PerformanceV

The given reading of R in Table 6.47 is 0.796, which presents the value of the multiple correlation coefficients between the outcome and the predictors. R Square is 0.633 meaning that around 63.3% of the variability of Performance is accounted for by the independent variables. Adjusted R Square in this model is 0.623, which is slightly lower than R Square because it considers sample size. This means that 62.3% of the variability of Performance is accounted for by the independent variables. These results are supported by ANOVA results. Table 6.48 shows the results of the ANOVA, which tests if the model is significantly better at predicting the outcome than using the mean.

Table 6.48 ANOVA.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2088.389	5	417.678	60.479	.000[b]
	Residual	1208.584	175	6.906		
	Total	3296.973	180			

a. Dependent Variable: PerformanceV

b. Predictors: (Constant), PurchaseSupplyV, ConnectednessV, CultureV, OrgStructureV, InfoSharingV

By presenting regression sums of squares, Table 6.48 shows calculations of the difference between the regression line and the mean value of the predictors. This difference is 2088.389. The difference between the value predicted by the regression line and every observed data point represents the residual sum of squares, which is 1208.584. Dividing the regression sum of squares and the residual sum of squares gives the regression mean square and residual mean square, which are 417.678 and 6.906, respectively. The F-ratio is the ratio of the regression's mean square in relation to the residual mean square. It shows the possibility to develop the model's prediction. The F-ration is 60.479. A value below 0.05 would present significance of fit with the data. The Sig result is 0.000, which demonstrates significance of fit. The other important analysis in regressions is coefficients.

Table 6.49 Coefficients

Model	Unstandardised Coefficients B	Unstandardised Coefficients Std. Error	Standardised Coefficients Beta	t	sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound	Correlations Zero-order	Correlations Partial	Correlations Part	Collinearity Statistics Tolerance	Collinearity Statistics VIF
Constant)	5.78	1.61		3.59	0	2.6						
CultureV	0.33	0.07	0.24	4.68	0	0.189	0.466	0.5	0.33	0.21	0.8	1.26
OrgStructureV	0.48	0.1	0.252	4.79	0	0.284	0.683	0.54	0.34	0.22	0.76	1.32
InfoSharingV	0.61	0.07	0.485	9.23	0	0.481	0.743	0.61	0.57	0.42	0.76	1.32
ConnectednessV	0.29	0.08	0.198	3.88	0	0.143	0.44	0.41	0.28	0.18	0.81	1.24
PurchaseSupplyV	0.01	0.07	0.005	0.1	0.92	-0.12	0.137	0.25	0.01	0	0.81	1.23

a. Dependent Variable: Performance

The coefficients for each of the items show the amount of expected change in Performance should the variable change in value for every one-unit change, assuming all other variables are constant. Table 6.49 gives two important values, which are VIF (Variance Inflation Factor), and tolerance. VIF is the inverse value of tolerance and therefore a value more than 10 would indicate multicollinearity. Tolerance gives indications as to how much of the variability of the specified independent is not explained by the other independent variables in the model and if its value is less than 0.10 it indicates multicollinearity (Pallant and Julie, 2013). Table 6.49 shows tolerance and VIF values for Culture, Organisational Structure, Information Sharing, Connectedness, and Purchase & Supply in relation to Performance. Tolerance values are 0.795, 0.759, 0.758, 0.807, and 0.812, respectively. They are all above 0.10 and less than 0.90, which aligns with the multicollinearity assumption. VIF values for the same variables are 1.258, 1.317, 1.319, 1.240, and 1.231, in the same order. These values also support the multicollinearity assumption, as they are over 0.10 and less than 0.

The beta coefficients are obtained when the outcome and independent variables are transferred into standard scores prior to running the regression. This is to say that beta coefficients measure the relative strength of the different independent variables in the model. In this case, Information Sharing has the largest beta, of 0.485, and Purchase & Supply has the smallest beta coefficient, of 0.005. Therefore, an increase or a decrease of one standard deviation in Information Sharing leads to an equivalent effect of 0.485 on Performance with the other predictors in the model held constant.

In the Scatterplot of standardised residuals (appendix 6.1), it is preferred that all residuals are reasonably distributed in a rectangular shape and most of the plots are scattered around the zero point in the centre. There is also the hope that you do not have outliers with values higher

than 3.3 or less than -3.3. It is not surprising to find some outliers with large samples where you do not need to take any action, as long as there are only a few (Pallant and Julie, 2013). The Scatterplot (appendix 6.1) shows that residuals are roughly rectangular in their distribution and most of the scores are centred along the zero point. There is only one outlying residual, which does not require taking any action.

In general, regressions statistics show significances in the results. This indicates that items in the analysis impose influence on supply chain performance. Generally, results from the model summary, ANOVA, coefficients and collinearity diagnostics confirm the dependency of supply chain performance on the predictors, which complies with the assumptions made by the research hypotheses.

Regression analysis is followed by mediation analysis to examine the effects of Culture on supply chain Barriers and supply chain Performance. Mediation analysis highlights these relationships.

6.5 THE EFFECTS OF SUPPLY CHAIN BARRIERS ON CULTURE AND SUPPLY CHAIN PERFORMANCE: MEDIATION MODEL

Mediation analysis examines the influence a certain factor X has on another factor Y with the existence of a third factor M, which is the mediation factor. The objective of establishing mediation analysis is to measure the effect of a causal variable X on some outcome Y via mediators (Hayes, 2012). To establish a mediation analysis, the independent variables X must be correlated with the outcome variable Y. The independent variables must be correlated with the mediator M too. The mediator and the independent variables are tested using the regression analysis method. The independent variable is expected to show significance, strength, or both.

For this analysis, we developed a model that helps test the influence of Culture as a mediating item.

Mediating variable can be used in a mediation model, depending on the adopted theoretical framework (K. Alfes *et al.*, 2013). In this section, we will examine the effect each of the factors has on Performance. This relationship would pass through Culture factor, as it is the mediation factor.
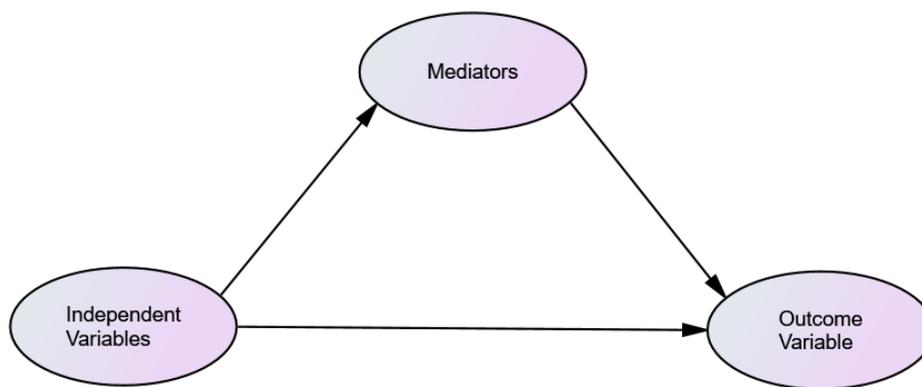
Figure 6.5 Mediation path diagram

Figure 6.5 shows the connection between X, Y, and M in a typical mediation analysis model. It shows the simplest mediation relationships. In more complicated models, additional mediators and/or independent variables can be included.

The four observed variables X represent Organisational structure (OSV), Information sharing (ISV), Connectedness (ConV) and Purchase & Supply (PSV). The mediating factor M is Culture (CV) and the outcome variable Y is Performance (PV). Mediation was tested here using the Indirect, Direct & Total effect option in IBM Amos SPSS 23. Figure 6.6 shows the directions of relationships in the model.
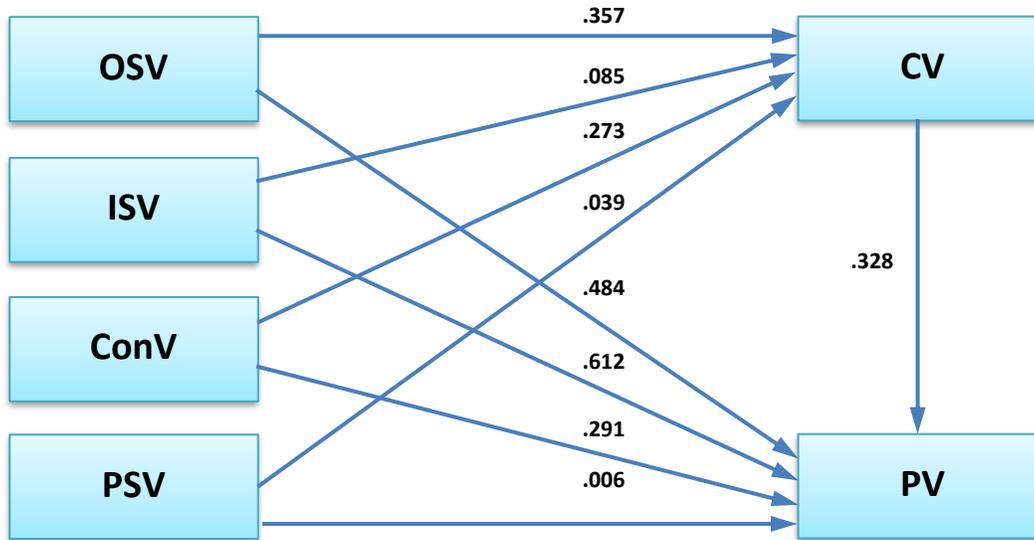
Figure 6.6 Mediation path diagram for the study model

The analysis was run and it presented some interesting results. The following tables present results from the analysis, showing estimates including regression weights, covariances, correlations, standardised total effects, standardised direct effects, and standardised indirect effects.

Table 6.50 Regression Weights

Direction	Estimate	S.E.	C.R.	P	Label
CV<---OSV	0.357	0.104	3.439	***	Culture <--- Organizational Structure
CV<---ISV	0.085	0.07	1.209	0.227	Culture <--- Information Sharing
CV<---ConV	0.273	0.077	3.532	***	Culture <--- Connectedness
CV<---PSV	0.039	0.07	0.552	0.581	Culture <--- Purchase & Supply
PV<---CV	0.328	0.069	4.742	***	Performance <--- Culture
PV<---OSV	0.484	0.1	4.859	***	Performance <--- Organizational Structure
PV<---PSV	0.006	0.065	0.097	0.923	Performance <--- Purchase & Supply
PV<---ConV	0.291	0.074	3.936	***	Performance <--- Connectedness
PV<---ISV	0.612	0.065	9.365	***	Performance <--- Information Sharing

(Group number 1 - Default model)

Table 6.50 shows regression weights in all direct and indirect relationships. It also indicates the significance of P value for all the relationships. There are three insignificant relationships, which are ISV→CV, PSV→CV and PSV→PV. Estimates of these insignificant relationships are 0.227, 0.581, and 0.923, respectively. The remaining relationships in the table show significance. To see if it is full mediation or partial mediation, the indirect and the direct effects are reviewed further.

Table 6.51 Standardised Indirect Effects

	ConV	PSV	ISV	OSV	CV
CV	...	...	...	...	...
PV	0.001	0.544	0.162	0.001	...

- Two Tailed Significance (BC) (Group number 1 - Default model)

Table 6.51 presents P values for the standardised indirect effects. It appears that Connectedness and Organisational Structure have significant relationships with Performance at 0.001, for both, while Purchase & Supply and Information Sharing do not show significance in relation to Performance. This indicates mediation with Connectedness and Organisational Structure. To complete the picture of relationships, there is a need to look at the direct effects, which are assessed in Table 6.52.

Table 6.52 Standardised Direct Effects

	ConV	PSV	ISV	OSV	CV
CV	0.002	0.558	0.196	0.002	...
PV	0.001	0.978	0.002	0.003	0.002

- Two Tailed Significance (BC) (Group number 1 - Default model)

Table 6.52 shows P values for the standardised direct effects of the observed variables on the mediator and the outcome variables. It also presents the P value of the standardised direct effect of the mediator on the outcome factor. Connectedness and Organisational Structure show

significance in their relationships with the mediator Culture and the outcome variable Performance. Purchase & Supply shows insignificance in the relations with both variables. Information Sharing is insignificantly related to Culture and significantly connected to Performance. The mediator Culture shows significant relationship with the outcome variable Performance. Estimates of the standardised indirect and direct effects are presented in the following tables.

Table 6.53 Standardised Indirect Effects

	ConV	PSV	ISV	OSV	CV
CV	0	0	0	0	0
PV	0.061	0.01	0.022	0.061	0

(Group number 1 - Default model)

Table 6.53 gives the estimates of the standardised indirect effects of the observed variables on the outcome variable.

Table 6.54 Standardised Direct Effects

	ConV	PSV	ISV	OSV	CV
CV	0.253	0.041	0.092	0.254	0
PV	0.198	0.005	0.485	0.252	0.24

(Group number 1 - Default model)

Table 6.54 gives the estimates of the standardised direct effects of the observed variables on the outcome variable.

Table 6.55 Standardised Total Effects

	ConV	PSV	ISV	OSV	CV
CV	0.253	0.041	0.092	0.254	0
PV	0.258	0.015	0.507	0.313	0.24

(Group number 1 - Default model)

Table 6.56 Direct Effects

	ConV	PSV	ISV	OSV	CV
CV	0.273	0.039	0.085	0.357	0
PV	0.291	0.006	0.612	0.484	0.328

(Group number 1 - Default model)

Table 6.57 Indirect Effects

	ConV	PSV	ISV	OSV	CV
CV	0	0	0	0	0
PV	0.089	0.013	0.028	0.117	0

(Group number 1 - Default model)

Table 6.58 summarises important readings of mediation analysis and shows whether mediation is achieved, along with the level of mediation. A decision is made depending on the significance of relationships between variables in the model. Partial mediation happens when both the direct and the indirect relationships are significant. Full mediation happens when there is only one significant relationship that passes through the mediator. The software tests the regressions of independent variables in two directions. Mediation is complete when the direct path from X to Y is zero, after controlling for M. It is partial mediation when the path from X to Y can be significant with reduced effect (Valeri and Vanderweele, 2013).

Table 6.58 Mediation analysis summary.

Hypotheses	Direct effect	Indirect effect	Result
OSV→CV→PV	.252**	.061***	Partial mediation
ISV→CV→PV	.485**	.022 ns	No mediation
ConV→CV→PV	.198***	.061***	Partial mediation
PSV→CV→PV	.005 ns	.010 ns	No mediation

**=P<0.01; ***=P<0.001; ns= not significant

From an analysis of the output, it can be concluded that Organisational Structure and Connectedness are partially mediated by Culture, as both the partial and complete mediation are significant. This means that not all the Organisational Structure and Connectedness effect goes through Culture. Part of it is explained by the direct relationship and the rest is explained by the indirect relationship. The results show no mediation between Information Sharing and Performance. Although their direct relationship is significant, the indirect relationship does not show significance. This means that the relationship is fully explained by the direct relationship, without the need for a mediating factor. Purchase & Supply shows no significance in both the direct and the indirect relationships. It can be concluded that it is not mediated. In brief, Organisational Structure and Connectedness are partially mediated and the remaining variables are not mediated at all.

6.6 HYPOTHESES TESTING

The first group of hypotheses 1-5 test direct connections between supply chain management constructs and supply chain performance. These constructs are culture, organisational structure, information sharing, connectedness and purchase & supply polices. In addition to testing reliability, the relationships between the constructs and supply chain performance are tested through correlations, regressions and mediation analyses. Table 6.61 presents findings and decision on each hypothesis. It is important to note that respondents were informed that the survey aimed at identifying barriers to supply chain management. Therefore, their level of agreement with the statements of the survey indicates their agreement on their negative influence. Therefore, results from the quantitative analyses showing positive readings indicate agreement with the relevant hypothesis.

Table 6.59 Hypotheses 1-5

#	Hypothesis	Reliability Cronbach's alfa	Correlation	Regressions	Mediation Direct effect	Decision
1	Culture has a negative influence on supply chain performance.	0.718	.497[**]	0.24	0.328	✓
2	Organisational structure has a negative influence on supply chain performance.	0.684	.540[**]	0.252	.252[**]	✓
3	Information sharing practices and capabilities have a negative influence on supply chain performance.	0.834	.611[**]	0.485	.485[**]	✓
4	Supply chain connectedness practices influence supply chain performance negatively.	0.658	.407[**]	0.198	.198[***]	✓
5	Purchasing and supply policies have negative influence on supply chain performance.	0.541	.249[**]	0.005	.005 ns	✓

It can be seen that the accepted hypotheses are in agreement with the findings of previous studies where these relationships have been tested in different contexts such as Western and Chinese supply chains. (Archer, Wang and Kang, 2008; Cannon *et al.*, 2010; Richey *et al.*, 2010; Hai *et al.*, 2012). However, the level of agreement differs somewhat for some of the findings, as

it can be seen that some of the constructs are not similarly supported by the collected data. For example, information sharing is significantly supported by Cronbach's alfa, correlation, regression and mediation while purchasing & supply is only supported by correlation. These findings are discussed in further detail in the following sections.

The second group tests hypothesised relationships 6 -15 between culture, organisational structure, information sharing, connectedness and purchase & supply polices. Table 6.60 presents results from the analyses and the decision made on accepting or rejecting hypothesised assumptions.

Table 6.60 Hypotheses 6-15

#	Hypothesis	Correlation	Decision
6	Culture has a negative influence on organisational structure in relation to supply chain management.	.374**	✓
7	Supply chain connectedness practices are negatively related to culture.	.351**	✓
8	Culture is negatively related to sharing information in supply chains.	.192**	✓
9	Purchasing and supply policies are negatively related to culture.	0.211	x
10	Sharing information between supply chains is negatively related to organisational structure.	.258**	✓
11	Sharing information between supply chains is negatively related to connectedness practices.	0.066	x
12	Purchasing and supply policies are negatively related to sharing		

#		Regressions	Decision
	information.	.428**	✓
13	Connectedness practices are negatively related to organisational structure in relation to supply chain management.	.368**	✓
14	Organisational structure is negatively related to supply chain purchase and supply policies.	0.072	✗
15	Purchasing and supply policies are negatively related to supply chain connectedness practices.	.428**	✓

Hypotheses 6-15 were tested via correlations. The accepted hypotheses correspond with the findings of previous studies analysing supply chain relationships in other parts of the world such as the Western countries and China (Zhao *et al.*, 2008; Lin and Ho, 2009; Tillmann Böhme, 2009; Taylor, 2014). However, of greater interest are the three relationships which are not supported by correlations. These are the relationships in hypotheses 9, 11 and 14 which are discussed in greater detail in Chapter 8.

The final hypothesis 16 tests the collective effect of supply chain management constructs on supply chain performance.

Testing of hypothesis 16 includes findings from the ANOVA test. Table 6.61 presents results from the analysis and the decision made on accepting or rejecting the hypothesised assumption.

Table 6.58 Hypotheses 16

#	Hypothesis	Regressions	Decision

16	The collective influence of supply chain barriers is negatively related to supply chain performance.	ANOVA 2088.389	✓

The acceptance of hypothesis 16 goes in line with the acceptance of hypotheses 1-5 as it has been supported by correlation.

6.7 SUMMARY

In this chapter, quantitative analyses were conducted on the collected data. The survey data was exposed to factor analysis, reliability analysis, regression, and mediation analysis. The research model was tested via dimension reduction analysis to see if the constructs will fit under certain factors. These constructs are supply chain Performance, Culture, Organisational Structure, Information Sharing, Connectedness, and Purchase & Supply. Readings of KMO, variance, extraction sums of square loadings and reliability are presented in Table 6.65.

Table 6.59 Factor Analysis and Reliability

Factor	KMO	Extraction sums of square loadings		Reliability Cronbach's Alpha
		% Variance	Cumulative %	
Performance	.635	32.514	32.514	.626
		19.722	52.236	
Culture	.674	54.295	54.295	.718
Org. Structure	.645	61.898	61.898	.684
Info. Sharing	.705	75.470	75.470	.834
Connectedness	.682	49.439	49.439	.658
Purchase & Supply	.639	42.821	42.821	.541

Table 6.62 provides a summary of factor analysis and reliability for all included factors in the model. It shows that KMO is minimum, 0.639, in Purchase & Supply and maximum, 0.705, in Information Sharing, which is sufficient for factor analysis. Variance and cumulative readings are good across all constructs. Cronbach's Alpha readings meet the minimum requirement for reliability, except for Purchase & Supply, which is 0.541. Generally, the readings gave indications that the data is good for factor analysis, which was done and analysed accordingly.

Regression analysis was conducted, to study the influence of barriers on supply chain Performance. These relationships were tested and the results of correlations, adjusted R square, standardised coefficients, and collinearity statistics were reported.

Table 6.63 Regression

Factor	Correlations		Adjusted R square	Standardised coefficients	Collinearity Statistics
	Low	High		Beta	Tolerance
Performance	PS.249	IS.611	.623		
Culture	PS.093	P.497	.623	.240	.795
Org. Structure	PS.072	P.540	.623	.252	.759
Info. Sharing	Con.066	P.611	.623	.485	.758
Connectedness	PS. -.019	P.407	.623	.198	.807
Purchase & Supply	Con-.019	IS.428	.623	.005	.812

Table 6.63 summarises the main regression estimates. Factor items were transferred by adding up their values to act as one variable. Then, they were exposed to regression analysis, as per the developed model. The results show that factors give adequate correlations, except for Connectedness and Purchase & Supply, where they correlate lowly, at -0.019. In contrast, performance correlates very well with the other factors, at 0.611. Adjusted R square is 0.623, which is accepted. Standardised coefficients (Beta) give acceptable readings for all factors, ranging between 0.198 and 0.485, except for Purchase & Supply, which is 0.005. Tolerance shows sufficient readings, with the lowest result at 0.758, and 0.812 as the highest. This was followed by Structural Equation Modelling analysis to confirm the findings from the factor analysis.

A final quantitative analysis was executed to test the influence of Culture in Saudi Arabia on supply chain Performance. Because culture is a key element in this study, it was used as a mediator in mediation analysis to test its influence on the effectiveness of supply chain

management. Results showed partial mediation to Organisational Structure and Connectedness, with no mediation to Information Sharing and Purchase & Supply.

Findings are significant in most relationships of the analysis, which aligns with the research hypotheses, but there is a weakness in the results. For example, it is interesting to highlight that Cronbach's alfa of 0.541 was calculated from the Purchase and Supply construct, which means the survey questionnaire doesn't reflect this construct. This result doesn't support the relevant hypothesis. However, when the data was loaded into the hypothesised model, it showed adequate goodness-of-fit. In regression analysis, Connectedness and Purchase & Supply showed low correlations, compared to the other included supply chain management constructs, causing limitations in the analysis.

It is also interesting to see the mediation relationships between supply chain management constructs and Performance, with Culture being a mediating factor. The analysis shows partial influence of Culture on Organisational Structure and Connectedness practices, while it shows no effect on Information Sharing and Purchase & Supply. This can indicate that these constructs work as barriers, independent from the cultural influence.

Although the literature argued the negative influence that survey constructs have over supply chain management, some of the relationships were not confirmed as barriers by the survey data. The study applied different quantitative analyses to test included supply chain management relationships. Results of factor analysis, reliability, regression and mediation analyses supported the research assumptions. This confirmation can indicate that barriers to supply chain management in Saudi Arabia are generally in alignment with literature. The

rejection of some relationships brings about a number of additional barriers not normally presented.

Therefore, additional evidence was needed to support the quantitative study and to see whether these constructs really obstruct supply chain management in Saudi Arabia. Semi-Structured interviews were conducted with professional candidates from the Saudi market. Interviews can help present a fuller comprehension of barriers to supply chain management in Saudi Arabia because this method allows candidates more time and freedom to give details on the investigated issue. Interviews also allow for identification of current issues that are not included in the quantitative study.

Carrying out a survey method on its own is limited, in supply chain management research (Cadden, Marshall and Cao, 2013). This limitation is caused by the nature of data collection in surveys where respondents are presented with specific statements, which they might or might not find relevant. The findings presented in this chapter highlighted a number of these weaknesses, and by themselves did not allow a full conclusion on the barriers to supply chain management to be reached. The semi-structured interviews were employed to supplement and enhance these findings. Additionally, in order to build on the quantitative method, the interview questionnaire has been developed, with insights from the literature and the survey model, where the same concepts have been utilised in preparing the interview questions. Detailed descriptions of these interviews are presented in the following chapter.

CHAPTER SEVEN: QUALITATIVE DATA ANALYSIS

7.1 INTRODUCTION

Interviews were conducted with fifteen supply chain management personnel, who came from diverse backgrounds. Candidates were contacted via a number of channels such as emails, messages, and personal recommendations. Interviews took place either in person or over the phone. After collecting the qualitative data, transcribed interviews were thematically analysed. Findings from the analysis showed that barriers fall under three themes: logistics, policies, and regulations. Because the research sought the respondents' opinion over the survey model, it is interesting to see their considerable agreement with its constructs. Although they found challenges in relation to the survey constructs, candidates looked at the issues differently and identified other barriers.

7.2 DATA COLLECTION AND RESPONDET GROUPS

A semi-structured interview methodology was employed to serve the research purpose in exploring barriers to supply chain management. Fifteen interviews were conducted with employees who have experience of supply chain management in Saudi Arabia. All interviewees were asked the same group of questions and candidates were allowed to give their own opinions, with guidance from the interview questionnaire. They were instructed not to limit their answers to the specific experience of their organisations but to include what they have seen in their entire work experience. As a starting point, participants were asked to assess supply chain management in Saudi Arabia, compared to the developed supply chains of Western countries. Any input from the interviewer was only to keep the interview within the subject matter. Opening questions were

supported by more specific questions. The additional questions were prepared to help explain the main question and to assist in acquiring more information from respondents.

Here are main questions of the interview.

- How do you see the situation of supply chain management in Saudi Arabia?

- In your opinion, what are the challenges facing higher performance of supply chain management in Saudi Arabia?

- Do any of the following aspects influence supply chain management performance:

    o Culture

    o Organisational structure

    o Information sharing

    o Connectedness practices

    o Purchasing and supply policies

- In what way do challenges influence supply chain performance?

- Are these challenges specific to one sector?

- In your opinion, what challenges are considered to be the most important to supply chain performance?

- Who imposes these challenges on the supply chain?

- What do you do to avoid such challenges?

Although all participants gained their experience in the Saudi market, they come from different sectors, such as education & training, petrochemicals, logistics, and oil. This diversity is positively reflected in the research because it ensures a wide coverage of business sectors. Table 7.1 presents information on the respondents' current sectors of employment, the number of

respondents within each sector, the size of their organisations, and their level within the organisation.

Table 7.1 Respondent groups

Sector	Number of respondents	Size of organisation		Level within organisation
Import and trade	3	2 Small,1Large		2 Owners, 1 supply chain professional
Petrochemicals	3	Large		Supply chain professionals
Education & Training	2	1Large, 1Small		1Lecturer, 1Training specialist
Oil	2	Large		Procurement managers
Construction	1	Large		Expediting manager
Electrics	1	Large		Supply chain manager
Logistics and port clearance	1	Large		Supply chain professional
Pharmaceutical	1	Medium		Supply chain specialist
Telecommunication	1	Large		Supply chain manager

Respondents represented nine different professional sectors in terms of current employment; however, it should be noted that some had past experience in a variety of different sectors. The highest number of respondents in one sector was three interviewees working in petrochemicals and three in import & trade. There are two in education & training and two in the oil industry. The remaining sectors were represented by one each. This allowed for a good diversity of responses and helped cover a wider area of supply chain management in the country. With consideration to the size of organisations, three respondents worked for small sized

companies, one worked for a medium sized company, while the remaining 11 respondents worked for large businesses. Levels within the organisations varied, with all respondents working in supply chain management. There were supply chain managers, supply chain professionals, an expediting manager, a lecturer, a training specialist, and business owners. Interviews were conducted either in person, over the phone or via Skype calls. All interviews were recorded, translated (as needed), and transcribed. The translated transcriptions are presented as an appendix to this thesis.

Table 7.2 presents demographic details on each respondent regarding the organisation's sector, size, respondent's level within the organisation, number of supervised employees, and the total number of workforce in the organisation. The fifteen interviewees represent twelve individual organisations. Starting from this point, each respondent will be identified during the analysis by the respondent number given in Table 7.2.

Table 7.2 Respondents demography

Respondent number	Sector	Size of Organis ation	Level within Organisation	Supervised employees	Organisation employee #
1	Import and trade	Small	Owner	35	35
2		Large	Supply Chain Manager	47	11000
3		Small	Owner	11	11
4	Petrochemicals	Large	Supply Chain Professional	10	300
5			Supply Chain Professional	0	300

Respondent number	Sector	Size of Organisation	Level within Organisation	Supervised employees	Organisation employee #
6			Supply Chain Manager	7	300
7	Education & Training	Large	Lecturer	0	1673
8		Small	Supply Chain training specialist	0	N/A
9	Oil	Large	Supply Chain Manager	23	60000
10			Supply Chain Professional	15	60000
11	Construction	Large	Expediting Manager	30	20400
12	Electrics	Large	Supply Chain Manager	5	30000
13	Logistics and port clearance	Large	Supply Chain Professional	0	6000
14	Pharmaceutical	Medium	Supply chain specialist	0	200
15	Telecommunication	Large	Supply Chain Manager	60	1500

7.3 THEMATIC ANALYSIS OF QUALITATIVE DATA

In a thematic analysis, themes can be classified into three levels, which are global themes, organising themes, and basic themes. Under this classification, global themes are the broadest thematic categorization. They encompass all ideas from the qualitative data in relation

to the research assumptions. Basic themes are the narrowest thematic classification, which work as subthemes of the organising themes (Attridge-Stirling, 2001). All themes must be related to patterns within the data set. Idiosyncratic items should not be forced under irrelevant themes (Braun and Clarke, 2012).

Thematic analysis was employed in this research for identifying, interpreting, and explaining the different identified issues. What is also significant about this method is its suitability to analyse collected data, with respect to the research objectives. In addition, thematic analysis is an appropriate match to the research paradigm. It includes six steps, as proposed by (Braun and Clarke, 2006), which are, familiarization with data, generation of initial codes, search for themes, revision of themes, definition and naming of themes and, finally, production of the report. The report demonstrates connections of qualitative data in answering the research question.

7.4 THEMES

The collected data was carefully reviewed, looking for barriers, challenges, and difficulties addressed by respondents, either implicitly or explicitly. Findings were coded and clustered into main and sub categories. Issues, concepts, and patterns were categorised, recategorised, and refined. The researcher decided to include all relevant issues into the interview analysis to allow for a better conceptualization of supply chain management barriers.

Among the several steps taken to analyse the collected data, interviews were revisited to find and list all mentioned challenges. A list of all mentioned challenges was created. The list was then refined, excluding repeated issues and combining similar challenges. Similar basic issues were clustered to form organising themes. This step reduced the list into five organising

themes, which were then combined under wider classifications. The wider classifications formed three global themes of the study: Logistics, Policies, and Regulations. Under the three global themes, there are 15 organising themes and 73 basic issues. The themes are discussed in the following sections.

7.4.1 Logistics

Participants believe that challenges under the Logistics theme are responsible for a considerable amount of supply chain management barriers in the country. Delivery, transportation, and warehousing formed the organising themes, as they were considered major challenges to the supply chain. The basic issues under the Logistics theme account for 17.8% of the total issues categorised as part of the findings from the 15 interviews. Eight respondents discussed delivery issues, 5 discussed transportation issues and 2 discussed warehousing issues during the interviews. Table 7.3 lists barriers of the Logistics theme, with subcategory issues. Frequency refers to the number of respondents who identified issues under a certain category.

Table 7.3 Logistics barriers and issues

No	Category	Frequency	Issues
1	Delivery	8	▪ Delivery price ▪ Quantity and quality checks ▪ Missing items ▪ Delays ▪ Distribution among different cities, branches or stores ▪ Uncontrolled shipping service providers
2	Transportation	5	▪ Inexistence of trade rail ▪ Inefficient transportation ▪ Weak transportation infrastructure ▪ Item traceability issues

3	Warehousing	2	▪ Storage space ▪ Warehousing strategies ▪ Inventory cost

It is believed that challenges come from both internal and external factors[1][2][3]. Organisations are expected to take responsibility in managing internal challenges, while the government should deal with the external boundaries. There are two levels of barriers "*one is within the organisation itself and needs to be managed internally by clear processes to connect the different functions and departments. On the external side, I hope that the government have a clear strategy of the needs of the country*[4]". From identified issues, it appears that delivery concerns internal and external supply chain management.

Managers witness delivery difficulties in terms of price, time, missing items, and distribution issues. Some of these issues appear with moving valuable products. "*Although they are expensive and moved in big volumes they are not moved by money moving companies that have better protection*[5]". Other challenges facing product delivery include miscommunication between partners, lack a of transportation media that helps smooth movement of goods between cities in a safe, easy and fast fashion[6]. In addition, one persisting challenge is the "*non-existence of specialised supply chain service providers. There are no specialised companies in supply chain management*[7]". Such companies can help improve safety and security of supply chains by advancing management of information flow between supply chain partners, employing enhanced

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[1] Respondent number 14. Interview conducted on 10/11/2015.
[2] Respondent number 7. Interview conducted on 10/6/2015.
[3] Respondent number 12. Interview conducted on 13/1/2016.
[4] Respondent number 15. Interview conducted on 7/10/2015.
[5] Respondent number 15. Interview conducted on 7/10/2015.
[6] Respondent number 3. Interview conducted on 16/11/2015.
[7] Respondent number 8. Interview conducted on 2/2/2016.

technologies for product traceability, and strengthening relationships between partners (Marucheck et al., 2011).

Barriers of an external nature in delivery include not having much control over some shipping service providers[8]. Railways in Saudi Arabia are not well prepared. "*We do not have a good trade rail that serves trade operations. The only one that we have is very old and not really supportive*[9]". Although there is a plan and on-going work on improving train linkages between various destinations in the country (www.saudirailways.org), the existing facilities are not enough. The railways infrastructure is not up to international standards. One of the most important transport methods in Europe is the train. "*In Saudi Arabia, we do not have efficient trains. The train that we have does not move products everywhere around the country*[10]". Improving this sector helps avoid transportation challenges and traffic problems, by decreasing the number of shipping trucks on the highways.

7.4.2 Policies

Findings from the survey analysis show policy barriers including education, politics, and economics. Total issues under these barriers account for 17.8% of the total issues categorised over the course of the 15 interviews. Fourteen respondents highlighted supply chain management education issues, four participants mentioned political issues, and nine discussed economic issues. Political challenges were not related to internal supply chain, while supply chain

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[8] Respondent number 4. Interview conducted on 27/7/2015.
[9] Respondent number 5. Interview conducted on 27/7/2015.
[10] Respondent number 8. Interview conducted on 2/2/2016.

management education and economics were associated with internal and external issues. Table 7.4 presents Policy theme barriers and subcategory issues.

Table 7.4 Policy barriers and issues

No	Category	Frequency	Issues
1	SCM Education	14	▪ Lack of sufficient SCM college education ▪ Insufficient SCM training ▪ Lack of sufficient experience ▪ Lack of knowledge of SCM
2	Politics	4	▪ Wars ▪ Political problems/ disturbances
3	Economic	9	▪ Poor investment management and policies ▪ Rapidly increasing prices of products and services ▪ Sudden, seasonal changes in demand ▪ Lack of sufficient funding ▪ Increased insurance cost ▪ Monopoly ▪ Competition with local suppliers who are funded by government and others

Some policies were mentioned as barriers to highly performing supply chains because they are not well designed and/or implemented. They were regarded as external factors influencing the supply chain[11]. Many of the barriers are there because supply chain management is new to the country. Some supply chain managers believe that it is only a matter of time before the system in Saudi Arabia would adapt[12],[13]. The adaptation comes through changing ineffective policies and implementing efficient strategies.

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[11] Respondent number 7. Interview conducted on 10/6/2015.
[12] Respondent number 6. Interview conducted on 22/6/2016.
[13] Respondent number 2. Interview conducted on 20/7/2015.

Education policies result in a shortage of an educated and trained supply chain workforce. There is a need for university level education in supply chain management to prepare young professionals for the market because education makes a difference in employees' performance (Gray and Kish-gephart, 2013). Currently, we do not have enough universities that grant students degrees in supply chain management and procurement[14]. There is only one university offering a degree in supply chain management, which is King Fahd University of Petroleum and Minerals. Although they are doing a good job providing education and training in supply chain management[15], graduates were not seen as competent when they entered the market[16]. In addition to the lack of sufficient university education, there is a problem with the existing training programs. Clearly, supply chain management trainers in Saudi Arabia are not well qualified. Their education is not competent[17]. A lack of high level supply chain management education and training makes finding the right talent one of the biggest challenges in Saudi Arabia. The problem is that those who work in supply chains are either engineers or marketing people, who are not specialised in supply chain management with work experience[18]. Improved educational policies, in alignment with customised political and regulatory policies, can help improving the current status of supply chain management.

Political disturbances caused by wars and political conflicts bring about supply chain barriers. Currently, Saudi Arabia faces political tension with three neighbouring countries, which are Yemen, Syria, and Iran. War in Yemen led to cutting supply chain lines between the two countries and disturbed supply chains in the Southern regions of the country. Add to the cost of

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[14] Respondent number 8. Interview conducted on 2/2/2016.
[15] Respondent number 6. Interview conducted on 22/6/2016.
[16] Respondent number 11. Interview conducted on 27/7/2015.
[17] Respondent number 11. Interview conducted on 27/7/2015.
[18] Respondent number 10. Interview conducted on 14/12/2015.

the on-going war, exports and imports between the two countries have been hugely influenced, due to ceased trade relations. Marine traffic through Bab-El-Mandeb strait has also been largely affected by this tension, in terms of increased insurance rate, safety, and security of shipments[19].

A similar situation happened with Syria, where trade exchanges were stopped, affecting landline transportation with Turkey, Europe and neighbouring nations. More recently, the tension with Iran led to a cutting off of relationships. Diplomatic representation between both countries was ended and trade relations were halted. As a consequence of such political conflicts, insurance prices escalated. "*There are problems ensuring the supply chain especially at the current time where the country is facing a political problem. Therefore, transport insurance can witness an increase of prices*[20]". These political conflicts are responsible for creating barriers, such as cutting transport lines, banning trade exchanges, stopping money transactions, and halting business cooperation agreements with international parties. Challenges coming from local economic policies can create barriers towards improving supply chains with national parties.

Some of the economic challenges arise from poor investments, management policies, and insufficient funding. There were plans to attract investors from all over the world to do business in Saudi Arabia, providing them with needed facilitations. However, "*the Saudi Arabian General Investment Authority has not attracted investments as expected. There needs to be successful investments in transportation, storing and other strategic sectors*[21]". Although there are several funding programs, the efficiency of such programs needs to be maximised.

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[19] Respondent number 1. Interview conducted on 10/6/2015.
[20] Respondent number 1. Interview conducted on 10/6/2015.
[21] Respondent number 15. Interview conducted on 7/10/2015.

Many of the projects experience financial difficulties that lead to delays in finishing projects on time. Although there are successful businesses that need funding to expand, they encounter challenges in getting needed and sufficient financial support[22]. It is time to reach out for businesses and see how to provide them with funding and support, especially at such times where the country witnesses challenges at all levels. The ever-changing situation determines the need for robust and reliable economic planning to keep up with financially successful markets.

7.4.3 Regulations

The analysis of the interview data reveals regulatory barriers under three categories; regulations, bureaucracy, and customs & ports. The total numbers of issues under these barriers are represented by 21.9% of the total issues categorised during the 15 interviews. Ten respondents highlighted barriers caused by the practice of some regulations. Four participants blamed bureaucracy as being a challenge to a highly performing supply chain, and eleven interviewees discussed issues in relation to customs and ports. All highlighted issues under the regulatory theme can be classified as external challenges. Table 7.5 presents Regulatory theme barriers and subcategory issues.

Table 7.5 Regulatory barriers and issues

No	Category	Frequency	Issues
1	Regulations	10	▪ Inconsistent and rapidly changing regulations ▪ Not actually enforcing best practice regulations ▪ Inefficient import regulations ▪ Requirement of pre-authorization to allow item entry to the country ▪ Not accepting Purchase Order as a form of payment

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[22] Respondent number 1. Interview conducted on 24/7/2015.

			▪ Closing at prayer times ▪ Saudization
2	Bureaucracy	4	▪ Delay in the official processes that causes increased cost and loss of capital ▪ Having to provide many paperwork for every single shipment ▪ Having to acquire different entry authorizations from different official agencies in sequence
3	Customs and ports	11	▪ Electrical product checks ▪ Chemical product checks ▪ Inspectors low level of knowledge or/and education ▪ Time consuming process ▪ Increased land fees as result of lengthy clearance process or holidays ▪ Clearance requirements

Participants pointed to several regulations that contradict effective supply chain processes. Companies are keen on improving their services and operations. They work towards enhancing performance but they are obstructed by official requirements, especially at entry gateways, such as seaports, airports, and land ports[23]. Existing import and export regulations act as external barriers and do not support the easy handling of supply chain[24]. An example of such regulations is the requirement of acquiring preauthorisation for every single shipment of the same specifications. That applies to every shipment, even if it is part of a larger order[25]. Having to present proof of payment is another challenge. Many payments are made upon receipt or after installation; such regulations can delay the process and result in financial loss.

Furthermore, inconsistent regulations confuse supply chain management by adding more work and cost to the process. Managers who face unpredictable changes in legal requirements

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[23] Respondent number 3. Interview conducted on 16/11/2015.
[24] Respondent number 9. Interview conducted on 27/7/2015.
[25] Respondent number 15. Interview conducted on 7/10/2015.

will end up losing time and money to meet these new requirements. One example is the ever-changing regulations by the Ministry of Labour, which disturbs the whole market, and the transportation sector in particular[26]. The Ministry issued regulations that put additional burdens on business owners and investors by including extra fees and labour entry requirements.

Saudization is one of the regulatory issues that concern supply chain managers. It is understandable that this is done to encourage employing Saudi citizens and deal with the increasing unemployment in the country (Sadi, 2013). It is also understood that the Ministry wants to create job opportunities for Saudi nationals. However, there is some type of work that does not attract locals. For example, it is hard to find Saudi truck drivers. Lack of people willing to take such work would force employers to look for expatriates to do the job[27]. Saudization is only one of the regulatory issues slowing the flow of supply chains. Incompatibility of national regulations with that of the other countries upsets local businesses, as well as foreign investors.

Differences in regulations of supply chain can confuse international partners because the local rules that govern the entry of imports to Saudi Arabia do not align with the rules of their countries. Moving goods within the Euro Zone, for example, is much easier because of the existing agreements and treaties that control the movement of products and services among member countries. Issuing supply permits goes through similar procedures inside the Euro Zone. Even though Saudi Arabia has become a member of the World Trade Organisation, there is still much work to do[28]. The problem is deeper than just employing different rules over entry of goods. There is a misalignment on entry requirements between some entry points within the country. Different ports require dissimilar paper work for clearing identical products. Such

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[26] Respondent number 5. Interview conducted on 27/7/2015.
[27] Respondent number 15. Interview conducted on 7/10/2015.
[28] Respondent number 1. Interview conducted on 10/6/2015.

disagreements confuse supply chain managers and add more responsibilities that could have been avoided by standardising regulations[29].

Bureaucracy in finishing paperwork and quality cheques leads to delays in clearing imports. Because of such delays, cost increases and profit goes down. Some of the areas that need improvement are the entry points. "*In Saudi Arabia, we have a problem with the customs. The process is very slow, bureaucratic and outdatedly regulated*[30]". Some products need to pass through laboratory examinations, such as products with electric circuits and performs. The testing process takes longer than it should take. With negligence and bureaucracy, products stay at customs for long periods. After 14 days of arrival, the owner will have to pay land fees[31].

This theme is the third and last theme identified in analysing the content of the conducted semi-structured interviews. Questions that were included in the quantitative survey questionnaire were also included and tested by the interview questionnaire. Barriers from the survey model were classified and tested separately during the interview analysis to see whether they confirm findings from the survey.

7.5 VALIDATION OF QUANTITATIVE DATA

Respondents were introduced to the same barriers that were tested by the survey model. They were asked to comment on each of the constructs and if they would regard them as barriers. Responses were reported with a list of identified issues under each construct. The analysis of the interview content resulted in identifying a total of 30 issues, under five categories that account

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[29] Respondent number 15. Interview conducted on 7/10/2015.
[30] Respondent number 1. Interview conducted on 24/7/2015.
[31] Respondent number 1. Interview conducted on 24/7/2015.

for 41% of the total issues categorised during the interviews. Candidates were asked if they encounter challenges in relation to Culture, Organisational Structure, Information Sharing, Connectedness, and Purchase & Supply. The findings show that all agreed that organisational challenges create barriers to highly performing supply chain management. Fourteen participants believe that Information Sharing challenges hinder successful management of the supply chain. Thirteen respondents highlighted challenges in relation to Culture. Connectedness and Purchase & Supply practices were considered as facing barriers, by ten respondents, each. Except for Culture, almost all the mentioned issues under the other categories were internal barriers. Under the Culture category, there were internal issues and external issues, and there were issues that can apply to both. Generally, the semi-structured interview responses show agreement with the findings from the survey model.

Table 7.6 presents findings from the interview responses showing categories, frequencies and identified issues.

Table 7.6 Survey model barriers

No	Category	Frequency	Issues
1	Organisational Structure	15	▪ Placing different divisions of the supply chain under dissimilar departments ▪ Conflict of interests ▪ No clear measures of performance ▪ Poor administration ▪ Inefficient human resources ▪ Lengthy and costly recruitment process ▪ Improper organisational planning
2	Information Sharing	14	▪ Competition restricts sharing information ▪ Incompatible information systems ▪ Unavailability of SCM information systems ▪ Not using information systems ▪ Not employing information systems efficiently

No	Category	Frequency	Issues
			▪ Lack of specialists in operating information systems ▪ Safeguarding confidentiality ▪ Lack of unified and shared item description and /or specifications ▪ Weak IT infrastructure
3	Culture	13	▪ Lack of SCM education and training ▪ Lack of SCM knowledge ▪ Out-dated mentality in managing the SC ▪ Low level of acceptance to SCM ▪ Weekend and holiday differences
4	Connectedness practices	10	▪ Poor integration between the relevant official authorities ▪ Poor communication between departments within the SC ▪ Poor alignment and synergy between departments within the SC ▪ No collaboration with other SCs
5	Purchase and supply policies	10	▪ Not providing enough cash money in the hands of SC management ▪ Lack of sufficient funding ▪ Taking purchasing and supply lightly by higher management ▪ Lack of flexibility in purchasing policies ▪ No strategic purchasing planning ▪ Poor sale and/or after sale services

7.5.1 Organisational Structure

Supply chains are influenced by the structure of organisations. Some companies place stores, inventory, and supply chains under the marketing department, which can limit the efficiency of supply chains. Other companies have special departments named supply chain management. The structure of an organisation can differ depending on industry differences. It is more likely for organisations that focus on import/export activities to name a supply chain

manager[32]. On the other hand, it is less likely to see a supply chain manager working in an elementary school.

Some of the challenges facing supply chain management come from not taking it seriously. Marginalizing supply chain management in a business that depends on operations and movement of material can lead to major losses when the success of supply chains is an important part of the organisation's success. Very successful companies such as Samsung and Apple operate very successful supply chains, in addition to focusing on consumer satisfaction[33]. Positioning the supply chain in the structure of organisations is critical because it determines the area where supply chain managers can operate.

There are some organisations that place the supply chain under procurement or finance, which makes it much easier for supply chain managers to operate, while placing supply chain management under sales can create a lot of complications. Some organisations put logistics under sales and place procurement under finance, which can also lead to poor integration between the two departments. It is best to place procurement, contracting, logistics, and warehousing under the management of one department manager[34]. One of the critical tasks of top management is to set a proper organisational structure that suits their business, with consideration to the type of needed operations to run the business. It must allocate work tasks properly and ensure smooth streamline of processes. Otherwise, the structure can create a conflict of interests and complications in running the business[35].

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[32] Respondent number 1. Interview conducted on 10/6/2015.
[33] Respondent number 13. Interview conducted on 16/11/2015.
[34] Respondent number 15. Interview conducted on 7/10/2015.
[35] Respondent number 9. Interview conducted on 27/7/2015.

7.5.2 Information Sharing

One of the more imperative aspects of managing supply chains is the availability of the right information at the right time. Strict confidentiality and ineffective information systems can create serious damage to the supply chain[36]. Companies are afraid of sharing information with partners outside the organisation for different reasons. They do not realise that sharing information helps them[37]. Mistrust is one reason why partners are afraid of providing relevant data to other parties. It is even worse when partners within one organisation are not willing to share information among internal departments. Fragmented efforts to meeting targets can lead to lose-lose situations[38],[39].

Nonetheless, some respondents argue that it is not the sharing information that matters, but rather, the sharing of right information. Clear communication is more important than merely sharing information. Sometimes extra information has an opposite effect to what you are looking for. Moreover, cost can increase if partners are not willing to share the same level of information[40]. Supply chain management is very dependent on data. Informed supply chain managers, with the facility to obtain exact information on needed items, will not need to store products. Items can be ordered at the right time, at the right quantity, to make sure they are delivered in a timely manner. The problem is that such availability of information does not exist in Saudi Arabia[41]. Advanced information systems are installed in many organisations in an attempt to help provide needed data promptly but unfortunately the systems are not properly used

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[36] Respondent number 9. Interview conducted on 28/7/2015
[37] Respondent number 15. Interview conducted on 2/2/2016.
[38] Respondent number 13. Interview conducted on 16/11/2015.
[39] Respondent number 5. Interview conducted on 27/7/2015.
[40] Respondent number 9. Interview conducted on 27/7/2015.
[41] Respondent number 5. Interview conducted on 27/7/2015.

in managing supply chains[42]. Besides, half of the challenge is a rigid negative attitude of managers towards sharing data with partners within their own organisations, or with external supply chain partners (Fawcett and Magnan, 2001).

In many cases, challenges come from not using a unified information system that links all departments together and connects the internal supply chain to external supply chains. Employing dissimilar information systems creates compatibility issues, where sharing data becomes uneasy and less effective. A good information system connects warehousing, purchasing, suppliers, transportation, and customer care departments, which is not available in Saudi Arabia[43]. Utilizing information systems such as SAP or Oracle can help resolve supply chain management complications, by helping to improve the speed of supply chains and transferring more accurate data to partners[44].

7.5.3 Culture

Barriers related to the cultural aspect include a lack of sufficient education and training of supply chain management, lack of awareness and knowledge on supply chain management, weekends, and holidays. Because education is an important part of any culture, it is seen as a fundamental driver to supply chain management. Some of the disturbing factors to the flow of supply chain management are a lack of supply chain management awareness, education, and training[45]. Many people in the business field do not know about supply chain management[46],

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[42] Respondent number 15. Interview conducted on 2/2/2016.
[43] Respondent number 11. Interview conducted on 27/7/2015.
[44] Respondent number 10. Interview conducted on 14/12/2015.
[45] Respondent number 3. Interview conducted on 16/11/2015.
[46] Respondent number 2. Interview conducted on 20/7/2015.

which makes it harder to bring change in managing business operations. The other challenge here is that many workers do not value time management[47].

Holidays and weekends are significant cultural times that can influence the supply chain. During Ramadan and Hajj seasons, for example, there are big shifts in the flow of supply chains. In Ramadan, the whole process slows down, as work hours are officially reduced. Workers are less effective because they are fasting. In addition, work stops at prayer times during work hours[48]. Considering that most people stay awake late in the nights of Ramadan, the productivity of employees goes down, as they will go to work not having enough sleep. Such a decrease in productivity slows down the whole supply chain starting from the customs[49]. One the other hand, during the Hajj season, demand on consumer products increases and complementary products witness a lower demand. Ports in Jeddah get overwhelmed with urgent imports related to the season, leaving regular imports on the waiting list[50].

Unlike most countries, the weekend break in Saudi Arabia is on Fridays and Saturdays. This means communication with other international businesses stops by close of business on Thursday and can only resume on Monday. The international market operates on Friday while the local market is off. On Sunday, it is the opposite, where the Saudi market is in operation, while the international businesses are traditionally off. The difference in weekends results in weaker communication between international supply chain partners[51]. However, many times, holidays can be exploited to create stronger relationships with business partners.

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[47] Respondent number 9. Interview conducted on 27/7/2015.
[48] Respondent number 10. Interview conducted on 14/12/2015.
[49] Respondent number 14. Interview conducted on 10/11/2015.
[50] Respondent number 3. Interview conducted on 16/11/2015.
[51] Respondent number 10. Interview conducted on 14/12/2015.

It is known that personal relationships in some cultures enhance business relations and lead to lower transaction costs. Such relations usually include exchanging favours and building trust, which can ease tensions, and help make things happen[52]. Although personal relationships improve trust among businesses they are mostly forged outside the organisational environment (Wang, 2015). Some people would culturally prefer risking work performance in favour of personal relations (Jurkiewicz and Giacalone, 2004). This happens repeatedly in businesses of all sizes in the country, where workers, managers, and even business owners would prefer keeping interpersonal relations, which can lead to less effective management of supply chains. Unfortunately, in Saudi Arabia, personal relationships are built on tribal and regional ties. An outsider cannot penetrate these cycles easily and thus making use of personal relationships to improve supply chain performance can be very tricky.

7.5.4 Connectedness

The nature of supply chains requires continuous communication with the different tiers along the supply chain. Relationship with supply chain partners such as sellers, buyers, suppliers, couriers and warehousing is important[53]. Level of connectedness can have a huge influence on the productivity of supply chains. One of the main purposes of information systems is helping integration between departments and partners. Needing to deal with different official authorities that are not well integrated via information systems and not similarly motivated to work is a challenge[54]. Availability of information systems is not the problem; not utilizing them correctly is the problem. Companies invest a lot of money in such systems to boost integration and

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[52] Respondent number 12. Interview conducted on 13/1/2016.
[53] Respondent number 11. Interview conducted on 27/7/2015.
[54] Respondent number 15. Interview conducted on 7/10/2015.

performance. Yet, these systems end up being ignored or misused, leaving performance lagging (Taylor, 2014).

Maximum performance requires top level integration. There are partners who refuse to talk to one another. The planning, sourcing, funding, warehousing and purchasing work separately, which is why barriers appear[55]. An important connectedness practice is communication, where it plays a very important role in increasing performance. "*Proper cooperation leads to high performance and poor cooperation leads to poor performance*[56]." Low levels of cooperation result in a waste of time, money, and effort. Furthermore, such practices ignite conflicts with partners, resulting in lower levels of connectedness and performance[57]. The majority of the supply chain issues come from a misalignment between partners. Companies in Saudi Arabia tend to do source the old way. There is no strategic planning that takes into consideration collaborating supply chains[58].

7.5.5 Purchase and Supply polices

The alignment between supply chain partners is necessary for setting purchasing strategies and plans. Misalignment between supply chain managers and sales manages creates conflicts. This is what happens in many organisations, where the different departments do not make proper arrangements to set a unified plan for purchases[59]. Although purchasing is a fundamental part of doing business, many organisations do not take purchasing policies seriously[60]. Barriers can arise from not supplying the right items in the right time to the right

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[55] Respondent number 15. Interview conducted on 2/2/2016.
[56] Respondent number 11. Interview conducted on 27/7/2015.
[57] Respondent number 10. Interview conducted on 14/12/2015.
[58] Respondent number 15. Interview conducted on 2/2/2016.
[59] Respondent number 10. Interview conducted on 14/12/2015.
[60] Respondent number 13. Interview conducted on 13/1/2016

place, which can be caused by poor purchasing policies (Chen and Yano, 2010). The opposite is done in some organisations to avoid any shortages.

Purchasing departments in some private and public organisations adopt buying in large quantities but unfortunately products end up in huge warehouses, with poor storage conditions. It is very important to change from spot purchasing policies to strategic procurement policies. *"We need to start building relations such as what is called blanket purchase order for disposable items. For the strategic items, we need to contract them for about 4 to 5 years. This is what is being done in the petrochemical industry, especially for the catalysts*[61].*"* Considering funding, demand, shipping, customs, warehousing, distribution and lead time, a supply chain manager makes the purchasing plan. Demand planning accuracy is another way of planning purchases, which is not really employed in managing purchases in Saudi Arabia[62]. Other ways of doing purchases can influence the supply chain differently.

One of the challenges facing supply chain mangers is a shortage of cash. Purchases in cash have advantages in Saudi Arabia, where a supply chain manager with enough cash can negotiate better deals. Checks are not very reliable as a means of payment, which is another barrier facing supply chain management. Sellers do not feel comfortable with check payments all the time because of the slow legal process dealing with forged checks. With cash payments, the purchaser can make discounted deals, up to 25%[63].

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[61] Respondent number 5. Interview conducted on 27/7/2015.
[62] Respondent number 6. Interview conducted on 22/6/2016.
[63] Respondent number 12. Interview conducted on 13/1/2016.

7.5.6 General highlights

Like the findings from the quantitative analysis, the qualitative analysis revealed interesting results. Except for information sharing, all the other constructs were perceived as barriers, differently. Respondents to the survey agreed on most of the barriers but participants in the interviews highlighted different issues under the same categories. The most contradicting example is that of purchase & supply, where it was not found as a barrier in the quantitative analysis. However, interviewees identified purchasing & supply challenges that were not initially included in the survey. Specifically, the survey questions included issues such as demand forecasting, inventory levels, and a tendency to buy from larger suppliers, while the issues from the qualitative method included finance, funding, planning, and integration.

This disagreement can indicate that literature barriers are no longer relevant to purchasing and supply. On the other hand, there was a considerable level of agreement with the barriers in the rest of the survey constructs. The identification of new barriers by candidates might indicate that challenges, seen from literature review, can be described as traditional barriers. Challenges from the qualitative thematic analysis can be new or more of a concern of this time and thus may need further investigation at a different stage.

7.6 SUMMARY

This part of the analysis examined fifteen semi-structured interviews, which were conducted with supply chain management academics and professionals. Thematic analysis resulted in identifying several barriers under three themes, which are logistics, policies, and regulations. These themes accounted for 57.5% of the total issues categorised from the 15 semi-

structured interviews. The remaining 42.5% of issues were listed under the study model. Most respondents considered issues under the model categories as barriers although they are less than the issues of the newly identified themes. Respondents agreed with the constructs of the survey model, believing that they act as barriers to highly performing supply chain management, while the quantitative analysis showed disagreement with some constructs, which may indicate current shifts of concerns and challenges. Generally, it is agreed that supply chain management is relatively new to the country and that challenges, as a result of its newness, would appear. However, it is only a matter of time before the system adapts and many of the barriers fade away[64].

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[64] Respondent number 12. Interview conducted on 13/1/2016.

CHAPTER EIGHT: DISCUSSION AND RESESARCH CONCLUSIONS

8.1 INTRODUCTION

More formalised supply chain management has been evolving into developing parts of the world where formal and modern supply chain practices have not been widely implemented. As can be seen from the vast body of literature pertaining to the domain, Western countries can be seen to have been continually improving and evolving their supply chain practices since the formal recognition of the domain in the 1980s. This has been contributed to by the continuous development of infrastructure and the business environment. On the other hand, the emergence of supply chain management as a formalised practice in other parts of the world such as the Middle East is still in its infancy and is not without challenge. While the traditional barriers to supply chain practice persist in these regions, their newness to the practice and cultural differences also pose unique difficulties. As an important part of the Middle East, Saudi Arabia has begun its journey towards the embrace of more modern supply chain management practices which can be seen in its more recent policy developments specifically focused on enhancing supply chain operations in the country. It is recognised in this study that in order to get the implementation of supply chain practice right, it is important to understand the differentials between this region of the world and those more advanced in the practice of modern supply chain practice. In recognition of this, it is also critically important to begin to understand the potential

216

differences between the theoretical constructs that have been well studied in more advanced

supply chain regions and those that might exist here. To support these positions this study has

successfully assessed the links between supply chain barriers and supply chain performance in

Saudi Arabia. In completing this study barriers already identified in the literature have been

found to also apply here. However more interestingly are the additional barriers that seem to be

aligned with the region itself, due to its context and culture. These factors and their implications

for theory and practice are explored in the later sections of this chapter.

In order to identify these barriers, a mixed methods approach was used for data collection

which involved the completion of a quantitative survey and semi-structured interviews. In the

previous chapters, the interrelationships between supply chain management barriers and supply

chain performance were analysed and assessed using qualitative and quantitative methods. The

data obtained from both methods were analysed in chapters six and seven. This chapter will now

seek to extract conclusions from the findings.

8.2 THE MAIN OUTCOMES

The relationships between supply chain management constructs and supply chain

performance have been tested and most hypothesised relationships were found significant. This

research hypothesised direct relationships for supply chain performance and culture,

organisational structure, information sharing, connectedness, and purchase & supply. The

interconnections between each of the constructs with the remaining variables have been hypothesised as well. As illustrated in Table 6.46, performance has significant correlations with culture, organisational structure, information sharing, connectedness, and purchase & supply. In addition, regression analysis shows that a considerable part of the variability of performance is accounted for by the independent variables. However, the remaining five variables have different correlations with one another. Findings show that not all variables are significantly associated with other variables, which can indicate a shift on what influences supply chain management.

8.2.1 Relationship between Culture and Supply Chain Performance

Research findings indicate that culture was significantly correlated to supply chain performance, at 0.497. Multiple regression tests measured culture interdependence with supply chain performance. Upon testing the relative strength of the different independent variables in the regression model, culture has a beta coefficient of 0.24. This means that an increase or a decrease of one standard deviation in culture leads to an equivalent effect on Performance, with the other predictors in the model holding constant. Moreover, findings from the semi-structured interviews show relationships between culture and supply chain performance.

These findings are in line with the main literature regarding supply chain management that suggests that culture can play an important role in supply chain management (Ueltschy, Ueltschy and Fachinelli, 2007; Zhao et al., 2008; Cannon et al., 2010; Liu et al., 2010; Cadden, Marshall and Cao, 2013; Wu, Chuang and Hsu, 2014; Kim, Hwang and Rho, 2016). Therefore, this research reinforces the significance of culture in managing supply chains that are operating in Saudi Arabia. This can explain how cultural traits can play a significant role in obstructing or slowing down supply chains. This notion is further explained by the qualitative data analysis, where interviewees identified culturally specific causes to supply chain management obstruction.

For example, weekends and holiday differences, and low levels of acceptance to supply chain practices, were regarded as barriers to effective supply chain management practices in Saudi Arabia. Furthermore, low levels of supply chain management education, knowledge, and training were directly linked to culture and it was found that supply chain performance was negatively influenced by them.

8.2.2 Relationship between Organisational Structure and supply chain Performance

This research tested the relationship between organisational structure and supply chain performance. It found that supply chain performance is significantly correlated to organisational structure, at 0.540. Multiple regression tests measured organisational structure interdependence with supply chain performance. The relative strength of independent variables in the regression model shows that organisation structure has a beta coefficient of 0.252. Therefore, any increase or a decrease of one standard deviation in organisational structure leads to an equivalent effect on Performance. In addition, findings from semi-structured interviews confirmed the relationships between culture and supply chain performance.

Findings are in line with other research that investigated organisational issues, with respect to supply chain management (Vaaland and Heide, 2007; Archer, Wang and Kang, 2008; Fawcett, Magnan and McCarter, 2008; Cadden *et al.*, 2010; Cadden, Marshall and Cao, 2013). This research reinforces the significant influence of organisational structure on supply chain performance in Saudi Arabia. This can explain how organisational structure can play an important role in obstructing or slowing down supply chains. This notion is further explained by the qualitative data analysis, where all interviewees identified challenges in relation to the structure of the organisation. An example of an organisational structure issue is placing different

divisions of the supply chain under dissimilar departments, which slows the flow of the supply chain.

8.2.3 Relationship between Information Sharing and supply chain Performance

Research results indicate that information sharing was significantly correlated to supply chain performance, at 0.611. Multiple regression tests were performed to measure information sharing interdependence with supply chain performance. Information sharing has the largest relative strength among included independent variables in the regression model. Information sharing has a beta coefficient of 0.485, meaning that any change of one standard deviation in information sharing leads to an equivalent effect on SC Performance. Findings from the semi-structured interviews show connections between sharing information and supply chain performance.

These results confirm findings from literature on supply chain management, where it is suggested that problems in sharing information can play an important role in obstructing effective supply chain management (Fawcett and Magnan, 2001; Gunasekaran and Ngai, 2004; Hult, Jr and Slater, 2004; Zhang and Li, 2006; Harland *et al.*, 2007; IBM Corporation, 2009; Mwirigi, 2010; Aliei, Sazvar and Ashrafi, 2012; Fransson and Molander, 2012; Wu, Chuang and Hsu, 2014; Oualid *et al.*, 2016). Hence, this research also shows the significance of sharing information in supply chain management, in organisations operating in Saudi Arabia. The findings can explain the destructive role of not sharing information to the supply chain. This notion is supported by interviewing supply chain management experts in Saudi Arabia, where collected data revealed that information sharing issues can slow or obstruct the flow of supply chains. For example, not using information systems at one end of the supply chain, forces

dealing via the ordinary means, which can cause delays in lead times. In addition, safeguarding confidentiality is another issue facing information sharing.

8.2.4 Relationship between Connectedness Practices and supply chain Performance

The research tested the relationship between connectedness practices and supply chain performance. The findings indicate that connectedness is significantly correlated to supply chain performance, at 0.407. Multiple regression tests were performed to measure connectedness interdependence with supply chain performance. The relative strength of connectedness among included independent variables in the regression model is explained by beta coefficient of 0.198. This means that any change of one standard deviation in connectedness leads to an equivalent effect on SC Performance. Findings from the semi-structured interviews show strong connections between connectedness practices and supply chain performance.

These results support findings from the literature, where it is suggested that connectedness issues can play an important role in challenging highly performing supply chain management (Frohlich, 2002; Seuring and Muller, 2008; Tillmann Böhme, 2009; Flynn, Huo and Zhao, 2010; Richey *et al.*, 2010; Hai *et al.*, 2012; Zhao *et al.*, 2013; Yu, Xiong and Cao, 2015). Therefore, this research reinforces the important role of connectedness practices for supply chain management, in organisations operating in Saudi Arabia. The results can show the connection between low supply chain performance and weak connectedness. The qualitative data also supports this notion, by revealing challenges in relation to integration, collaboration, and alignment.

8.2.5 Relationship between Purchase & Supply Policies and supply chain Performance

Research findings indicate that purchasing and supply policies were significantly correlated to supply chain performance, at 0.249. Multiple regression tests measured the purchasing and supply policies interdependence with supply chain performance. Purchase & supply has the smallest relative strength among the included independent variables in the regression model. Purchase & supply is explained by beta coefficient of 0.005, meaning that any change of one standard deviation in connectedness leads to an equivalent effect on supply chain Performance. Moreover, findings from the semi-structured interviews show relationships between culture and supply chain performance.

These findings are in line with the literature, which suggested an interrelationship between supply chain performance and purchasing & supply policies (Vaaland and Heide, 2007; Archer, Wang and Kang, 2008; Lin and Ho, 2009; Chicksand *et al.*, 2012; Hai *et al.*, 2012). This research confirms that finding, for supply chain management in organisations operating in Saudi Arabia. The quantitative results show the connection between low supply chain performance and ineffective purchasing & supply policies. The interview data also supports this notion, by identifying challenges such as lack of funding and flexibility in the purchasing processes.

8.2.6 Rejected hypotheses

The analyses of the quantitative data revealed the rejection of three hypothesised relationships in this research. These hypotheses test the following relationships: H 9. purchase & supply with culture, H 11. information sharing with connectedness practices and H 14. organisational structure with purchase and supply. The rejection of the three hypotheses does not comply with current literature which supports the relationships between all included constructs.

Although the literature supports interconnections between purchasing and culture (Lin and Ho, 2009) findings in this study does not support H 9 which suggests that purchasing and supply policies do not relate to culture. This can be related to the fact that people in Saudi Arabia make a strong connection between culture and education which they think is not directly connected to the purchasing decision in managing the supply chain. On the other hand, interviewees supported the connection between purchasing and culture by highlighting the differences in religious holidays and weekends which can delay processes or confuse purchasing managers. Candidates believe that at a number of cultural occasions purchases are hugely influenced. Some of these occasions are prayer times, Hajj season, Ramadan and weekends. Moreover, interpersonal relationships are valued and encouraged to help making deals in Saudi Arabia. The qualitative analysis showed increased interest in personal connections to help making deals in the Saudi supply chains.

The second rejected hypothesis H 11 hypothesises a connection between information sharing and connectedness practices. Both constructs found barriers in relation to supply chain performance but the interrelationship between sharing information and connectedness did not lead to accepting the hypothesis. Although the literature supports this relationship in a general sense (Gunasekaran and Ngai, 2004; Cai, Jun and Yang, 2010; Prajogo and Olhager, 2012) the rejection of the hypothesis can indicate reluctance from supply chain professionals in Saudi Arabia to connect both ideas for a number of reasons. First, people in Saudi Arabia prefer building trust from personal communication to building relations through the exchange of information about products and supplies. Interviewees also showed a tendency to safeguard information but were interested in creating connections and building business relations with

223

supply chain partners. The interviewed candidates did not find sharing data important for connectedness practices.

Even though candidates considered information sharing important to the supply chain they were very sceptical about what information to share and to what extent they can go in sharing data with supply chain partners. Moreover, supply chains face difficulties with incompatible information systems and lack of unified and shared item description which make the connection between supply chains reasonably uneasy.

The third rejected hypothesis is H 14 which suggests a connection between organisational structure and purchase and supply policies. The quantitative analysis does not support the hypothesised assumptions that connect both constructs with supply chain performance. In addition, literature supports the connection of purchasing & supply to organisations (Hult *et al.*, 2000; Zsidisin, Melnyk and Ragatz, 2005; Bhatti, 2014). The rejection of the hypothesis can indicate mismatch between purchasing departments and the organisations' management. In contrary, this relationship can be supported by findings from the qualitative analysis where candidates pointed out to the organisation's behaviour in purchasing. Interviewees reported challenges caused by positioning the purchasing department under different organisational departments that undermine its importance. Others reported that challenges can also come from not taking purchasing seriously.

8.3 CONTRIBUTIONS

This study focused on supply chains in Saudi Arabia. It adopted and researched supply chain management barriers from the literature to investigate whether they would also apply to the

specific context of the research, namely, examining barriers to supply chain management in Saudi Arabia. This research investigates five main barriers, which are culture, organisational structure, information sharing, connectedness, and purchase & supply. The thesis has assessed the challenges facing supply chain management in Saudi Arabia and their relationship to supply chain performance. Furthermore, the research finds additional barriers, which can represent direct and recent concerns in managing supply chains. The new challenges are closely related to logistics, policies and regulations. Consequently, in its pursuit to answer the main research question, this thesis is believed to have contributed to the knowledge and practice in supply chain management.

8.3.1 Contribution to theory

The findings add to the current understanding to supply chain barriers, providing empirical evidence of the relationships between barriers and supply chain performance. This thesis contributes to an empirical analysis of barriers to effective supply chain management in Saudi Arabia, as it used a mixed method; most of the previous work was either qualitative or quantitative. There were calls to use mixed methods in the study of barriers. This research fills that gap by exploring barriers to effective supply chain management via surveys and interviews. The methods used in executing the research have not been used previously in identifying supply chain management challenges in Saudi Arabia. Thus, this contribution sets the foundation for further research on barriers using similar methods in different contexts or applying different methods such as case studies to help confirm findings in the context of this study.

The barriers were identified and categorised at a third level. For example, one of the theme barriers is 'logistics barriers', which has sub-themes and issues listed under its category. The different aspects of the sub-level issues allow for multidimensional theoretical analysis. In

addition, this prepares the foundations for academics to use these barriers for further research on barriers to supply chain management, in different regions or via different methods.

Additionally, included issues in this research have been adopted from discussions and arguments of previous research. All of the issues in this study have been reviewed and discussed in fragmented pieces of work and not in the context of such a culturally different market. Most studies on barriers tend to primarily focus on Western countries. However, there is limited evidence about supply chain barriers in a Saudi context. This research brings barriers together in a collective work and tests them in a Saudi context. Findings clearly show that the theoretical underpinnings do not apply uniformly all over the world.

Most of the research on supply chain barriers emphasise other factors such as connectedness practices and information sharing. However, this study has shown that culture is a prominent factor, especially when it comes to countries such as Saudi Arabia. Therefore, this also adds to the understanding in supply chain barriers, which has to be taken into consideration in the study of supply chains in this specific context. The study also presents the interrelationships of all included factors on effective supply chain, with a consideration of the cultural influence.

Moreover, one of the pieces coming out of this study is that in addition to the normal barriers, a country such as Saudi Arabia has a number of additional barriers not normally presented. These barriers are the cultural influence over purchasing & supply policies, connectedness influence over sharing information, and organisational structure over purchasing and supply policies. The rejection of these hypotheses in this study leaves a theoretical gap; in the literature, these variables were found to have interconnections that were not supported in this

study. This can be an indication that these variables are not as pronounced in other regions that are similar to the region of this study. In addition, the identification of this gap provides an opportunity for future research

8.3.2 Contribution to practice

Nowadays, organisations are increasingly interested in enhancing the performance of their supply chains. Considering the business environment, and the specifics of Saudi Arabia, supply chain management faces specific barriers and challenges. Investors and business owners need reliable information on what to expect upon entering the Saudi market. This research provides details on barriers to effective management of supply chains operating in the country. The findings of this research present the foundations of risk assessment to supply chain managers, to help them make well informed decisions.

This research presents organisations with a comprehensive analysis of challenges facing supply chain management in Saudi Arabia. Companies that intend to enter the Saudi market need to consider these barriers in making that decision. Usually, investors are presented with the advantages which are important; however, informed decision making requires a clear analysis of the challenges as well. This is because knowing expected challenges helps with setting plans, alternative plans, and risk assessment. Additionally, not all existing organisations in the Saudi market face identical challenges all the time. Different businesses have different concerns with their supply chains. Therefore, this study can help organisations in setting future plans, with information on expected challenges arising from business improvement or expansion.

Practitioners can also benefit from the identification of barriers, as they can serve in training employees. The identified barriers can work as a useful guide to supply chain managers during the training activities that aim at improving supply chain effectiveness. The barriers provide a reference for supply chain trainers and help them focus their attention and resource allocation for training plans. This also helps organisations to focus on the most important challenges that can help them maximise benefits, with less effort.

This study identified culture as a prominent barrier. Foreign investors need to be aware of several cultural requirements not normally present in Western countries, in relation to religion and social relationships. Businesses need to consider training their staff with respect to the cultural specifications of the country such as closing shops at prayer times and generally slow business practice during Ramadan and Eid holidays, which are not at the same time as the holidays in different countries. In addition, interpersonal relationships and connections play important roles in running businesses in the country, which needs to be taken into account in employing public relations practices.

As mentioned earlier, the Saudi government has a policy with a main focus on supply chain management evolution. This study provides the government with the challenges that organisations and supply chain managers face in managing successful supply chains. The implementation of the policy would require removing identified barriers in this research. The removal of barriers can ensure faster and easier implementation of the policy. In addition, this study can help prioritizing improvement in the public sector that is connected to supply chain management such as transportations services, ports, and the related regulations. Future planning can utilise this study to assess the current situation of supply chain management and compare it to its situation in the future, to note improvements and measure performance.

8.4 LIMITATIONS OF THE RESEARCH

Although this research is significant, in assessing and analysing barriers to supply chain management in Saudi Arabia, it has some limitations that need to be noted:

- Access to organisations might have been hampered by restrictions to participation in research which is not encouraged by some organisations. .

- Challenges in collecting responses for the survey and the semi-structured interviews created further limitations to this research. A difficulty in creating a list of possible respondents, contacting them, and following up for data collection was another limitation, which has not been predicted prior to commencing the research.

- A low response rate to the survey was caused by limited cooperation from organisations and a lack of understanding to the research issue.

8.5 OPPORTUNITIES FOR FUTURE RESEARCH

Throughout the course of the research, certain areas have come to light that may warrant further research. They were not pursued due to their lack of direct relevance in answering the research question. Additionally, these areas have not been covered because the research was conducted to a relatively tight timeline.

The study investigates barriers to supply chain management and their relevance to supply chain performance in Saudi Arabia. This study could be replicated using different samples and research settings, which would be expected to contribute further evidence regarding the validity and generalizability of the research results. The research identifies the following opportunities for future research in order to advance research in this domain.

- It would be interesting to extend this study to include aspects that are specific to particular types of industries or supply chains. For example, the considerable interest in the oil industry in Saudi Arabia can present a good avenue for further exploration to supply chains and challenges specific to the industry. Organisations working in this field employ well-structured and advanced supply chains and they are connected to external supply chains in the international market, which brings an opportunity to explore supply chain management in this industry in relation to their external partners.

- This research can be extended to investigate the applicability of the barriers in different settings, such as examining the barriers in different seasons or at critical times. Saudi Arabia has a desert climate, which has an extremely high temperature at day time and a sharp temperature drop at night. Average summer temperatures are around 45 °C and can reach as high as 54 °C. In the winter, the temperature rarely drops below 0 °C. One of the challenges that faced supply chains in Iraq are high temperatures in the summer (DeJohn, 2004). Exploring challenges caused by weather conditions or natural environments could enable a further understanding to supply chains in this region.

- In addition, it would be interesting to conduct a case study of supply chain management to acquire clear understanding of supply chain management barriers, drivers, facilitators, and practices in Saudi Arabia and how they influence supply chain performance.

- Purchasing and supply policies were not found to be barriers to supply chain management in the surveys but interviewees did identify purchasing and supply. This could indicate that barriers from the literature have now changed somewhat. Future research could investigate this.

- Three of the hypothesised assumptions were rejected by the quantitative analyses while they were supported by literature and the qualitative analysis. These rejected hypotheses clearly indicate that theoretical underpinnings do not necessarily apply uniformly all over the world. This can also indicate lack of sufficient evidence in this study due to limitations such as time and resources. This brings about opportunities for future research to study interconnections in H 9, H 11 and H 14. These hypotheses did not support relationships between purchasing & supply policies with culture, information sharing with connectedness practices and organisational structure with purchase & supply policies.

- The influence of purchase & supply policies was supported by the quantitative analyses. However, this relationship was not as strong as it is in the other hypothesised assumptions. Result from reliability test was bellow accepted range and it was not supported by mediation analysis. This can indicate weakness of evidence where future research can investigate the relationship and provide stronger evidence.

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Appendices
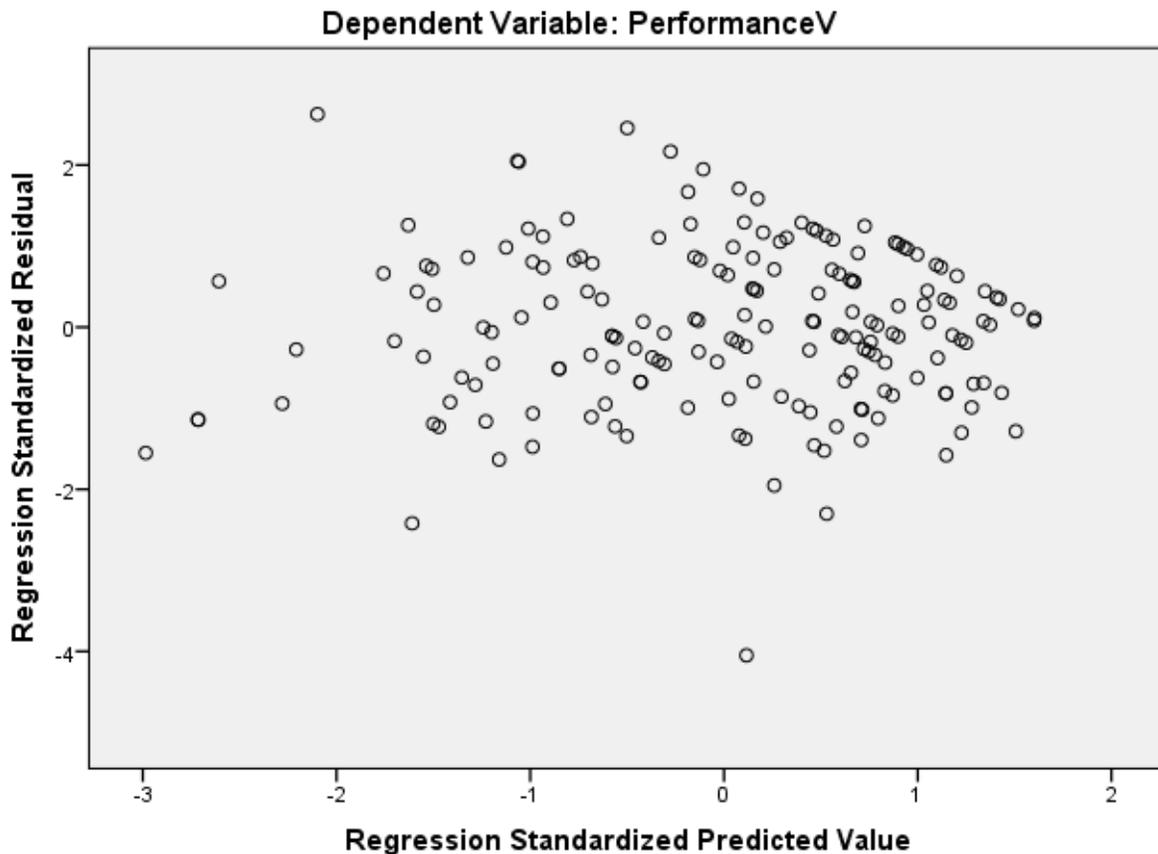
Appendix 6.1 Scatterplot

Most of the Smi-structured interviews were held in Arabic. Translation happened in working documents which are presented below. They are ordered in accordance with the given number to each candidate in Table 7.2.

Interviewee: 1

Sector: Import and retail

Number of supervised employees: 35

Date: 24/07/15

- *How do you see the situation of SCM in Saudi Arabia?*
  Managing the supply chain requires close attention. The manager needs to carefully search the market for the best products that fit their supply chain. Then, he needs to contact the supplier to set an agreement on the price, quantity and delivery. In our business, most of the products come from China. There is a huge number of manufacturers in China. Choosing the best supplier is a challenging process. You have to pay close attention to all details and product descriptions. When the shipment arrives you need a marketing plan ready. You also need staff that will be carrying, checking and arranging items on the shelves. You need to check the item numbers, quantity and description. Then you need to set the pricing depending on all the alternatives. You cannot just import a product and sell it in the market. Without good management and control skills you cannot operate in the market. That is when we talk about importing from outside the country. Of course, there are items that we buy from the local market. We find some imported Chinese items in Saudi Arabia cheaper than they are in China. This is because there are large importers who buy large quantities of single items for cheaper prices which costs us less to buy from them. Most of the products we sell are available in the local market. Wholesalers bring items to Riyadh and Jeddah. Choosing the item is not easy. It needs long work experience. Buying products from Jeddah, for example, requires delivery to the Eastern Province which costs 5-10 Riyals a box. Again, you need to check the shipment to make sure the right items are delivered in the right condition and quantities.

- *How do you compare it to the Western SCM?*
  I have no experience with Western SCM.

- *In your opinion, what are the challenges facing higher performance of SCM in Saudi Arabia?*

Or

- *What challenges confront SCM performance in Saudi Arabia?*

  We do not actually face many problems with transactions inside the country. When it comes to importing products from the international market we face challenges. Challenges start at the customs and ports. For example, products with electric circuits need to go to laboratory. Perfumes will be sent to laboratory for examination. This causes delay in products entry. When the product stays 14 days in the port the importer will have to pay fees. Bureaucratic kills time and adds increased cost to the product. Consequently, the item arrives on the shelves with costing more than its proposed price causing losses of capital or profits. Anyway, these challenges are only steps towards success. You might encounter a loss in one item but make unexpected extra profit from the other. This is how the market works. Success comes with good planning and persistence. In addition, competition can be a challenge. You may bring an item to the market to sell for a particular price but find a competitor selling the same item for less because they bought it cheaper. Marketing staff of suppliers can trick buyers claiming that all competitors bought the same product in particular quantities while they did not really take them. You need to be careful about such tricks.

- *Does any of the following aspects influence SCM performance:*
  - Culture

  For sure, this can create a barrier especially when products come out from outside the country. For example, you find the foreign ports' employee who is culturally illiterate unable to deal with importers which can delay allowing products in the country causing losses.

  - Organisational structure

  Yes, organisational structure can work as a barrier. Any business cannot function without a proper management. Employees within the organisation need to be well qualified for their jobs. Repeated managerial follow up with issues is needed to speed up their resolution.

  - Information sharing

  It is important that the management of the organisation meet periodically. You can't share critical information with exteriors. A successful manager gives authorities to the right employee. It is best to share minimum work secrets only with the ones closely related to the matter.

  - Connectedness practices

  Connectedness practices should not create a barrier. Nowadays, it is easy to connect with via communication media. For example, when you face some billing issues you can have them fixed online, by email or fax without having to travel or wait. Without these technologies you may have to wait for a week or so.

271

- Purchase and supply polices

The right selection of the purchasing personnel is very important to purchasing practices. You need to choose the knowledgeable and the experienced person to make sure you make profit from the supply chain.

- *In what way do challenges influence SC performance?*

Challenges do not necessarily influence all supply chain similarly. They influence your supply chain if its staff they are not well prepared to face challenges. Large companies may be in a better position to overcome barriers more than smaller businesses like ours.

- *Are these challenges specific to one sector?*

I am talking about our supply chain. I have no idea what challenges face other supply chains. New items enter our supply chain very often. When you go to the market you find products that have been there for a long time. That products influence the market negatively while customers are willing to buy the new products in the market. News about new products in the market spread through social media and consumers are more willing to buy them.

- *In your opinion, what challenges are considered to be the most important to SC performance?*

I think it is very important to have institutions that provide training on import practices. Experience is important. There will be lots of hardship in the beginning. With experience, challenges become smaller.

- *What do you do to avoid such challenges?*

To avoid challenges you need to personally explore the market. You need to go visit to the producer, communicate and coordinate with them. It is important to be innovative in what you do in order to avoid and overcome challenges. Providing incentives to employees encourages them to work more efficiently and increases their productivity.

- *How successful do you find it?*
- *Are there any other challenges that we have not discussed and that you find important?*

Lack of sufficient funding creates a barrier to supply chains. It is important for entrepreneurs to find the right financial support.

Interviewee: 2

Sector: Industrial

Number of supervised employees: 47

Date: 20/07/15

- *How do you see the situation of SCM in Saudi Arabia?*
  SCM is new in SA. Recently, SCM practices were only applied in the large corporations that have large numbers of employees. I expect to see more organisations apply SCM because it is gaining wider popularity in SA. I know a lot of companies that started to consider SCM. Some of them are trying to make use of the study we conducted and apply it to their business. Instead of having purchasing manager, warehouse manager, etc... They will create a position of SC manager. Department managers will report to the SC manager.
- *How do you compare it to the Western SCM?*
  I haven't enough knowledge about SCM in the West. I only studied SC as a subject when I was doing my Masters' degree. Then, I worked as a SC manager in SA and UAE. So, I can't compare.
- *In your opinion, what are the challenges facing higher performance of SCM in Saudi Arabia?*

Or

- *What challenges confront SCM performance in Saudi Arabia?*
  Accepting the idea of SCM is a challenge. It took one year for us to have it accepted in our organisation. This is because warehouse management and purchasing management refuse the idea of having a manager to which they have to report. They have concerns about the coordination between the different departments. Generally, there is weak SC culture or weak SC knowledge which creates ambiguity to companies. Logistics department can face some difficulties as well. Finance department also faced challenges in the beginning where they got conflicted billing filing. In the first year, there was some conflict in terms of allocating bills to what department. These are the main challenges.
- *Is there a specific time of the year at which these challenges peak?*
  Challenges appeared in the middle of the year with the first inventory.

- *Have you noticed any changes in the situation over the past few years?*
  I have just finished the fourth year as a SC manager. Indeed, there is a huge improvement in our SC to an extent that we do not face any challenges now. We wrote a detailed and clear manual that helps all employees and department management whenever there is any conflict. This manual is 270 pages. This helped us a lot and saved a lot of money.

  - *Can you expand a little on this?*
    We witnessed a big jump of improvement in warehouse and inventory management. Delivery that used to take around one week only takes 3 hours now. This was reflected in forms of big savings. The saving is also reflected on payments for employees where they are now offered to work overtime. All of this saved hundreds of thousands.
- *Does any of the following aspects influence SCM performance:*
  - Culture
  Yes, for our organisation we faced a challenge in educating employees about the idea and then creating an accepting culture to what we were about to apply.
  - Organisational structure

Yes, in the beginning we faced some difficulty but we overcame that stage.

- Information sharing

Yes, we faced some disturbances as we started but then the situation improved. Connecting departments become easier. Now, I can look up relevant financial and HR information with no difficulty. Therefore, I can say that, currently, information sharing is not a concern to us.

- Connectedness practices

No, I think connectedness reduces workload on top management. For example, workload on the CEO in our company fell 80%. Many tasks that used to be done by the CEO are now done by the SC manager. I mean, this happened after applying SC practices.

- Purchase and supply polices

There is no contradiction between SCM and purchase & supply policies. I mean in my job there is no conflict in relation to all purchasing issues.

- *In what way do challenges influence SC performance?*

  The problem we face with SC management is that it is new in the country. People do not know about it. In the beginning I had to explain my job description on my business card. What I want to say is that SCM is not widely recognised and accepted in Saudi Arabia which can reduce performance.

- *Are these challenges specific to one sector?*

    I do not know about other sectors.

  - *In your opinion, what challenges are considered to be the most important to SC performance?*

    I think the accepting culture is the biggest challenge we face. In any company, you need to get prepared to face those who avoid change.

- *Who imposes these challenges on the SC?*

  In the start we faced a challenge with the infrastructure that was available at the time. That started with the software that was used. Later, we needed to educate our employees about SCM as they were against the idea. Some of the management staff who worked with the company for ten years or more refused applying SCM.

- *What do you do to avoid such challenges?*

  The expensive software was brought to the company. US experts were invited to provide training on the software. The experts were asked to present about what SCM will bring to the business. Finally, the system was provisionally accepted. After a year using SCM system we were able to show the difference and witness its benefits. That helped accepting SCM.

- *Are there any other challenges that we have not discussed and that you find important?*

  As I mentioned earlier, SCM will help the organisation improve. It will reduce the number of needed employees and costs. The system will be more accurate. It will help reduce mistakes to minimum levels like what we saw in our company. I entered the company before applying SCM and participated in the establishment of SCM in the company and writing the manual. I worked on the application of SCM practices and enhanced the use of

the provided software. All that helped improve the SC performance in terms of more accurate data, timely information sharing. Inventory accuracy improved hugely which improved from seeing 10% error to witnessing only .006% which is a very big improvement.

Interviewee: 3

Sector: Import and Export

Number of supervised employees: 10

Date: 16/11/15

- *How do you see the situation of SCM in Saudi Arabia?*
  In general I believe there are some obstacles that face SCM in SA. There are some government agencies that are working on these barriers but it seems that there are barriers that they have not touched or they could not deal with these challenges. The large corporations have found their way to deal with the barriers but I think the SMEs are still struggling.
- *How do you compare it to the Western SCM?*
  I think that in Western countries there are regulations that ensure the easy flow of SC and they know the importance of doing so. Best practice regulations are also available in SA but the problem we face is in actually employing these regulations. They have not been put in action as they should. I think this is because personal interests interfere with the implication of such regulations.
- *In your opinion, what are the challenges facing higher performance of SCM in Saudi Arabia?*

Or

- *What challenges confront SCM performance in Saudi Arabia?*
The first and most important challenge is the official import regulations and requirements. This is the most important part. The second challenge is the internal transportation chains. I think we lack a transportation media that helps smoothly carrying goods between cities and centres in a safe, easy and fast way ensuring expedited delivery. This is the second problem in regards to SCM in SA.

- *Which sectors are most affected by these challenges?*

I think if we connect challenges to the religious seasons the most affected sector is the consumer product sector where demand on basic goods increases and demand on other complimentary products reduces. So, I think some sectors are affected more than others. For example, demand on food products increases during the seasons but demand on complimentary products like entertainment products, furniture and devices goes down.

- *Is there a specific time of the year at which these challenges peak?*
  There is no doubt these challenges increase in specific times; the peak times. The ports are the main gates from which goods enter the Saudi market. They include sea ports, airports and land ports. During the religious seasons, there is delay in handing goods and delivery. This causes changes in prices and delay in the process and delivery. Transportation cost increases because of increased demand.

- *Does any of the following aspects influence SCM performance:*
  - Culture
   Culture has an influence on the SC because who is involved in the SC is part from the society that it functions within. Therefore, there is no doubt they will put an influence on the SC. For example, when people are aware that supporting the SC boosts the economy and consequently improves the individual's income this will help facilitate expediting import.

  - Organisational structure
  I also think it is related where it is closer from society and faster. The organisational structure helps quicker and precise decision making. It will also help maximise the positives and minimise the negativities. It is known that in organisations where there is high hierarchical influence there is high level of bureaucracy. This influences quick decision making which should help the improvement the SC.

  - Information sharing
  Like the previous factors, sharing information is not less important than the organisational structure because decision making is based on shared or available information. Both factors are essential for making decision on the SC.

  - Connectedness practices
  If these practices were separated from competition or if competition was taken correctly in a win-win concept they should have a big positive impact on the SC. That is because I will not have to go through the difficulties that you have gone through and neither will you have to go through mine. The experience that I have you might have gained in a quicker pace. Therefore, connectedness practices should help speeding the SC.

  - Purchase and supply polices
  These policies have a big influence. Policies are set to facilitate. If policies were not put to ensure the flow, easiness and speed of delivering goods they will work as obstacles. There are examples of policies where you can see that they were put in certain times but they do not receive frequent attention in terms of revision and improvement.

- *In what way do challenges influence SC performance?*
  I think if these barriers were explained to those who can make decisions about the boundaries with the influence changing them may have on the whole economy then they

might work toward fixing the problem. You mentioned the influence of culture which I think it is not as important as the level of education people in charge should have. If we compare between the importance of the social culture and the educating people in charge I would say the latter is much more important to changing the import regulations.

- *Do they cause delays in lead times?*
  Yes, for sure.
- *Do they influence the quality of the product or the service provided?*
  Influence on quality can happen when the supply chain is long for the products that have short life span which would reach the consumer with lower quality. Their freshness will be influenced. The same applies for technologies. If the SC is too long the products reach late then consumer will fall behind in knowing about the product and how to use it.

- *Are these challenges specific to one sector?*
  They influence all sectors. However, this influence is not the same on every sector.
  - *Can you give me some examples?*
    An example of this is importing air conditioners. Delay in importing a specific type of air conditioners can negatively influence the importer but may not influence the whole economy because the consumer will look for alternatives which are available. The whole sector might not be negatively influenced but those who work within it will be harmed. However, if we take a specific type food which is favourable to consumers like a specific rice brand consumers will still have other options but the price of the brand will increase. Quality of the product might be affected by late arrival. We took rice only as an example but other products can be affected in quality by the passage of time. Delays can influence the product, the sector or the whole economy.
  - *In your opinion, what challenges are considered to be the most important to SC performance?*
    I think the roles and regulations have the most influence as barriers to SC performance. That is because companies know the benefits of the SC and they are keen to increase its performance. What hinder them are the regulations that are put by the government. Therefore, they can do anything about the regulations except for finding ways around them.
- *Who imposes these challenges on the SC?*
  In SA, there are different agencies that participate in imposing or lifting barriers. For example, customs as one responsible authority but they are not the only ones. Ports authority can have a role in this regard. They are two authorities that work in the same field but the regulations of each of them influence the other. Other state authorities like the Zakat authority in their issuance of required paperwork for clearing products from ports where it influences the Ports authority's decision. Every included authority has an influence. However their importance and the challenges they impose are not the same. In addition, even if the Customs authority and the Ports authority which are the most influential authorities on clearing goods were good enough they can't work separately.

That is to say if they work well but the transportations sector is not doing well then we still encounter barriers but may not be as big as in clearing products from the ports. Other sectors have variant yet limited influence unless the clearance of products requires permission from any of them. An example of this the products that need laboratory tests in authorised or accredited laboratories may encounter delays. This happened to us when we sent goods for examination which took two weeks where they are supposed to be done in only one day. Without the test results we cannot do anything with the products. This is an example of how the different authorities may influence the flow of the SC.

- *What do you do to avoid such challenges?*
  I would say that a single section can't fix the issues alone. When you look at the SC you will see the public and the private sectors involved. Each sector can play a rule in increasing the SC performance. For the public sector it is important that they know about the challenges and their influence on the SC and then work on lifting the barriers and enhancing the drivers. Every sector has its own policy in dealing with challenges and enhancing the positives.

- *Are there any other challenges that we have not discussed and that you find important?*
  We already talked about connectedness, cooperation, information sharing, organisational structure and policies but we have not talked about telecommunication. This sector is important in the sense that when, for example, you need to send a telex but you do not have the facility widely available then you are not in a good position.

Interviewee: 4

Sector: Industry

Number of supervised employees: 10

Date: 27/07/15

- *How do you see the situation of SCM in Saudi Arabia?*
  SCM in, our sector, 'petrochemicals' most of the products are made for export. There are a lot of experts in petrochemicals in SA. We have the talents and the experience available. The vendors, the suppliers and services that support supply chain in general are mainly controlled by the big players across the globe. That is because for an export based economy you need a wide network to support you. It is growing. It is very important. It is the area where you save money and contribute to your overall performance.

- *How do you compare it to the Western SCM?*
  Well, in Western countries you have many options. Laws and regulations are much clearer. Practices differ from one company to another. We are trying to follow the best

practice across the globe. In general, I would say that the only difference is the type of services and support to the SC and the laws and regulations are much clearer in some countries.

- *In your opinion, what are the challenges facing higher performance of SCM in Saudi Arabia?*

Or

- *What challenges confront SCM performance in Saudi Arabia?*

SC as a concept is very big. I am trying to give you generic answers that cover all. Communication is very important. Very critical in SC. Accurate, clear communication between different parties that are serving the SC is critical. Across the whole SC you need to have a clear communication because it is a chain where you need to link the task to the next chain. There are lots of cells within. Again, I am talking in general. Communication is a big part. Having options is important but as much as SC concerns the company should focus on it because they can save a big amount of money.

- *How did you learn about these Challenges?*
  It is the experience. I am in the field for about 10 years. Most of the root causes are because of lack of communication. For example, in the companies where I worked it is either a mistake from the company, a mistake from the vendor or the service provider. I am always in the export side. I have worked in procurement for a while. I worked in imports but I am much more concerned about export. Exporting finished goods to final consumers or to customers who are going to sell for final consumers. As I told you, root causes and troubles in relation to SC issues are linked to communication. Miscommunication is usually the main problem.
- *Which sectors are most affected by these challenges?*
  I will tell you one thing. Companies that have built their model to focus on the concept of SC are customer oriented. Again, I am here talking about export. So, those who are customer oriented can avoid a lot of these hassles. That is because a concept in customer service like having a customer focussed seeking or solutions usually avoid any kind of miscommunication. In site logistics, they are very keen to optimise their relations. If you have a good SC tram, a good customer service team they can provide you accurate information from the customer. If you have the support from the marketing, you can achieve their goals. Within corporations, there is always push and pulls between the different divisions to optimise the resources of the company they work for.
- *Does any of the following aspects influence SCM performance:*
  - Culture
    Yes, you can see a difference between cultures in terms of how valuable is time in the culture. How important is clarity of communication makes difference. You know some cultures are sharp to the point. Some cultures make a lot of stories without going to the main point.
  - Organisational structure
    Of course, it influences. For example, in petrochemicals, you find the marketing guy looking for prospects; do the sales; fight for a location; then sells products to the

customers. He makes sure the products arrive to the customer. He does the after sale services. So, it is one guy doing everything. Some companies have specialization. Each division have their contribution then they pass it to the next division. To support that, they have a customer service team who are responsible of communication with the customers, the external parties and the internal parties. They make sure the stream line of processes goes smoothly.

- Information sharing

It is clear communication more than sharing information that matters. Or let's say sharing the right information. The ones that are necessary. Sometimes extra information does an opposite effect than what you are looking for. If partners are not willing to share information cost can increase.

- Connectedness practices

Interviewee has already talked about this earlier.

- Purchase and supply polices

Key element is proper planning. If you have it for required materials usually you tend to have nice results. Procurement in our area is very standardised. You won't find big differences between companies in their procurement strategies or their procurement practices. They are all almost the same. What makes the difference is proper planning. If you have good planners then you won't have hiccups and issues. If you keep safety stock levels covered, if you think about different alternatives, I mean, different scenarios that might happen in reality then you are OK.

In what way do challenges influence SC performance?

In each one of these we tried to give examples. In general, having a proper control over the supply chain is a must. It is what makes competitive advantage. If you have a good SC and good services, you will win the market. Most customers buy from suppliers that have excellent services. Usually, services are related to the SC. If you provide your customer with solutions, they will be extremely happy.

- *Are these challenges specific to one sector?*

  Well, I was talking basically from my experience in the petrochemical sector. However, this does not mean these are not applied in other sectors. Typically, industries that are related to production are more sensitive to SC as compared to the services sector. In banking or retailing it is different but in manufacturing it is very sensitive.

  - *In your opinion, what challenges are considered to be the most important to SC performance?*

    As I told you before communication and proper planning are the critical elements that we need to keep an eye on. If we are talking about challenges in terms of external factors in the region there are two things that bother me. The regulations that govern import and export do not support easy handling of SC. Sending and importing stuff is always an issue especially importing. If we are talking about dangerous stuff it is a big

issue. Some of that is understandable because of the nature of the materials coming in or out while some need improvement. There is always an area for improvement.

The other aspect I have seen is that we do not have that much control over some service providers. People like shipping lines. These are really tough to be dealt with. Shipping lines companies are usually huge, big and if they miss it they miss it. Deal with it. So, sometimes it is hectic for us. I mean, it is a bit unfortunate if they could not serve us much and unfortunately you do not have that much of control. They are giant enough and controlled by giant companies. Entities like port authorities for example when we talk about SA in particular a lot of times they have congestion in this sea port or that sea port. That is hectic. We lose a lot of customers and a lot of dealers. We make commitments assuming that everything is going to go smoothly then at the port you cannot ship. One facility shut out and the other facility shuts out and the problem is either Eid vacation, congestion in Jeddah port, congestion in Dammam port and other issues like having entrance permit. Acquiring export licences is very lengthy and sometimes you have to link them to the port you are going to export to, the hub you are going to use. It is not unified for the chemical industry. If you are going to export from Jeddah you have to mention Jeddah. If you use this license to bring material from Dammam, it is useless although it is the same country. This causes concerns sometimes. This is an example of an issue that is very specific to SA.

- *Who imposes these challenges on the SC?*
Ultimately, SC involves different parties like suppliers, service providers, the manufacturers themselves and the government. Each of them has their input. Everybody is responsible.

- *What do you do to avoid such challenges?*
Well, we have different tools. Of course investing in people is very important. Keeping managing knowledge that we accumulated during our work experience is important. Tools are there. I have seen a lot of sophisticated tools are being used in Sadara. IT solutions are there. It is not an issue. I would say, keeping the expertise and trying to have as much as possible very clear procedures and processes being drawn and you have them recorded. You have key communication people. To deal with external parties is very important. These are tools we are trying to use to control our performance in SCM. Not forgetting having detailed metrics to measure our performance and see the areas where we can improve and develop them; identify gaps and try to fill them. Finding root causes is important like having corrective action in the management process.

- *Are there any other challenges that we have not discussed and that you find important?*
Well, we've covered a lot. I would say, thank you very much for considering my answers in this research.

Interviewee: 5

Sector: Industry

Number of supervised employees: 0

Date: 27/07/15

- *How do you see the situation of SCM in Saudi Arabia?*
  I believe, SCM in SA and the GCC has not reached the level of maturity it reached in the US. Giant companies like ARAMCO and SABIK started to apply SC practices since the 1990s. The name given to the practices is different from one company to another. Some of them call it procurement and others call it logistics. What is important for the SC is including all practices under one umbrella. It is important to include procurement, compliance, import, export, logistics, transportation and warehousing. There is a number of companies that apply such practices. I recently started to notice that transport companies are taking steps towards trucking. Let's take Almajdoy as an example. It is one of the largest trucking companies in Eastern Region. It started as a trucking company but now it provides very integrated services in SCM including warehousing, SC consultation, transportation, heavy trucking and SC solutions. Briefly, SCM not yet as mature as it is in large countries like the US but it has started to grow. It is notice that if you track job market you find increased demand on SC managers, engineers, coordinators. A short research shows the level of interest SCM is gaining. Companies in the Western Region pay more attention to SCM. This appears more in Jeddah especially among small businesses. In the Easter Region, large and medium companies show interest in SCM while the smaller businesses are not following up until today.
- *In your opinion, what are the challenges facing higher performance of SCM in Saudi Arabia?*

Or

- *What challenges confront SCM performance in Saudi Arabia?*

The SC is as strong as the weakest link. This means any mistake in any department like the purchasing, custom clearance or customer services will disturb the chain. In SA, we have a problem with the customs. It is very slow, bureaucratic and has out-dated regulations. There is delay in shipments. To be honest, delay is not only a problem in SA. It faces all SC including SCs in SA. I am talking about SA because I am here. When I was in the US, they used to put a window that reaches 70 days to be on the safe side. Delay in shipments is a big issue.

The other challenge is the changing governmental regulations. For example, three or 4 years ago the Prince of Riyadh Province, all of a sudden, issued a statement that heavy trucks are only allowed in the city between 12:00 am and 6:00 am. You can imagine the situation. It is well known that 'Riyadh breathes with the Eastern Region's lung'. Most services come to Riyadh from the Eastern Region including water. Now, you can imagine the impact of such

decision from a government authority where the person in charge did not study the consequences.

A third challenge is the inconsistent regulations set by the Ministry of Labour. They have negatively impacted the whole market in general and the transportation sector in particular. That is because in transportation we face the problem of not finding qualified defensive drivers. It is very hard. I worked with Almajdoy which is a transportation company. You only find one out of ten drivers who is a good driver. This includes locals and expatriates. It was hard to find a good driver. Now it is even harder because the Ministry issued more regulations that put extra burden on the business owner or the investor. Extra fees were added like having to pay SR2400, added charges, entry requirements and banning workers with some nationalities.

In brief, the most important barriers to SCM in SA are the custom management and the constant change in governmental regulations.

- *Does any of the following aspects influence SCM performance:*
  - Culture
  Cultural differences may influence performance. It is sad to say that people here look down to non-Saudi nationals especially those who come from Asia like India and Bangladesh. They are the ones who do the transportation jobs better than others. Even if your SC is excellent a weak transportation results in weaker SC. Then, you are at the mercy of this driver. Mistreatment of drivers has a negative impact on the SC. Therefore, I used to enforce the importance of showing respect to the driver. Unfortunately, drivers have issues like not caring for the vehicle, speeding, not following road rules. Such issues cause accidents which cause delays. Certainly, driving and cooperation cultures have big influence on transportation as part of the SC.
  - Organisational structure
  I talked to business owners explaining that SCMs need enough authority to function properly. Not doing so is similar to not giving a bank manager enough budgets to finance the bank's practices. Therefore, SCM need empowerment, delegation and authority to run the business. A SC manager must be knowledgeable; has enough experience. What happens now in some businesses is they put SCM under procurement or logistics. They undermine its importance. For best results and better application of SCM we need to put transportation, logistics, trade compliance, import, export, warehousing, packaging and tank farms under one management depending on the size of the company. Construction companies need SC managers because there are critical building materials. It is important to make sure they are available in the right time with the best price. Prices change more than one time a day for some items. For example, when the building materials were exported to Qatar to support the huge building projects prices went viral. In such cases, a good SC manager can predict the future; follow the economic status and plans ahead. He is able understand the macro and micro economics to know what is going around. You do

283

not live in separation. Another example is the oil price. It is well known that most of the oil production goes to China. When the Chinese economy sneezes the World economy becomes sick. Therefore, a SC manager needs to be a visionary guy. He leaves operations to operations management under his guidance. Knowledgeable, experienced and talented SC managers are very rare and demand on them is rocketing.

- Information sharing

As you know, information sharing is the gear that drives the SC. The SC gets better as much as we share information. An author defines supply chain as sharing information. The same author says that information can close inventory. This means, if the retailer knows the exactly the quantity needed of inventory they will not need to store them. They just need to order them in advance and make sure delivery arrives in a timely manner. In reality, there is mistrust between parties. That happens even within a particular organisation. There is mistrust between teams. You find sales and marketing people trying to exaggerate. They claim needing more than their real need. The manufacturing people say they can't operate different production lines at a time. Departments seek their own benefits. Here comes the importance of having a good SC manager who sets common goals. He makes sure parties understand that they are not competing on conflicting goals. Any achievement will give credit to the whole team and not to an individual. To share information you need to build trust. That happens even in personal human relations. You need to break mistrust walls. The problem with trust is that it is personal. People will always trust the persons they know. You also need to know how to increase cooperation. Then we need to pick a medium for sharing information. Companies use IT and information systems. There are many information systems used in the market to look up real time information on products. Difficulty in sharing information is international.

- Connectedness practices

This is one of the interesting topics. You need a road map for connectedness. I provide training courses in SCM. Trust is one of the most important issues I emphasis. Building trust is a must. Good companies build trust starting form the highest levels; owner to owner; GM to GM; VP to VP; director to director; ending with operation people. We must build trust bridges. Contracting is very important. However, nobody follows directly what is in it. We only refer to it when disputes happen. Conflict management is important just like communication improvement. You do not necessarily need an advanced information system. Sometimes an excel sheet works much better than expensive information systems. We need to agree on common language and common numbers.

- Purchase and supply polices

I have seen some unpleasant cases. For example, you find warehouses of the Ministry of Health. They are huge warehouses but unfortunately underutilised. Items are not well kept; there is not information system; and there is no tracking system. They buy in huge amounts and they do not cooperate with other warehouses under the same ministry.

It is very important to have to change from spot purchasing policies to strategic procurement policies. We need to start building relations like what is called blanket purchase order for disposable items. For the strategic items, we need to contract them for about 4 to 5 years. This is what is being done in petrochemical industry especially for the catalysts. They are very dangerous, unique and necessary. Therefore, they are contracted for a long term. This policy may be more expensive in numbers but in the long run it is safer for the business. Repeated contracting process for short term contracts can cost more than contracting long term.

- *In what way do challenges influence SC performance?*
Most companies have networks not supply chains. Sometimes you find them work like bees and sometimes you find lots of conflicts. We can avoid conflicts if we create an environment of cooperation and collaboration. We can improve if we have a systematic method of sharing information. Smaller businesses may survive with the old fashion of conducting SC practices. However, the bigger the company the more complicated its practices and the more it needs collaboration, cooperation and alignment. We need to be proactive in managing issues. A SC director needs to have a plan B should any problem happen like delayed deliver, conflict with suppliers or accidents.

- *Are these challenges specific to one sector?*
  Most of what I say is general. For petrochemicals, the problems are more because its SC is much longer. To produce one product, you have to go through many processes. Steps go through raw material, storage, transportation, manufacturing, tank farm, ports, ships, tank farm and manufacturing. All these steps are included in manufacturing petrochemicals before the reach the end user.

- *In your opinion, what challenges are considered to be the most important to SC performance?*
  Information sharing can be the most important barrier. Cooperation and collaboration come under the challenge of sharing information. Speaking about SA, governmental regulations are the most challenging barriers.

- *Who imposes these challenges on the SC?*
There is no doubt that governmental regulations are what impose challenges. We are talking about regulations in relation to containers, administration, services and ports. Some ports do not even work 24/7 which is very strange. Ports do not meet international standards.

- *What do you do to avoid such challenges?*
We try to predict the future. Work with the right partners. In Sadara we have partners like ARAMCO and DAW Chemical. Saudi ARAMCO has massive experience. It is a country inside a country and they have lots of connections. Be assured that all over the world, companies employ very strong people with strong relation in the government. No matter how strong in business you are, if you do not have a strong connection with the government that help export and import processes and help the licensing you get stuck.

That is why we have a department that takes care of such issues. They are very well paid but without them we would not survive.

- *Are there any other challenges that we have not discussed and that you find important?*
Unfortunately, in SA ports are underutilised. We do not have a good trade rail that serves trade operation. The only one that we have is very old and not really supportive. In Texas for example, most chemicals are transported via rail system.
Finally, there is a big challenge in setting the right procurement policies. You need to see the internal and external ranges. Then you need to see the possible options. After that you need to meet possible partners. Examine their creditability, find out about their reputation and then chose the suppliers. Not having alternative suppliers is a challenge that needs consideration.

Interviewee: 6

Sector: Pharmacy

Number of supervised employees: 0

Date: 10/11/15

- *How do you see the situation of SCM in Saudi Arabia?*
SCM in SA is improving. The SFDA systems and their role helped us a lot here in the workplace. Awareness on the concept of SC has increased as compared to what it was early in 2006 where we did not have any thing named SC or logistics. When I first graduated I was offered a job in logistics but I did not know what it meant. However, now the situation is different and people know more about SCM.

- *How do you compare it to the Western SCM?*
I have no knowledge about the Western SC as I have no experience there. The company that I work for is international and we deal with the other branches in the world. We share the same management, principles, GPI and targets. In the company, there are people from the different branches located in the Gulf Countries, Egypt, the other Middle Eastern countries, Germany, the US, Asia and from all around the globe. All of them share the same goals and the same process. They all belong to one section within the company.
- *In your opinion, what are the challenges facing higher performance of SCM in Saudi Arabia?*
Or

- *What challenges confront SCM performance in Saudi Arabia?*

I would not say we face any problems. The SFDA system has helped a lot. In times when I do not know what to do or how to import an item they provide clear and precise directions. When I need any help they are very supportive and clear in what they want. Import regulations on any medicine or any product are very clear to us. We might encounter lack of training in some issues like I have when I need to know more about logistics and SCM where there is no sufficient training or guidelines. The availability of training sessions in SCM would be very helpful because it would provide me with the knowledge I need to know about importing the products instead of just relying on agents. This knowledge could save a lot of time and effort because I will not need to rely on agents which might result in delays. The problem is that I do not think this type of training is available in SA.

- *Is there a specific time of the year at which these challenges peak?*
  Now as the country is more open to the world markets we have more opportunities to do business. The problem is it is not easy to open a business in SA. In answer to the question about the seasons there are two periods in the year which are Ramadan and the Hajj season. That is because the holidays we have does not coincide with the holidays customs. The other issue is the land fees where we have to pay much more in fees because of the delay. At these seasons, it is very hard to clear goods and they accumulate in the customs. Shipments are delayed.
- *Does any of the following aspects influence SCM performance:*
  - Culture

  Absolutely there is not influence of culture on the SC.

  - Organisational structure

  I do not think the organisational structure influences the SC. If you talk about external factors like wars I would say yes they have influence over the SC. War on Yemen has an influence on the SC there. In the global scale we face problems like this. The economy can have an influence on the SC but I would not say culture has any influence on the performance of SCs. The organisational structure does not have any influence too.

  - Information sharing

  We share information with all relevant parties. For example, if I call any company or the SFDA I will get immediate response. People are very professional dealing with emails. So, sharing information is well established between the government and the private sector and it is also well established among companies in the private sector. Communication is strong with other companies outside the country. For example, if I am reporting to someone outside the country I would easily reach them. Therefore, I would not say that sharing information would be of any concern to us.

  - Connectedness practices

  SC has many challenges. These challenges can be internal or external which is normal. There is no business without challenges. In our company, I might face the most challenges and it is normal.

  - Purchase and supply polices

Well I would say all these challenges that you asked me about would apply as challenges to procurement which deals with buying supplements that help doing the business. But they might not apply to the larger concept of SCM where it deals with import, inventory and distribution.

- *Are these challenges specific to one sector?*
  What I am talking about is the global SC. I have no enough experience with internal SCs.

  - *In your opinion, what challenges are considered to be the most important to SC performance?*
    The most damaging challenge that can face the SC can be internal challenge. If the company is having a problem the whole SC will be influenced.

- *Who imposes these challenges on the SC?*
  I think the FDA which is the agency that we have the most contact doesn't impose challenges. Their employees are well educated and cooperative. They have a very well established communication system that is very compatible with the market's needs.

- *What do you do to avoid such challenges?*
  If we have any internal issue, we would asses that challenge and deal with it. We also learn from our experience.

- *Are there any other challenges that we have not discussed and that you find important?*
  I think I have said all what I need to say.

Interviewee: 7

Sector: Education

Number of supervised employees: 0

Date: 10/06/15

- *How do you see the situation of SCM in Saudi Arabia?*
  Supply chains provide the service of delivering products from the producer to the consumer. Some of the most notable issues with SCs are delivery price differences, inventory issues, storage space, weather conditions. Challenges are not the same for all products and companies.

- *How do you compare it to the Western SCM?*
  First of all, the type of products delivered is one difference because in Saudi Arabia people are more consumers than producers. Therefore, demand on importers is higher than

in other countries. Import volume is higher than export in Saudi Arabia. Generally, most of the products there are consumer products; not producer products. In comparison to the Western SCs insurance issues arise. In Saudi Arabia, there are problems ensuring the SC especially at the current time where the country is facing a political problem. Therefore, transport insurance can witness an increase of prices. In contrary, supply to an Asian country, for example, that is not involved in a political conflict will be easier, safer and cheaper than supply to the Middle East. This is one of the comparison points when it comes to comparing countries.

- *In your opinion, what are the challenges facing higher performance of SCM in Saudi Arabia?*

Or

- *What challenges confront SCM performance in Saudi Arabia?*
  I mentioned earlier, there are types of challenges. Some of them are external challenges that are not within the organisation like the political, economic and regulatory barriers. There are internal challenges like the increase of consumer demand. For example, comparing demand on mobile phone services where it witnessed increased demand. In response to this demand the government allowed more service providers in the country like Mobily and Zain. There is seasonal increase of demand on consumer products like the week prior to the month of Ramadan. That identifies two types of increase in demand; the yearly increase and the seasonal increase.
- *Have you noticed any changes in the situation over the past few years?*
  - *Can you expand a little on this?*
    Competition is another challenge for SC management. Foreign companies face regulatory challenges in the Saudi market. They find that regulations are not the same as regulations in their home country. For example, in Europe, Supply regulations are very similar since they are within the Euro zone. Therefore, their regulations and laws are generally similar which makes issuing supply permits relatively easy. It is different in Saudi Arabia where the laws and regulations are different. Even though the country joined the WTO there are still challenges. The country is religiously conservative which led to setting specific requirements for market entry. Saudi culture is completely different than culture in Europe, the US or Australia. Generally, there is a variety of different challenges. Pricing is a challenge for foreign suppliers because local production and distribution can be cheaper. The Saudi government supports national investment inside the country which gives them a competitive advantage over foreign investors. In addition, transport can create a challenge. If we are talking about the Northern region, for example, it is different than when talking about Riyadh or Makah where there is a large port that facilitates export and import. Generally speaking, the future looks appealing for investments in the Middle East and Saudi Arabia in import and export activities. If we are talking about SCM, Saudi Arabia supplies about 9 million barrels which shows the existence of capable infrastructure that ensures the flow of this SC that starts inside the country and extends to other countries. The government has built the infrastructure that can be used for import and export processes.
- *Does any of the following aspects influence SCM performance:*
  - Culture

For sure, there is no doubt that culture plays an important role influencing the supply chain. The target of suppliers or distributors is to reach the end user. Therefore, they have to put in consideration the culture of the targeted consumer and show respect to the culture.

- Organisational structure

Supply chains are influenced by the structure of organisations. Some companies classify stores, inventory and SCs under the marketing department while other companies create a special department named SCM. Structure of the organisation depends on the sector where the company operates. It is more likely for organisations that focus on import/export activities to name a manager of SC.

- Information sharing

It is not easy to share information with external partners because it can create competitive disadvantage while I think it is very important to share information within the internal sphere of the organisation.

- Connectedness practices

It is good to connect with other organisations in order to exchange experiences. Most organisations have centres under the marketing department. They usually name it the 'research and marketing'. This centre researches purchasing and supply chain issues. These centres play a very important role in studying the market and exchanging experiences. So, I would agree to connect with other organisations with safeguarding the organisation's privacy.

- Purchase and supply polices

It is important for organisations to watch market volatility and change policies accordingly. Companies have to put their policies with consideration to economic and political changes.

- *What do you do to avoid such challenges?*

  To avoid challenges the management need to be well informed about regulations in the country. Managers need to read about the economic situation in Saudi Arabia and look for information that enables them to predict demand. As an importer who practice storing items and supplying them to the market he needs to gain information about demand in the region. As you know leaving inventory in the storage puts additional cost on the business. To avoid challenges, you need to know the market. The most important you need in this regard is the insurance because it minimises the risk. There will be an increase in the cost which will reflect on the price of supplied product which can leave the supplier with competitive disadvantage. Some suppliers avoid insuring product transportation to compete with lower prices. It is risky not to buy insurance policies and suppliers need to make sure their supplies are insured.

- *Are there any other challenges that we have not discussed and that you find important?*

  I just would like to reconfirm the importance of buying supply insurance policy. It is also important to use technology in the supply chain to save data on importers and consumers. It is very important to use technology to support the supply chain. There are new

information systems that allow the user to electronically track products as it leaves the producer until it reaches the consumer. The systems contribute in minimizing risks. For example, DHL allows online tracking of packages and checking delivery. I strongly emphasise the need to apply information systems that support supply chains.

Interviewee: 8

Sector: Petrochemicals

Number of supervised employees: 7

Date: 22/06/16

- *How do you see the situation of SCM in Saudi Arabia?*
  Well, this is a general question. What I see worldwide in SC is a very effective tool to implement the organisation's goals and to be well organised. In the management of the SC especially in SA, SCM was barely coming in the last four years but it is growing so quickly and it is saving a lot of money. Especially in costumes we do have a lot of systems have been implemented just to create, I would say, a structure of SC in chemicals, in foods, shipping, ports, clearance, logistics and procurement. The engagement in most professional companies recently the SC has a big role in each professional company's structure. It is very challenging but very interesting as well and the growth of SCs as I told you makes a tremendous change in the Saudi market.
- *How do you compare it to the Western SCM?*
  Well, the Saudies have gained the experience from outside especially the US. Most of the roots in SC theory, logistics, procurement, planning and budgeting have come from outside like the UK and the US. There is a big difference between SCs in the US and Saudi Arabia. They are more advanced. SC in SA has just appeared. Previously, people were taking care of purchasing and logistics but now they implement the real cycle of the SC such as trade compliance, optimization, customer care, engineering procurement, logistics and warehouses. They are all parts of their business plans. Supply chain takes most of the budget of companies. By this I mean the budget of the previous company I was working with. We were dealing with twenty containers a month. Twenty containers of food a month. We were handling three regions which are Riyadh, Jeddah and Khobar. This is to say we cover the Eastern province, Central province and Western province. By implementing SC, we were using warehouse management system which was created by a German company which is a great system for storing. It uses FIFO and LIFO theory.
- *In your opinion, what are the challenges facing higher performance of SCM in Saudi Arabia?*

291

Or

- *What challenges confront SCM performance in Saudi Arabia?*
  Time. I would say time because we are behind in SC as compared to other countries. For me I see it as an advantage and a disadvantage but mostly now I would say it is a disadvantage. Some of the main challenges relate to the implementation of the roles of warehouses leading to lower SC performance. In the private sector, SCM is doing well. In the government sector, it is moving fast but not fast enough as compared to the private sector. I don't know if I gave you a clear answer but the implementation to SC in the government is kind of slow.
- *Does any of the following aspects influence SCM performance:*
  - Culture
  Well, I don't really see culture as one of the main barriers in SA. I don't agree.
  - Organisational structure
  It would be a barrier in some companies. In government sector, I would say, it is a barrier but in private sector I would not say it is a barrier. May be it would lowly influence SCM in the private sector.
  - Information sharing
  Sharing information between employees in private or public is not a barrier to SC performance in SA. If I work in SC I would share information with other employees. I don't see that SC performance SA would be in a good shape because I share that information. What needs to be done is like what is happening in KFUPM where they have courses and seminars in SC. They talk about SC in the university and encourage people and educate them about the importance of SCs and their influence on the business of each organisation. They give the real announcement and definition of the SC and how it affects. For me, sharing information will not affect the SC of the organisation. Of course, inside the organisation sharing information is good but outside the organisation there has to be a different entity that educates people about the importance of SCM. As a SC cycle, you must share information with co-workers in the organisation. For example, you have many departments in the SC. You have customer service, trade compliance, warehouse and logistics. I have to work with them and interact as business need. I don't call this sharing information. Some of my information is not necessary for other departments. However, what needs to be shared in the business, of course, it is required to share it.
  - Connectedness practices
  There are many practices to enhance the SC. For example, in a port, when a ship arrives with 100 containers or more the question comes how fast will you off load that ship. Expediting the containers can face barriers. Is the country ready to work with the time by having more space for work, implementing new rules, tools and installing equipment's that help the process. This can save billions. It decreases the expenses of the SC at national level. And it will decrease the cost on major companies such as SABIC. Alignment and cooperation of the supply chain if does relate to performance it would be

with companies. It would not be with employees. Employees have to receive rules and instructions to cooperate with required entities to be in alignment with each department. The employees will be well organised with each other. For me, it is about structuring the SC.

- Purchase and supply polices

I would say purchasing is the implementation of procurement. Procurement is the planning of the SC purchasing which includes budgets and the capacity of the company. When you say purchasing affects SCM in SA, for me I don't see a clear question. What I understand from the question is that putting the right plan especially in procurement and in implementing DPA (demand planning accuracy) in purchasing is very important to save a lot of money. In SA most of the companies don't implement DPA. What I mean by DPA or supply planning accuracy is we have demand in the market and we should be in line with the sales department and study our resources, our value needed, our market and our capacity in the warehouses to implement a good procurement which includes importing our goods from outside. The time between selling these goods with less effective time. I mean using lean system by not affecting our capital. For example, I used to work as a distributer of tomato paste in SA. There are many factors that affect purchasing. Most of the purchasing is related to finance and budgeting. I have the end user who is the customer and the factory or the supplier. Between those, customer is requesting a period of time for goods to be shipped and reach end user. I have to organise with the supplier and the warehouse for delivery. Usually, in purchasing or procurement in demand planning, we work on a plan for forecast. Forecast is the main factor for success in all companies. We work on expected demand to move the process smoothly. We talk with customers about lead time which is around 60 days from order. When the customer orders containers, he has to give a sequence of 3 months for confirmed orders. We call it plus three months confirmed order. Therefore, I don't bring the entire amount at once because I will have to pay cost for the warehouse. I have to order them in sequence. So, the payment to my supplier will not be affected. If I pay to the supplier and I don't get paid from the customer I will have a problem with the cash flow. So, purchasing is always related to the cash flow.

- *In what way they influence the performance of SCM?*
  I would say planning. Having the right planning will influence it in the right track. Weak planning will negatively influence the whole SC.
- *What do you do to avoid such challenges?*
  Custom clearance is related to government rules which can change unexpectedly. They can be effective within one or two months while organisations may have plans for six months in advance with suppliers. Suppliers will have to produce these goods in their factory. In this case, the containers can stay in the customs which causes problems to the supply chain as a whole. There will be different challenges from one sector to another. Governments have different departments to deal with different supplies. Therefore, challenges will differ from one sector to another.

293

- *Are there any other challenges that we have not discussed and that you find important?*
  You are bringing a new concept into the country. Therefore, you will have to deal with challenges until it is well situated. For me, I have mentioned the major challenges and nothing in my mind now.

Interviewee: 9

Sector: Industry

Number of supervised employees: 23

Date: 28/07/15

- *How do you see the situation of SCM in Saudi Arabia?*
  SCM is different from one organisation to another. In ARAMCO and some other companies, practicing SCM is acceptable. However, it lacks a lot.
- *How do you compare it to the Western SCM?*
  I have no experience with Western SCM.
- *In your opinion, what are the challenges facing higher performance of SCM in Saudi Arabia?*

Or

- *What challenges confront SCM performance in Saudi Arabia?*
  One of the main challenges we face is the item specification. We do not have an internationally unified description of items that is available in global information systems. In other business activities this can be less of a problem. For example, in the car industry, it is easier to find unified spare parts all over the world. In contrary, it is very hard to find that for items related to the gas and oil industry. That is because every company has its own specification for the machine they produce. There are machine that do the same job but their specifications and spare parts are different. For example, there are a number of companies that make electric generators. The spare part that does the same job is not in each generator is not given the similar description or item number. This is a big problem that does not only face our company. Other firms like SCECO have the same problem. I was in conference in Abu Dhabi and this was one of the discussed issues. There was a recommendation that descriptions and item numbers for the spare parts should be unified. It needs a long time to be enacted. This is one of the big challenges that face SCM. We face another challenge with shipments from the manufacturer to the customer. Sometimes, you cannot track the item where it becomes in a hidden area. You cannot locate it. Again

294

this is another issue that had discussion in the conference. A suggested solution to avoid this difficulty is tracking items using RFID technology. It is suggested that RFID device attached to the shipment so the customer can track it. We also face the problem of missing items before arriving final destination. In some cases, labels on items fall which causes difficulty in identifying items. That requires lengthy search to locate them. Some of the problems happen when delivery of an item is urgent. Giving too much attention to these items creates confusion and sometimes leads delayed delivery. Sometimes because it is a very important item employees want to make sure they deliver it personally. They leave it with them and forget to hand it which causes delays.

- *Does any of the following aspects influence SCM performance:*
  - Culture

  Of course, culture influences SCM performance because in our region knowledge of supply management is very low. Knowing exactly what you need, its specifications, time of required deliver makes things easier. We tend to insist on examining items in person because we lack the specialists. Until today, I have not seen material engineering specialist. Culture is very important and it reduces our SC performance.

  - Organisational structure

  For sure, I have seen the structure of SCM but it does not really exist in practice in SA. However, the organisational structure in ARAMCO is actually helping improved SCM.

  - Information sharing

  Yes, strict confidentiality obstructs the SC. For example, when ARAMCO wants some items from other companies they provide it immediately to us. When another company wants the same item they cannot get it easily. There is another example. We needed an item from a company that does not have an agreement to supply items to us. So, I went to our supplier and asked them to buy the item to us from the other company. They refused to sell it because our supplier is their competitor. This obstructs SC progress. Many of the machines are unique and they only sell for specific companies. There is a company that produces back pressure valve. It is used for safety proposes. For three years, we are trying to prepare a catalogue for the parts we need. This company refuses to pass information about the specifications of the item. This is because they are afraid that the design specification reaches competitors. It is well known that patents and IPR are protected for specific number of years. Although, this company has been producing machine for more than 70 years they still protect it and no other company can produce it. Still, we have to buy it from them because ARAMCO puts safety issues first. They may place pressure on companies to sell items to the company but ARAMCO may forgo demand on data verification of items to keep good relations with suppliers.

  - Connectedness practices

  Look, if you are talking about ARAMCO these practices are used because it is a huge company. Partners trust ARAMCO will pay them whatever they agreed to pay on a timely manner. So, I do not think it is causing any disturbance to our SC.

  - Purchase and supply polices

No, I do not think they can cause problems. That is because companies need to follow specific procedures. There are company procedures which should not cause any problem and there are regulatory procedures that companies need to respect. For example, IT items need to go through specific investigation in the customs. We respect that and we have no problem with it.

- *In what way do challenges influence SC performance?*
  The most important part of the SC is getting the right item at the right time. Any obstruction can cause problem in operations, delivery and cost. In ARAMCO, any delay can cause decrease in production which affects the global energy market.

- *Who imposes these challenges on the SC?*
  ARAMCO is having a problem with the customs. Releasing machines takes a long time. Inspectors are not well educated. ARAMCO has a department for custom clearance. Those who work in this department do not care if the item is cleared today or tomorrow. So, we tend to import items through Dubai. It is much easier. Items take very long time in Saudi ports before they are released because they do not know the machines. In addition, customs are very suspicious and want to clear every item in separation.

- *What do you do to avoid such challenges?*
  We had a lot of discussions on this issue. It was actually one of the issues that were raised in the last conference. You can avid challenges by forecasting and planning for the short and long run. To forecast a long time issue, you need to meet the operations' management to know the lifetime of machines. Then, you will have the capability to know when you will need an item. You can place the order for machines or spare parts in the right time. We do that especially for the critical items. We prepared the catalogues and planned agreements with suppliers to provide us with the items for a period of 10 years. This is one of the strategies we follow to avoid some barriers. Periodic maintenance is another strategy. ARAMCO has been doing this for a long time. Their problem is that they do not pay attention to minor issues. These minor problems influence the performance of major operations. For example, unavailability of a spare transformer for an electricity substation can cause a shut down to the whole substation and cause delays. ARAMCO used not to take care of such minor issues. Now, this has changed and they started to pay attention to all details.

- *Are there any other challenges that we have not discussed and that you find important?*
  It is great to find people studying SCM. I have been working on SCM for about 25 years. I have not seen field studies being conducted in SCM. I have not seen researchers surveying issues related to SCM. We need researchers like you study SCs. Such studies can help identify issues and deal with them. I would suggest doing a study that targets all SC managers in ARAMCO. A study like this can lead to major improvement in SC performance. If you target head SC management will get a lot of information because they have been working in the field before the concept of SCM emerged. Unfortunately, research is not getting enough attention. The company cares more about providing courses in SCM more than adopting field studies.

Interviewee: 10

Sector: Industry

Number of supervised employees: 30

Date: 27/07/15

- *How do you see the situation of SCM in Saudi Arabia?*
SCM is a new field in Saudi Arabia. I first heard about it being practiced in the country in 2010 or 2011. As far as I know University of Michigan was the first university to provide courses in SCM. Then, it started spread. SCM is still new in SA. The SCM software is great. It provides solutions to all our problems.

- *How do you compare it to the Western SCM?*
I have no experience with Western SCM. I read about the program and tried to enrol in University of Michigan. The university started the program and they provide the most difficult program.

- *In your opinion, what are the challenges facing higher performance of SCM in Saudi Arabia?*

Or

- *What challenges confront SCM performance in Saudi Arabia?*
First of all, lack of experience and lack of experts are the most important challenges. Basically, there are managers who work in similar positions like logistics, transportation and expedition. In the end of the day, they all work as SC managers. Productivity could be better if managers have SCM qualifications and if the manpower have training. Second, the nature of the relations between the SC partners, sellers, buyers, suppliers, couriers and warehouses is important. They are not linked through one information system. For example, in SA warehouses, purchasing and receivers use different information systems. This is one of the problems. We wish to have one information system throughout the SC with unified management. Then, the process will have to go through finding the supplier, placing the order, transporting the item, collection and confirmation of collection. This will be good for us but it is not available in SA as far as I know. I have not seen more than 1 or 2 managers with a position titled SC managers. I do not think applying SCM will face objection provided that it is well researched and organised. I read about SCM in details. I find it very close to what I am doing as an expediter manager. However, nobody came and proposed applying SCM to Nesma. If it was proposed to the company showing top management the gains from

applying such system they will accept it. Moreover, I recruited to KFUPM graduates but found out they were not well informed about SCM. Their qualification was SCM. They were not successful. They had a diploma from the university. It was clear that SCM education is very weak in SA.

Again, lack of experience is a main barrier to highly performing SC. It is clear that SCM trainers in SA are not that much qualified. That might have been caused by better conditions and offers provided to SC management in other countries. As I have seen, those who had some education and training were not up to the expectations.

- *Does any of the following aspects influence SCM performance:*
  - Culture
  I do not think culture can create a barrier. That is because we are in an open market. The country has international trade relations. Even with old trade traditions, change has to be done.
  - Organisational structure
  Contradictions can happen. For example, I supervise 30 employees. It would work as a barrier if I am doing my job properly and I cannot execute a proposed plan. The company has been doing business for 30 years. We are flexible in many ways. The accumulation of experience led to changes in, for example, the information system used in the organisation. This system enables tracking items from A to Z. It provides data starting from placing the request to a material until the item arrives and get approved. Mistakes can happen but they have to be dealt with. However, we do not have a specialised system for SCM.
  - Information sharing
  Sure it influences SCM performance. For example, I work as an expediter manager making sure items reach the end user. Sometimes delivery is direct to the end user. It does not have to go through stores or delivery systems. If there is no confirmation or communication of delivery, I will have to report to the supplier that this particular item was not delivered. This can happen after a day, a week or a month. They would rely that they have already delivered the item. This will show that I am not doing my job properly; I am not following with the site management or higher management will question my performance. This is one of the problems that can happen with misalignment. We have daily reports. There could be human mistakes if they did not report delivery. Another probability is that I made the mistake myself. I receive 100-400 emails a day. Sometimes I read the email but I forget about it. This influences performance.
  - Connectedness practices
  Every employee wants to finish their jobs. Why should I repeat jobs? Cooperation is required. Everyone wants to finish their work so they go to the next stage, order or job. Cooperation is a very important part in the SC. Cooperation can play a very importance role in increasing performance. Proper cooperation can lead high performance and poor

cooperation can lead to poor performance. This is dependent on personal performance as well. The company provided a system that helps all employees perform well. All communication methods are available like emails, telephones, mobiles and connection to the system. Employees are kept up to date. Performance has become personal with the availability of all facilities. All this can influence SCM performance in general.

- Purchase and supply polices

I do not think it should influence SCM. We have a list of suppliers. Purchasing standards are classified under three categories. First category is quality which is also classified under best quality, approved quality and acceptable quality. There are items that we use and others that we supply to clients. We always prefer acceptable quality. We buy cheap products that are made in China for certain purposes. We also buy used products with approved quality. Second, best delivery period. Third, best price. If, for example, I have the best price offered I will check the rest of purchasing standards. Decision is made depending on purchasing priorities.

Purchasing policies can create barriers when the purchasing has to go through one line. If you only have one source and there is no way to buy from other suppliers or if the purchasing approval was granted only to buy from a specific supplier then you have no options. For example, if you are buying air conditioners and the approved supplier is Zamil Air-conditions you have to go to them. Therefore, you have to accept Zamil's issues, payment, delivery and delay. All this influence performance.

- *In what way do challenges influence SC performance?*

    This goes back to individual performance. Every employee has a performance capability. However, as a SC manager you need to think how to solve problems; how to update the management process or you need to communicate with suppliers about issues. You need to communicate with buyers, suppliers and higher management. You have to find a way to solve problems. This depends on how you act. Some problems can be solved via good relations. Sometimes you have to go to your management. Sometimes you have to go to the supplier's management or you may need to reach the business owner, GM or whoever entitled to solve the problem. Finally, it depends on the SC manager.

- *Are these challenges specific to one sector?*

    No, it is the whole organisation is involved in the SC. However, not all organisations face typically the same challenges. A supply chain of dairy factory is different from the supply chain of an eclectic generating company. A dairy factory usually produces locally and faces distribution issues or manpower problems while an electric generator will need to import equipments. This is because most of needed material is not manufactured in SA. There are assembly factories. Some of them partially manufacture but most of the products are imported. Therefore, every sector is different from the other. Oil companies mostly buy items that are readily made and have specific descriptions. Their spare part list is ready. Once a specific part is used they order a replacement.

- *In your opinion, what challenges are considered to be the most important to SC performance?*
  Lack of knowledge and experience on SCM is the highest barrier to its performance. Most of what I do myself is SC and I do not have full information about SCM.
- *Who imposes these challenges on the SC?*
  No, there is no specific person or entity to blame for barriers. It is only conflict of interests. I know Almarai has a SC in which they are successful. If I am not mistaken, I think success of SCs depends on the organisational structure of the company. ie whether it is managed directly by the owner or by board of management.
- *What do you do to avoid such challenges?*
  We do nothing. There is a very strong information system in the company that we use. You can track orders in a timely manner whether the item is a small pen or heavy equipment. I can see where the order is and get detailed information about the product. We have lots of options like changing expediters or allowing other employees to do the job. It is easy. A few months ago, an expediter failed and we took his place and solved the problem. The information system that we have provides detailed and complete information.
- *Are there any other challenges that we have not discussed and that you find important?*
  That is everything I have to say.

Interviewee: 11

Sector: Petrochemicals

Number of supervised employees: 15

Date: 14/12/15

- *How do you see the situation of SCM in Saudi Arabia?*
  It is improving but one of the most important problems is not using information systems like SAP or Oracle. That applies to Aramco in some divisions. Such issues slow the SC or result in transferring inaccurate data.
- *How do you compare it to the Western SCM?*
  SCM in SA is way behind. Well, there are some companies that try to catch up like Aramco and Sabic and others. They are trying to improve their systems and provide training. I worked with Sdara for some time and I had training in Europe for six weeks. I mean they are trying but still SCM in SA is behind as compared to it in the West. This is

because using systems is more accurate, faster, and easier for tracking and finding information in general. It is also better for making transactions and other financial issues.

- *In your opinion, what are the challenges facing higher performance of SCM in Saudi Arabia?*

Or

- *What challenges confront SCM performance in Saudi Arabia?*

Finding the right talent is one of the biggest problems in SA. By this I mean it is not easy to find the trained and educated people to work with. The problem is that those who work in SCs are either engineers or marketing people who are not specialised in SCM with work experience. You rarely find people who are specialised in SCM which is one of the big challenges. The other challenge is finding people who work on the systems which provide accurate information for prediction and visibility.

- *Which sectors are most affected by these challenges?*
  I am talking in general. However, in the chemical sector it is more difficult because people in this field already have certificates and training on explosives, dangerous goods, temperature control where such material needs special care in transportation and storage. Food products are another example of goods that need specialised people to handle them. The more the SC requires technical support the more difficult to find the right specialists.
- *Is there a specific time of the year at which these challenges peak?*
  Yes, of course. One of the challenges is that in Jeddah they find explosives or infectious material which causes delays to the SC. In Ramadan and the holidays the government sectors gets delayed. This is very clear in Ramadan because they only work for few hours and leave. This is not only a concern for the SCs. Ramadan season is a real big challenge in Saudi Arabia. The other challenge here is the difference in the weekend. Now, the weekend in SA is Friday and Saturday while it is Saturday and Sunday in the rest of the world. Therefore, on Friday people in SA cannot report to people outside the country. On Sunday they work in SA but others still in the weekend. This adds two days to the weekend when dealing with the international market. One suggestion around it is to have some people work on Fridays and some work on Sundays.
- *Does any of the following aspects influence SCM performance:*
  - Culture
  There is a problem we face related to culture which is the holidays that are different than those in the rest of the world. In Ramadan as well, people do not really work as hard and efficient. The other issue is the prayers times when employees take time off to go for prayer. However, we try to deal with it by putting all that in consideration when estimating required time. By this I mean when we think a job of custom clearance requires an hour, for example, we give it four hours. In the lunch break, employees leave for two hours instead of one hour to do their prayer and have lunch.
  - Organisational structure
  It can vary regarding to how the company perceives the SC. Some companies give the SC a secondary priority while other companies put it in the top of their lists. They know that having on time delivery needs an accurate SC. So, they give importance to the SC. Such

companies give more focus to sales. Sales department may give promises to deliver in a certain time. Sometimes they can make it and some other times they cannot. This causes conflict between the customers and the sales department.

- Information sharing

Such problem can happen with the service providers. When you need more visibility on delivery and shipment this issue might be a concern. With the information systems this issue can be overcome.

- Connectedness practices

This is a very good point because sometimes you work with a company that has SAP while the logistics provider does not have it. This makes communication and sharing information difficult specially if it is via emails and excel sheets. This makes communication more complicated and causes delays. When there is good communication, people can deal with issues anyway by creating solutions. Let's say we have SAP we can agree with our partners to do excel sheets which are easier to upload to SAP. But if the partners are not willing to cooperate in that regard then doing the work manually can be hard, time consuming and inefficient.

- Purchase and supply polices

Here the alignment is very important. Purchasing strategy needs to align with the company's policy in general. This is to say that it is important that the SC department and the sales department need to agree on how they want to do. If the sales department want to sell from location or industry and the SC department decides differently problems will arise. It is important that they agree on one strategy. In the end, you do not want to keep inventory. So, you need to let the sales people know what you want and make it clear to them. For example, when you have a lot of stock and you want to sell it in the market you might need to let the sales people know about it. Here it is very important to communicate with the sales about your plans for each month wither you want to accumulate stocks or you want to clear the stores. If every department works separately where the marketing, sales, SCM there will be lots of conflicts.

In what way do challenges influence SC performance?

As I said infections may cause delays and damages to delivered products.

- *Do they contribute in raising the cost of the SC?*
  There is no doubt these challenges can increase the SC cost. Sometimes you may find ways around the challenges and avoid them but sometimes you cannot change things. For example, you cannot change the process with the customs. We just try to push them. We ask them to improve their process. We might give them suggestions to help them improve their process but in the end we cannot change it and it is very minimal what you can provide to the ports management.

- *Are these challenges specific to one sector?*
  They are not specific to one sector. These barriers are general.

  - *In your opinion, what challenges are considered to be the most important to SC performance?*

Lack of systems or lack of qualified people to run the system is the biggest challenge the SC faces. This is because the existence of systems makes managing the SC much smoother and easier. It helps the SC management to analyse and predict.

- *Who imposes these challenges on the SC?*
  You cannot blame only one party. There are delays in imports and in the customs. You can also improve your organisation and then look at the external factors.

- *What do you do to avoid such challenges?*
  To be honest, you cannot avoid these challenges. For example, you have to recruit expatriates. Let's say, you have 20 trucks. You cannot recruit locals to drive them. They do not want to drive. They want very high salaries as compared to expats. Therefore, you will need to recruit expats which takes time and effort. Then, you will have to deal with the lengthy process of the Labour Ministry. This is one issue that you cannot escape.

- *Are there any other challenges that we have not discussed and that you find important?*
  This is all in my mind for the time being.

Interviewee: 12

Sector: Education

Number of supervised employees: not applicable

Date: 02/02/16

- *How do you see the situation of SCM in Saudi Arabia?*
  That is a good question. I see we are behind in terms of the SC and specifically in the field of the SC. As you know the SC is a network with concepts of planning; sourcing and procurement; warehouse management; inventory management or control; logistics; transportation and distribution; and the most important thing is SRM which is supplier relationship management; and QMS quality management systems within the supply chain itself. We are behind in all these areas. I think this is because we do not have that much planning especially in our SC operations. I am talking about manufacturing because I come from the manufacturing field. There is no correlation between demand planning and supply planning. The other thing is the infrastructure for our transport is not really up to the international standards. The country is doing a great job for the infrastructure but we are not there yet. There are ambitious plans going forward especially from the Ministry of Commerce and Industry for improving logistics within the industrial zones. For example, custom clearance does not have to be done at the port. Goods can be moved to the industrial city and the clearance process can be done there. Meaning that why companies have to do the clearance process in the port rather than do it in the industrial city? This is a

very good move towards improving our SC operations. The other thing here is our storing operations are behind. The PCL is not mature. There are not companies specialised in the PCL. I am talking about warehouse management. I mean from the SCM perspective we have a long way to go. I think I should have started my statement with this: SC in SA today is a growing industry. It is very, very promising. The country is leading the SC towards the future. I like your statement in the beginning about barriers. We have challenges. One of the most important challenges we face in SC today is human resources and education. Today, we do not have universities that grant students degrees in SCM and procurement.

- *In your opinion, what are the challenges facing higher performance of SCM in Saudi Arabia?*

Or

- *What challenges confront SCM performance in Saudi Arabia?*
  Number one is human resources. I mean, development of the human resources is one of the major challenges today. Awareness of investors to the importance of SC to their organisations is another challenge. SC is not really given important consideration by managers within their organisation. Therefore, we need to have that awareness among decision makers in the private sector. The other thing I consider as a challenge is the infrastructure. It is not up to the international standards. We are behind to be honest with you. One of the most important transport methods in Europe is the train. It is taking a huge magnitude of moving products from one place to another. In SA we do not have efficient trains. The train that we have is only from Dammam to Riyadh. It does not move products everywhere around the country. Therefore, the infrastructure needs to be actually looked at. Saudi Arabia Railroads (SAR) is committed to connect all the cities to the port to move products in their containers. This needs time. How can we keep trucks off the roads and leave them for domestic transport? One of the challenges that I can see today is speciality non-existence of specialised SC service providers. There are no specialised companies in SCM. As a company, I should not really be having a SC department. I should outsource it. Today we do not have that profession. Why companies have their own SC? Why wouldn't they outsource it and focus their effort and sources to core business? Retail business is not really depending on outsourcing companies. Thankfully, one of the things we have here in SA is that the government is giving so much attention to the SMEs. They were not actually taken care of by different players like large companies, investors and the government. They are left behind. As you know majority of the countries' economies is dependent on the SMEs. For example, in the US 98% of their GDP comes from SMEs. In SA we barely can reach 15% or 18%. However, recently SMEs are being looked after by the Small and Medium Size Enterprise Authority. This Authority will be supporting the small and medium investors. I believe the SC area is good for small investors to invest their money in the supply chain.

- *Does any of the following aspects influence SCM performance:*
  - Culture

  Culture can work as a barrier. When I say the word culture I mean the mentality in managing the SC in SA. People here do not manage it with the same mentality of Westerners. I am not talking about the people's habits and life. Mentality of managing the

SC in SA can work as a barrier within the culture. This is actually my interpretation to culture becoming a barrier to improving the SC.

- Organisational structure

Definitely, this is one of the main barriers today. Look at the organisation of SC what do they do? Everybody works separately. They are not integrated. SC in the organisation's structure needs to be integrated. It must be integrated to give you the maximum performance. You have people who do not talk to each other. You see the planning working at their own. Sourcing and funding working at their own. Warehouses are not talking to the planning and they are not talking to purchasing. This is why they are having issues in the organisation. When I do consultation with companies I find most of their problems coming from the organisational structure. Their problems come from their methods of managing the organisation. Everybody is working in separation.

- Information sharing

The barrier of sharing information within the organisation itself comes from improper organisational planning. There is actually no integration within the information centre of the information. People do not use automated systems. They do not use Enterprise Resource Planning (ERP) where all information is gathered in one platform which is the ERP. For people like planning and purchasing if they want information it takes days. You know why? Because they have the information system in reality but they are not utilizing it. If they utilise it they will do for clerical purpose. It is not really done for analytical purpose and decision making objectives. Therefore sharing information is a barrier due to non-utilisation of automation systems. Some companies have the information systems but unfortunately they use them only for clerical purpose.

Sharing information outside the organisation: companies tend to not share information with outsiders. They think about confidentiality. They do not really realise that sharing information will help them. Today, for example there are very weak Supply Relation Management (SRM) practices in SA. I am talking about all sectors including manufacturing, health ... etc, you name it. All the sectors are included in this. Everybody is scared to give information or to send information out and that is really a barrier today if you are thinking sharing information with others.

- Connectedness practices

Let's take one of the main pillars of the SC which is sourcing materials or services. Majority of the companies in SA tend to do their sourcing the classical way depending on hit and run bases and models. They do not use strategic sourcing. They do not collaborate with their suppliers. Whenever they work with a supplier they think the supplier is an enemy. They never think of the supplier as their soldier. I mean, the supplier and the customer should be in the same boat. If something happened to that boat, both of them will sink. This thinking is not there today, unfortunately. When the customer negotiates with the supplier they act like being in a battle where each one wants to kill the other. This is the mentality today in sourcing. The best sourcing practice today is that you

merge with your supplier. When I say merge I mean you become like a one unit. If you lose he loses and if you wine he wins. This mentality is not heir yet.

- Purchase and supply polices

By the way the policy can feed into the benefit of the organisation. The policy is not a constitution. As a decision maker I should change my policies to the interest of my company. If my policy is making me not benefit from my supplier I should change my policy to make benefit. Here is an example. AlMarai is a live example. We did it in AlMarai. We had a purchasing open policy with our packaging supplier in SA. It is an open book policy which means that you are sharing the information of your cost with your supplier. The price the supplier puts on us we work it together with the supplier. We do not allow him to do it alone. What do we have in the price? Three things as you know. We have fixed cost, variable cost and margin, profit. So, the fixed cost will be worked together to fix it. We sat down sat down with them and negotiated to fix the cost at a certain rate. The variable, he can't control, I can't control. The customer can't control it not the supplier can control it. It is the market that controls prices of the raw material. For example, prices of copper, aluminium or paper are driven by the market, not me or the supplier. We have actually to give what the market asks. So, we do not control it. We have a weekly meeting to review the market price and we will apply it to the formula. We have a formula by the way that we have established and we review it every week. We use it to set up the prices. We negotiate with our suppliers at a clear contract margin. This is the strategic thinking we are talking about. Now, we are thinking strategic. We work on five or ten year not only for few months. The reason I am bringing this here is because we are talking about policies. AlMarai changed their policy because of the benefit or the interest of AlMarai.

- *In what way they influence the performance of SCM?*
  Definitely, if the company does not work strategically with their supplier that will cause delay and interruption in the supply or the production. This is caused by loss of opportunity in the market. If you cut off your product from the market what will happen? You lose that opportunity. You can't sell it. Somebody else will take the market share from you. All of this is a consequence of not being able to supply in the market. Where is this coming from? It is coming from SC barriers. The SC barriers arise from not really working in a strategic methodology. Now, look at the supplier if he works with you in a strategic methodology what will happen? First of all, the supply will be GIT just in time. Meaning, you do not have to carry inventory. The supplier will supply you as you need it. Second, you can go on a consignment stock. Consignment stock arrangement means if you have part, material or MROs that you need in your factory; for your operations ; or in the hospital an in pharmaceuticals if you have good relations with your supplier you will be having a consignment contract. In the consignment agreement the stock does not come into your book as a company. It doesn't really appear in your financial statement until you use them. So, even though you have them physically in your store but they belong to the supplier. They are not actually in your financial statement yet. They will be in your financial statement when you start using them. So, if the material is in your store that

doesn't mean they are yours. They belong to the supplier. As a beneficiary company, you carry the material in your store but the material does not belong to you. It belongs to the supplier. This strategy will drastically reduce your cost. What cost will be reduced? Working capital will be much less, why? This material doesn't belong to you. They don't go into your financial statement. So, you are having less cost in inventory. Another thing I would like to mention here. If you are using VMI, vender management inventory your supplier is managing your inventory. You outsource your inventory. Meaning that, when your inventory goes down the supplier will bring it up to desired level for you. How can you use VMI without having a good and utilised information system at the level of B to B? VMI is a tool or a methodology which can reduce the cost of your inventory. Consignment is another strategy. What does reducing inventory mean? It means less working capital and less storage cost.

- *Are these challenges specific to one sector?*
  The challenges of SCM face all sectors but they influence manufacturing and retail sectors because these sectors are heavily dependent on the SC.
  - *In your opinion, what challenges are considered to be the most important to SC performance?*
    I think the most sever challenge is the human resource development.
- *Who imposes these challenges on the SC?*
  There is nothing that can impose challenges. It is all about the results of practice. By this I mean, in SA there are practices that impose these challenges.
- *What do you do to avoid such challenges?*
  One of the areas that is important to every organisation in avoiding challenges is by creating a risk management team. This team will be responsible for identifying the areas of risk or challenges. Then they should start doing risk mitigation plan. This team has to be supported by the top management of the organisation. Meaning, the top of the pyramid of the organisation should lead that team. I am talking about individual companies. Now, if you are talking about the government level I believe we need to have SC transformation projects.
- *Are there any other challenges that we have not discussed and that you find important?*
  I think each decision maker in the organisation should take awareness courses about the importance of SCM in their organisation. The second, I agree that we need to have a very good educational infrastructure for SCM in SA.

Interviewee: 13

Sector: Logistics and port clearance

Number of supervised employees: 0

Date: 16/11/15

- *How do you see the situation of SCM in Saudi Arabia?*
  I can see that SCM is attracting a lot of attention nowadays. Most companies are now looking at SCM practices but in different ways and with the use of different technologies.
- *How do you compare it to the Western SCM?*
  As a matter of fact, SCM in the West is more advanced as compared to it in the Middle East. Western countries support the automation systems while in SA there is a minimum support for the automation systems which causes relatively higher cost on them. Large companies are more advanced in SCM like Almarai and AlSafi that need fast moving solutions.
- *In your opinion, what are the challenges facing higher performance of SCM in Saudi Arabia?*

Or

- *What challenges confront SCM performance in Saudi Arabia?*
I would say there are no real barriers on the time being because the workforce is heap. Everything is available and most work is covered by the available workforce.

- *Does any of the following aspects influence SCM performance:*
  - Culture
  Well, from a cultural perspective SCM is perceived differently. Awareness about SCM is not equal for all people in the country. Not all individual have a real understanding of what SCM is. In the surrounding work culture SCM is known as the process of carrying, transporting, storing, time management and source management that work to deliver goods to the final consumer. In reality SCM is not only this. It is more about the interconnection between all sectors that contribute in presenting the product to the market; a process that includes feedback and reverse logistics. However, culture as a culture does not create a barrier because the SC is all about the people within that culture. Those people are the ones who will buy the products provided through the SC. If there are professionals behind this product, then there are no concerns.
  - Organisational structure
  The influence of the organisational structure depends on the positioning of the SC within the organisation. If the SC is positioned immediately under the GM it will be hugely influenced by the GM. Other structures would designate separate SCM section that supervises divisions like sales and other core business divisions. I have seen different structures where SCM would be marginalised or put in the front. Structures are different from business sector to another. For example, food SCs are different than cargo SCs. The success of the SC is part of the companies' success. Strong companies like Samsung and Apple depend on very strong SCs in addition to focussing on the consumers' satisfaction. This gives an indication of how companies differ. Some companies started but couldn't continue without changing their policies and strategies with focus on SCM. This resulted

in them creating more revenue and profit. When we talk about SC we talk about all the stages the product passes. Some companies are strong and have special prices. The way they deal with supplies is not typical.

- Information sharing

Sharing information is vital to the success of SCs. Information has to be shared among the involved departments. The HR does not have anything to do with the production. It is an administrative section while the production is concerned with the processes and functions. Therefore, not willing to share information can create a barrier because every section within the organisation has a target. When everyone only focuses on meeting their section's target away from other section the overall target might be negatively influenced.

- Connectedness practices

If we talk about products, then we need to know what is needed to be shared with others either within the organisation or outside its borders. In the 50s the market was dominated by demand push and pull. At that time, factories used to produce and send to the market. Now, the end consumer demands products from the market.

- Purchase and supply polices

Of course, purchase and supply polices have an influence on the Supply Chain. This influence is certain when prices are variable because it will reflect on the profitability of the organisation. I suggest that long term contracts with fixed prices would be beneficial for the SC in the long run. In general, I do not see any policies that can create problems between the buyer and the seller. However, if an external factor got involved then problems might occur. I mean if the governments or the banks got involved they might create challenges.

- *In what way do challenges influence SC performance?*

  Competition is the largest challenge SCM may encounter. This happens when a larger competitor enters the market with better managerial experience, customer services and responsiveness. When the SC does not provide this to its customers they will shift to the other providers which will influence the SC's share in the market.

- *Are these challenges specific to one sector?*

  They are not specific to one sector. These barriers are general.

- *Who imposes these challenges on the SC?*

  There is no agency or organisation that imposes these challenges.

- *What do you do to avoid such challenges?*

  We act proactive. We investigate what we can do to avoid challenges. There are many case studies from which we learned a lot.

- *Are there any other challenges that we have not discussed and that you find important?*

  The increase in production cost can influence the markets like what happened in the last few years. That caused increase in the prices creating many problems for the SC. The size of the company plays a big role here. For example, a company with 30 employees of which 20 drivers is different than a company with 5000 employees including 1500 drivers.

The cost is on the 3500 employees as compared to the 10 employees in the other company.

Interviewee: 14

Sector: Telecommunication

Number of supervised employees:

Date: 07/10/15

- *In your opinion, what are the challenges facing higher performance of SCM in Saudi Arabia?*

Or

- *What challenges confront SCM performance in Saudi Arabia?*
  One of the main challenges facing SCM in Saudi Arabia is acquiring pre authorization of entry to some goods. Pre authorizations prevent delay of custom clearance. It is especially important to acquire pre authorization from the Communications and Information Technology Commission (CITC). There are many devices, SIM cards, recharge cards, microwave and telecommunication devices that are required to be pre authorised by the CITC before they can be cleared in the customs. This is one of the biggest challenges we face. Other than that if we have the pre authorizations our shipments get cleared easily. The challenge here is that you cannot get the authorization providing a purchase order document. For example, if I am going to buy a million SIM card the PO goes to the exporter. In fact they would not send the million SIM cards in one shipment. They will be sending shipments with 200000 or 300000 each. What I wish is the CITC would issue an authorization for the whole amount of the PO at once. Provided that I give them all needed information like the shipments and specifications of the imported items. It is very unfortunate that we cannot get pre authorizations on PO. We only get authorizations on every partial arrival. For instance, if the exporter is going to send 5 shipments I will need to acquire 5 separate authorizations. This is one of the biggest challenges that delay delivery and make it complicated. For every single shipment you need to attach the shipment policy, certificate of origin and original copies of the receipts. Each entry authorization takes 8 to 14 days. This is something we do repeatedly. The first time we apply for authorization it takes 14 day. Why do I have to repeat the same process for the same items? What is strange here is that they do not actually take samples for test. They only take the attached documents. So, why do they do all this complication in the process? I can see it is only a routine rather than an investigation process to know about the specifications of imported products. This is what I have experience during the last 8 years working in this field. One of the challenges we face recently is proving a proof of payment

310

method. It has now become a big challenge for many importers. Some importers pay upon receipt of shipments and others pay after installation of received products. In projects, we do not pay before certain stages of the project. For example, if we are installing a telecommunication equipment in the middle of the Empty Quarter we are not going to pay the importer before the equipment is installed, operated tested and approved. The inclusion of installation in the contract makes not possible to provide a proof of payment before installation which requires entry authorization. This makes things complicated. The original company cannot ship the products under their names. They have to send it under the name of Zain. The company cannot provide a proof of payment because they have not paid then.

- *Does any of the following aspects influence SCM performance:*
  - *Culture*

  Of course, there are some people who think the SC is only about a store where you dump inventory. They do not know that there are lots of chains that precede storing items. This includes import, product collection, demand planning, order fulfilment, cargo, trade management and inbound operations. When the product arrives in the store there is inventory management, internal order fulfilment, sales orders and distribution. Some people do not have this knowledge about SCM. They do not have any information about reverse management as well. They think it is easy to reverse manage products with no problems of inventory, finance and import. They do not have enough knowledge about the complete product cycle.

  - Organisational structure

  OS can make managing the SC easier or harder. This depends on where the SC chain is situated within it. If the SC is placed under procurement or finance it will be much easier to operate. However, if it is placed under sales the SC will be so much complicated. There are many organisations that put logistics under sales and procurement under finance. This causes them not be well integrated. The SC needs to be well integrated. This means the procurement, contracting, logistics, warehouse operations should all be under one department manager. This is to ensure a synergy between these divisions. This appears in contracting for example. There needs to be a well informed and solid contracting strategy that integrates all the relevant divisions. The procurement division will do the product acquirement. The logistics division do trade management, trade consolidation, custom clearance, distribution and warehouse operations. If all these divisions are under one SC manager they will be well synergised. I worked in some companies that put procurement totally in separation of logistics. They place procurement under finance and logistics under sales. They think logistics have to align with sales supply and demand. This can work when the products are already available. But if there is no clear forecast and purchase planning that will create difficulties. In a nut shell, the SC divisions should not be placed under different departments. From my own experience, when the procurement, contracting, logistics and warehouse operations are under the same director they will definitely deliver a better SC results. If they are under separate departments then you will have to deal with different people who may have different

interests. The sales, for example, would want to leave inventory open until the last day of the month to sell while the finance would want the store closed on the 28th to count inventory.

- Information sharing

To be honest, I don't agree with transparency and openness under no conditions. There are things that you shouldn't be sharing. However, transparency is required among the people, the suppliers and the vendors. You have to play the role of partnership. So if you see your employees, your vendors, your suppliers and your clients as part of your community then transparency is part of the job. However, if as part of transparency I have to show you my quotes and my codes I do not think this is doing business.

- Connectedness practices

If there is no cooperation and no information sharing there will certainly be a barrier. There has to be clear processes with precise guidelines to streamline the whole supply chain with all partners. This includes cooperating in solving problems and helping partners overcome obstacles.

- Purchase and supply polices

If you set buying guidelines that is something that needs to be agreed upon in all the organisation's departments. This includes the sales, marketing and finance that should all agree on that guideline. They have to put a strategy on how much they hold in inventory, number of turns and number of units to be kept. They need to set minimum and maximum inventory. With the clear guidelines and category of products things are easier. For example, if you have a stock that is enough for 90 day why would you buy more? It is not a matter of buying for the sake of it.

In what way they influence the performance of SCM?

If there is no governance model that governs all process and procedures that influence the production of the company it will make very difficult. For example, in a large country like Saudi Arabia there is no sufficient transportation system. If you have to build your own it will be expensive. There are challenges to deliver first class SC. The challenges differ for different organisations. For our company we only import original products that align with the regulations of the country. That includes attaining required official paperwork. The problem is that I deal with scratch SIM cards. In some occasions, we have inventory of 800 million cards which have a value of around one SR billion. There is no bank in the country except for the central bank that holds this amount of cash in their premises. These cards act like cash. Each card has a value of money on them like SR 5, 10, 20 or 50. I have problems in moving these cards. Not any shipper will deliver such products. This requires specific contracts with high risk which includes insurance and other issues with the shippers. They refuse to insure the whole value of the very expensive SIM cards. To ensure the flue of supply I need to move cards with value of about SR20 million daily. Cargo companies only accept liability of the manufacturing value of the card and not the cash value that it has. They carry the cards for SR3000-4000 while I have to deal with all the other risks like theft and organised terrorism. If the insurance company knows exactly about the real value of the cargo they would either refuse to insure it or the insurance rate will extremely increase resulting in loss of profit. If I want everything covered in the

insurance then I would not make proper profit as I make marginal profit from each card. This is because we depend on the volume of sale and not on individual sales. Transactions profit is only 2-3% and if the transportation insurance will take good part of it then profitability will go down. Without inclusive and synchronised contracts with sales, insurance, finance, sales strategy and payment strategy I would not be able to function. This is one of the difficulties we face in what we do.

- *Are these challenges specific to one sector?*

  These problems are not specific to telecommunication. I know there are similar problems with bringing food products in the country.

  - *In your opinion, what challenges are considered to be the most important to SC performance?*

    Distribution is the highest challenge we face. Not to mention the infrastructure issues. They are issues that appear only upon installation. But the permanent challenge is the operational challenge. This includes the wide variety of products I need to deliver like phones, prepaid SIM cards, bill pay SIM cards and many other products. For example, the phones we sell are minimum SR 700. I have to move thousands of them from city to city or store to another. That is because there is no price protection on such electronics. Their prices drop unexpectedly whenever a new technology emerges. There is another problem with moving these valuable products is that regardless their high value they are not moved by money moving companies that have better protection. In the banks and supermarket the money moving companies bring shield vehicles to move a cash of SR 1 million while I move much more valuable products in trucks that are not well protected.

- *Who imposes these challenges on the SC?*

  There is no specific authority that is responsible for the barriers. However, there problem is the misalignment between the governmental authorities in the country. They act in separation. For example, King Khaled Airport in Riyadh is one of the best airports in SA in dealing with our items. However, King Abdulaziz port in Jeddah is one of the worst ports in SA. Sometimes they require paperwork that is not required in any other port in the country. The ports in SA have general agreement on the requirements of entry to products but they still have a problem with the details. The same items require different paperwork in the different ports. This is one of the challenges that face us and other organisations. The second challenge is that the CITC is the authority that gives the authorization to our imported items. They issue the authorization and have sent to the Ministry of Finance which is responsible for the ports. Therefore, we have to track the paperwork in the Ministry of Finance until the authorization is sent to the specific port or point of entry. You have to go through all that bureaucratic process that only causes confusion and waste of time. Integration systems are available but they are not really utilised. The problem is that you need to deal with different official authorities that are not well integrated and not similarly motivated to work. Another issue includes having to acquire authorization from different agencies for the same product. This is more complicated in the food industry. I worked in Canada with no complications in importing food products like we have in SA.

- *What do you do to avoid such challenges?*

313

There are two levels of challenges. One is within the organisation itself and needs to be managed internally by clear processes to connect the different functions and departments. There needs to be a KPI set to measure performance. There also needs to be a clear SLA agreement between all involved parties. This results in setting a governing policy to all the processes which makes it easy to measure performance. Setting clear measures helps knowing how long a process needs to be done. There also needs to by synchronization, synergy and harmony in a governance model that is inclusive to a KPI, processes and SLAs. This is for the internal streamline management. On the external side, I hope that the government clearly strategy of the needs of the country. SA is a big country and the number of trucks is not enough. The situation of investment section is not clear. To the best on my knowledge, the Saudi Arabian General Investment Authority has not attracted investments as expected. There needs to be successful investments in transportation, storing and other strategic sectors. It is necessary to focus on talented workforce not only on the number of Saudi employees in the company. I am not against Saudization. It is important that Saudi nationals take over their share in the work market. However, some types of work do not attract Saudi nationals. For example, when I need 3000 truck operators I can find that there are no enough licences for truck operating in the whole country. Their problem is that there is no enough labour to do the work and the government restricts employing expatriates. Therefore, we need a thorough scan to the needs of the country in investment. The electronic government needs to be well utilised and prioritised in order to ensure integration and connectivity. The integration of e-government and e-systems will help the supply chain. Saudi Arabia is a big country and encounters a problem in moving medicine or blood. In a very hot weather there needs to be a well-developed and safe cargo system for such products.

- *Are there any other challenges that we have not discussed and that you find important?*
  I hope I added something to you. All I said is out of my experience and I think working in Saudi Arabia is better than doing business in anywhere else. We would love to see improvement in all sectors of the country. If you find you needed to ask more questions, feel free to contact me again.

Interviewee: 15

Sector: Electrics

Number of supervised employees: 5

Date: 13/01/16

- *How do you see the situation of SCM in Saudi Arabia?*
  In general, SCM in Saudi Arabia is not well established. Sometimes we find ourselves forced to buy less quality products only because they have a certified agent the country. In many cases the agents are not leading good business like Bridgestone and Michelin. I wanted to buy tyres from Michelin but they only had the old ones from 2014. Some other times you order a product but you cannot find it. There are only limited options. This forces buying less quality products that provide better after sale services like warranty. In managing projects we assume that the product will need maintenance so we look for those who provide such service. If we talk about cars we know that many drivers will use it which can create a higher chance of default in the car. Whatever the quality of the car it will not stay in a good condition it is used by many drivers and it will need fixing. We tried different cars but they were not good options. Therefore, we had to deal with only one make because the agent is cooperative.
- *How do you compare it to the Western SCM?*
  The Saudi market is a consuming market. Pick any product, start a company and you will find buyers. Pricing does not change in Saudi Arabia. For example, Nike products can keep their prices for five years even if new models come to the market. In other markets you find discounts up to 50% or more. That is not applicable to the Saudi market. Monopoly is a big issue with low quality. You can hardly find high quality products in the Saudi market with fair prices.
- *In your opinion, what are the challenges facing higher performance of SCM in Saudi Arabia?*

Or

- *What challenges confront SCM performance in Saudi Arabia?*
  High prices bring a big challenge to the SC. For example, air conditioning is very expensive. The Freon gas is constantly witnessing increased prices. We try to hedge its price but the suppliers will only give a quotation that expires in two days. In other countries you can contract such things. The problem in SA is that even if they give a quotation they might change it within the given time period. Prices are not fair in SA. You can find the same product with cheaper prices in the neighbouring countries like Bahrain and the UAE.
- *Which sectors are most affected by these challenges?*
  Projects sector is the sector that is affected the most. There is a company that contracted with ARAMCO to do a maintenance project for SR 1 million but it cost them SR 1100000. That is because they imported the spare parts from the US. We needed a fuse that is 500 amber but we could not find it in SA. The highest we found was 350 amber and it did not meet the specifications that we need. Therefore, I had to order it from Dubai. Such things cost a lot. I think any project is 60% purchase.
- *Is there a specific time of the year at which these challenges peak?*
  Sometimes companies accumulate high stock from a product that they anticipate will witness high demand as a result of coming projects. For example, El Saif knows there will be demand on some electrical tool and buys big amounts of it causing the prices to increase. There is not specific time of the year when there is increase in the challenges. In

the past, expats used to go to their home countries causing drop in demand in the summer but now with the conflicts in the Arab countries they prefer to remain in SA. Therefore, there is no difference now in demand between seasons.

- *Does any of the following aspects influence SCM performance:*
  - *Culture*

  For sure they influence it. For example, people buy their new clothes for Eid the night before it comes. Another example is at the lunch time where you find many people queuing on restaurants. When you go to the restaurant just after that time you will find it easy to buy. This allows sellers to sell low quality products because people will buy anyway as opposed to the dinner time where people are not in a hurry. They will question the food supplier which is the restaurant and demand quality food and service. In other sectors like the electronics when there are discount offers. You find the crowds in specific shops that provide the discounted products from first day. They can go the next day as the offers will remain in the shops but people will always want to go from the beginning. This results in having the shops not really offer value discounts.

  - Organisational structure

  We face this in our organisation. Orders to supply items often come in the end of the week. The problem is in many times we are asked to make them available the same day when many shops are closed. The sales person will not spend more of their time at work to have this order finished. For this reason I had to create personal relationships with sales people so I can ask them do such favours. This relation includes going with them for dinner and exchanging personal phone numbers to strengthen the relationship. Exchanging favours eases some of the tension and helps making things happen. The problem here is that top management people do not know about such complications. That is because some of them are expats.

  - Information sharing

  For this we have sales people who search the market for products, samples and prices. This goes into a database to keep record of them. Some companies do not give samples that are usually cheap as compared to the quantity we propose to buy. Other companies refuse to give information or give inaccurate data about their stock from the product.

  - Connectedness practices

  I think this is an important issue. I have been living in SA for 22 years. This enabled me to know the people much more. That includes taking an informed guess wither this buyer is honest or not. I can guess if this supplier has the items at hand or he will buy it from another supplier. The problem sometimes is that higher management interferes in what you do as a SC manager. This happened when I had an agreement with a supplier and my manager interfered and made payment of a higher price without letting me know. This caused in losing so much money in that transaction alone. The consequence is that top management changed this manager.

  - Purchase and supply polices

For sure policies have big influence. This applies to our company where we only have limited cash. Most traders like cash and give advantages to who pays in cash. They are afraid of checks because of their complications resulting of not fulfilling payments. In some cases suppliers give discounts up to 25 % in favour of receiving cash payment. Sometimes it is not understandable how they make profit this way but it is good for buyers who want to save money in their transactions. I have been doing this and saving lots of money. Some other companies do the same thing. For example, Saudi Oger follows the same purchasing policy. They give their supply chain managers cash flow of SR100000 and leave it with him until it is time he clears his accounts. Not having that cash flow can delay supply of some products as suppliers want to have their money in cash or the price will be more expensive. Wiring money between banks as a means of transaction is time consuming and suitable for urgent purchases. It takes 5-6 days not including the weekend. This results in project management complaining about slow supply by SC section.

-In what way they influence the performance of SCM?

There are lots of thoughts to ease supply chain processes. You cannot do business by the book. There are lots of give and takes in the process. People do not learn it in schools. It is gained via talent and experience. You find some academics that come from a different culture and want things done precisely a certain way. There is no standardised way of conducting business. The problem is that people mix up specializations and responsibilities. Another issue is that higher management does not listen to SC management in what we suggest.

- *In your opinion, what challenges are considered to be the most important to SC performance?*

  One of the main challenges is the high prices of products and their rapid change. For example, prices of car batteries have increased up to SR 100. I used to buy batteries for SR 200 and now the lowest price is SR 250. If you want a battery that lasts you would have to pay SR 400. The other issue is not having enough knowledge about products. A good example of this is that some companies have plants in Germany, Romania and China. They make the same products with different qualities. This results in variations in the price. So, it is easy to get tricked by such issues. Many people think that by only knowing the prices they master purchasing. Some suppliers bring products to their projects that are not high quality and they have to dumb them in a shorter time frame. They go back to buy new ones again. When you suggest to them to buy high quality products it appears that they believe they are saving by doing that.

- *Who imposes these challenges on the SC?*

  Accounts and finance are main cause of difficulties to our SC.

- *What do you do to avoid such challenges?*

  Most of the time I pay from my own account to avoid problems. I get paid later but I do that to avoid delays and problems with suppliers. I know that I will be paid eventually but doing this I save myself time and hardship. In some occasions the higher management does not listen to my suggestions and end up paying more. This happened when they

wanted to buy 10 buses. I told them to act and buy them for the given price but they waited until the end of the week having to pay more SR 3000 for each bus.

- *Are there any other challenges that we have not discussed and that you find important?*

Taking purchasing lightly is another problem. Projects depend heavily on purchasing and the supply of items. The problem is that many organisations do not pay enough consideration to it.